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# THE POLITICAL ECOLOGY OF ENVIRONMENTAL HAZARDS IN ACCRA, GHANA

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**Abstract**

The paper explored how governmental policies influence human vulnerability to environmental hazards. The main objective was to examine how economic and political processes impact on the choices households and communities make to mitigate flood hazards. The units of analysis were the household and community. Both qualitative and quantitative data were collected and analyzed. The analysis shows the implementation of some development strategies, its consequential environmental degradation, and the marginalization of some groups increased the impact of disasters. Also, disaster impact has increased because of the lack of consistent government policy on vulnerability reduction. Furthermore, the analysis revealed a lack of flexibility of social networks to assist households in the aftermath of floods. The paper concludes that much of Accra's current land use patterns and socio-economic characteristics can be traced to the past. Failure to address the problems rooted in history has limited householder and community options for reducing vulnerability to environmental hazards.

**Keywords:** Floods, Disasters, Vulnerability, Political Ecology, Ghana

## 1. Introduction

Over the past few decades, social actors in Ghana have turned their attention to flood hazard mitigation to reduce losses. For example, after the floods of July 1995, several measures were adopted to mitigate flood hazards. Hague and Burton (2005:341) find that mitigation is "the wide array of actions that can be taken to reduce vulnerability." It is understood that the success of mitigation activities is determined by the decline of short and long-term risk to people and property. In this sense mitigation goes beyond preparedness to paying attention to the context of vulnerability and how it has evolved in a society.

Despite increasing mitigation efforts human vulnerability to flooding continues to increase. More than a decade after a major flood disaster, losses associated with successive floods continue to increase. For example, the floods of July 3, 1995 destroyed major roads, thousands of homes and took 13 lives in Accra but on June 28, 2001, flooding in Accra led to the death of 20 people, the displacement of thousands of households, and the destruction of millions of dollars worth of property (The Daily Graphic 2001). Between 1995 and 2007, more than ten incidents of flooding were recorded in Accra that resulted in the loss of human life, displacement of households, infrastructure damage, and disruption of economic activities with each successive flood having a severe impact than the previous one (Government of Ghana 2001; 2003). One would expect that people who have long experience with flooding would develop methods to mitigate their impacts. Therefore if flood victims continue to suffer heavy losses, then explanations should be pursued.

The flood disasters (product of a natural force with severe consequence on vulnerable human populations and their possessions) of 1995, 2001 and 2007, and the devastating annual floods in Accra indicates that hazards are more than a force of nature. Although flood events can become actual disasters for many reasons, some related to the physical characteristics of the flood (rain intensity, duration, size, etc), in Accra the vulnerability of human groups that are exposed to the flooding risk is significant. Without a doubt both the level of risk at Accra (the probability of

 

occurrence of flooding and likelihood of damage) and conditions that contribute to social vulnerability (a wide range of social, economic, and political factors within society) are implicated in the impact of disasters in the metropolis. Unfortunately, increasing flood impact is often attributed to excessive rainfall without a deeper look at the political ecological processes that may amplify or attenuate the impact of floods.

**1.1Materials and Methods**

Political ecology is a rapidly growing research approach that emerged as a reaction to environmental narratives of traditional and state-based approaches, especially those associated with economic growth in less developed countries (Bryant & Bailey 1997). The origin of political ecology dates back to the 1970s when the term was coined to think about ways in which questions of access and control over resources were indispensable for understanding the forms of environmental disturbance and degradation (Watts 2000; Peet & Watts 1996; Stonich 1998). Blaikie and Brookfield (1987)'s definition of political ecology as incorporating ecology and broadly defined political economy is the most widely accepted (Dagert 2001). The roots of political ecology in geography occurred with the evolution of ecological concepts in human geography. These concepts moved geographical thinking from basic formulations of human adaptations to the role of ethnicity, social, and political power in influencing human behaviour and its relation with the environment (Zimmerer 1994). Researchers adopting this approach recognize historical processes as a contingent factor shaping current environmental change; view broader political, social and economic forces' impact on local resource utilization decisions; and view as important differences in human capacity and relative ability to respond to environmental change (Zimmerer; Dagert).

There are many variants in political ecology. Offen (2004) grouped the approach in geography into five categories. These included elements that focus on livelihood production and reproduction as the key investigative site; those that looked at the relationship among social, economic, and environmental change; those with a focal point on international, colonialist, state, and corporate intervention at the community level as well as the uneven consequences and responses (e.g., conflict over resource access, changing gender relations); variants that center on causes and consequences of social-environmental marginalization and its remediation; and those whose center of attention is empirical field and historical research (Offen). For instance, Blaikie et al. (1994) developed the Pressure and Release model which traces the roots of human vulnerability to marginalization. The basis for the model is that an "explanation of disaster requires us to trace a progression that connects the impact of a hazard on people through a series of social factors that generate vulnerability" (Blaikie et al. p. 22). Their assumption is that vulnerability is rooted in social processes and the underlying causes of present human vulnerability may be ultimately quite remote from the disaster event itself (Blaikie et al.). This concept was adopted to trace the social, economic, political, and environmental processes that underlie the 1995, 2001, and 2007 flood disasters of Accra.

Applying the political ecological approach to hazards provides an analytical framework to understand the root causes and consequences of disasters within a specific context; allows the integration of concerns regarding how hazards evolves over time, why it evolves the way it does, and the consequences of such evolution in a particular context; and enables exploration of power relations and uneven resource access within a particular context (Dagert 2001). Researchers adopting a political ecology approach recognize historical processes as a contingent factor shaping current environmental change; view broader political, social and economic forces' impact on local resource utilization decisions; and view as important differences in human capacity and relative ability to respond to environmental change.

Available data from the Ghana Meteorological Agency, 2010 indicate that annual rainfall patterns have oscillated around 800 mm per year, and monthly averages have not changed dramatically. This suggests that increased impact of flooding on the population must be attributed to human modifications and urbanization processes. The paper seeks to shed light on this important issue of governmental policies and mitigation strategies and to provide the foundation for further research. While the research community in Ghana has studied population characteristics suggesting more and more people face higher levels of vulnerability, they have generally not focused specifically on collecting empirical data to analyze the root causes of increasing flood impact and what has gone wrong with mitigation strategies by different actors. This study fills this need and open up new avenues of research on urban hazards in

 

Ghana. Specifically, the following questions were examined in the study: How has governmental policies increased or decreased flood vulnerabilities? What has government done to mitigate flood hazards and how effective have these been and for whom? In what ways has governmental policies influenced access to education, employment, and income? How has access to education, employment, and income affected mitigation strategies?

The main objective of the study was to understand and document how flood hazards has evolved over time in Accra, why it evolved the way it did, and the consequences of such evolution in the particular context of Accra. The specific objective was to:

• Analyze historical processes influencing coping mechanisms.

• Examine the effect of governmental policies on access to education, employment, and income.

• Examine the effect of education, employment, income on mitigation strategies.

A micro-level analysis of human vulnerability was undertaken to understand flood hazards in Accra. The household was used as the unit of analysis. As a basic unit of production and consumption, the household provides the foundation upon which human vulnerability must be understood. A household is defined as a person or group of persons who live together, share the same living arrangements and consider themselves a single unit (Ghana Statistical Services 2005). In this definition, household residents need not be related by blood or marriage, but simply cohabitate. It follows that the term family is not synonymous with household in this context, even though family members who live in different households often involve one another in decisions concerning production and consumption. For example, older children from a family who no longer live with that family, but who contribute to family support are not defined as part of the household unit. In contrast, a group of people who have no blood ties but live together as a domestic unit with decision-making autonomy about production and consumption are defined as a household.

But, households are a part of larger communities that they draw on for resources, information, and moral support to mitigate hazards. A community is best articulated through the notion of connectedness to both a place and to social webs that constitute it (Morris-Oswald 2007). Community could also be seen as a state of mind, but intimately tied to a public place. The connection to a common landscape and fellow citizens encapsulates the notion of community in both geographical and social terms. Community is defined as a group of households that interact frequently and have common interests, needs, and shared sense of identity (Morris-Oswald, 2007). Communities are, thus, not spatially defined neighborhoods but social collectivities that share something in common and may or may not be place-based. For example, the homeless community is a community with, by definition, no fixed residence. Meanwhile, households can be part of the homeless community. In this example, a homeless household in two different areas across town can be considered part of the same community: the community of the homeless. Thus, communities in this study are not necessarily fixed in space nor are they based on family or ethnic ties.

The characteristics of households in the neighborhood of Alajo (see figure 1) and among the homeless: people who have frequently recorded higher losses from floods than averages were investigated (Columbia University 2003; Archival Records 2007). The research began with an informal conversation with relevant institutions and through this conversation I selected Alajo as the town for the study. Alajo has been identified as “hot spot” and highly vulnerable to flooding by the various institutions due to their history of flooding. Alajo, is located in a flood prone area at the confluence of the Odaw River and one of its tributaries about 8 km. from the Korle Lagoon where the river empties into the Gulf of Guinea. It has a population of about 80,000 people (Ghana Statistical Service 2000) and spans a physical area of approximately 1 km2 (Columbia University). This density is thus on par with some of the most densely settled places on the planet. There are 1,813 houses in Alajo (Ghana Statistical Service 2000). It is important to note that in a community such as Alajo, a single structure or house could contain more than one household unit. For example, a compound house could contain between four to ten rooms rented out to different households. With an average household size of 4.8 persons, there is a possibility that a single compound house could contain more than 40 persons. This suggests that the 44 persons per house derived from the above figures is not an

 

exaggeration. The target population for the 2000 census included a headcount of each person present in Ghana, irrespective of nationality at the place he or she spent the midnight of March 26, 2000 (Ghana Statistical Service 2005). I selected Alajo as a study site not only because it was among the most vulnerable to flooding in the metropolis, but also because it contains a great diversity of peoples who have differential access to resources to mitigate flood hazards. Alajo is comprised of populations that have lived there for many generations but also of recent migrants. The combined circumstances of the physical hazards and the societal conditions at Alajo make it an ideal place to study human vulnerability and social response to flooding.

I carried out fieldwork for a period of twelve months. This assured both the rainy season, which often coincide with flooding, and dry season are both captured. Due to the size of the town, time, and financial considerations a non random sampling method was used. Primary information was obtained through interviews, questionnaire, and direct observation. I administered questionnaire to heads of households and interviewed institutional heads with structured interview guide. The questionnaire was distributed to 180 heads of households representing approximately ten percent of the sampling frame. Some households included a single person household. In this instance, the person was automatically given a questionnaire. In Alajo a single structure or house could contain more than one household unit. For example, a compound house could contain between four to ten rooms rented out to different households. I selected only one household in each compound house for interview with the assumption that the other members of the house shared common experiences and perspectives with flooding. According to the 2000 population and housing census, there are 709 homeless people in Accra, a number that surely underestimates the total homeless or part-time homeless. The census defines a house as a structurally separate and independent place of abode such that a person or group of persons can isolate themselves from the weather. This definition covers any type of shelter used as living quarters, such as huts, kiosks, containers, tents, and compound houses. A household's usual place of residence is where the household members spend most of the day or time. A homeless person, in this study, is a person whose usual place of residence is not a house. Interviews were also conducted with 70 homeless persons, representing approximately ten percent of the sampling frame.

The questionnaire was used to obtain socio-demographic data about respondents, information about household mitigation activities, information on recovery and sources of help for mitigating and recovering from impacts of floods. I asked the respondents to provide information about their physical infrastructure, and how they prepared for previous floods. My intention was to define their living conditions and relate them to the impacts of flooding. The list of questions I used sought data about the protection of housing structure, housing tenure, use of social capital, and the buying of flood insurance. I designed the questions to collect information on damages to persons, houses, and personal belongings in 1995, 2001, and 2007.

Data collected for the study was both qualitative and quantitative. The qualitative analysis involved some attempt to summarize and order the data by identifying themes, concepts, propositions, and theories. It also consisted of the search for patterns in data and for ideas that help explain the existence of those patterns. The quantitative analysis on the other hand involved the use of statistics to describe, summarize or explain the set of data. I analyzed the data compiled through questionnaires using descriptive statistics. The methods used in the analysis of data provide an integrated view of differential experience of and response to the impact of floods. The aim was to examine the differences between households within a community and between communities. The focus was to seek a relationship between changes in mitigation measures and changes in household vulnerability to flooding. I analyzed changes in vulnerability using qualitative analysis of archives and interviews. I organized responses to the questions thematically into a subset of issues with implications for flood risk mitigation. I adopted the Pressure and Release (PAR) model proposed by Blaikie et al. (1994). The model traces the roots of human vulnerability to marginalization. The basis for the PAR model is that an "explanation of disaster requires us to trace a progression that connects the impact of a hazard on people through a series of social factors that generate vulnerability" (Blaikie et al. p. 22). The underlying assumption of the PAR model is that vulnerability is rooted in social processes and the underlying causes of present human vulnerability may be ultimately quite remote from the disaster event itself (Blaikie et al.).

 

**1.1.1 Results and Discussion**

Some hazard researchers argue that disparities in the availability of and/or accessibility to different resources among various segments of society contribute to being more socially vulnerable (Jones 2004). Some of these resources are education, employment, and income (Morrow 1999). These resources are analyzed to provide a deeper understanding of how hazards evolve over time, why it evolves the way it does, and the consequences of such evolution in Ghana.

*1.1.2 The Roots of Human Vulnerability in Accra*

Some researchers are of the view that poverty results from development policies. They argue that development policies often result in diminished access to natural resources and the poor are the most affected. To them, the underlying issue for human poverty is policies that institutionalize and exacerbate unequal access to resources (Painter & Durham 1995; Stonich 1998). A major argument has been that local people's access to resources and its control are connected to larger scale political and economic forces (Watts 2000). Blaikie et al. (1994) posit that the underlying causes of present human vulnerability to hazards and factors that reproduce them over time are a set of well-established, widespread processes within a society that are rooted in history. These include among others, economic and political processes that in the past affected the allocation and distribution of resources between different groups of people (Blaikie et al.). Information reviewed shows that several colonial policies established the foundation upon which human vulnerability to flooding in Accra ensued. Some colonial policies with significant influence on human vulnerability to flooding are the choice of Accra as the physical location of the national capital and the policy of residential segregation. The relocation of the national capital to Accra brought tremendous growth in human population with serious consequences on the natural environment. The spatial expansion associated with the rise in human population increased flood risk as the land cover that restrained the impact of rain and runoff water was removed from both Accra and the surrounding landscape. Despite the implications of colonialism for flood hazard exposure and vulnerability the legacy have persisted to the post-colonial era. The rapid population and urban growth from the colonial era continued to the post colonial era but various government administrations have shown little commitment to addressing the issue. What constitutes a bigger problem in the case of Accra is that the annual population growth rate of 6.3 percent for 1970, 7.5 percent for 1984, and 4.3 percent for 2000 surpassed the national annual growth rate of 2.2 percent for 1970, 3.4 percent for 1984, and 2.4 percent for 2000 but social and economic infrastructural development has not kept pace with the growth. What is more the problem has overwhelmed government agencies, permitting the continued development of unplanned settlements, some of which are established in flood prone areas.

Reviewed literature has documented the role of political factors in the development of "at risk" populations (Hewitt 1983; Blaikie et al. 1994). Vulnerability is related not only to the geographic characteristics of the places where human settlements are located or to the fragility of homes or infrastructure but also to lack of resources, unstable political system, and unstable institutional commitment to flood risk mitigation. After political independence the vulnerability of the residence of Accra has emerged as a consequence of the interaction of these factors. Some of the most important factors that has contributed to human vulnerability to flooding in Accra in the post colonial era includes unstable political system, unstable institutional commitment to vulnerability reduction, continued disregard for land use planning, and rapid population and urban growth that has overwhelmed government agencies.

Evaluation of documents suggest successive post colonial Ghanaian governments have done very little to reverse the trend of residential segregation policies that were a direct colonial legacy. The system of planning and building regulation that was pursued in the colonial era resulted in residential segregation and created slum and unplanned settlements such as Alajo. During the colonial era, zoning and building regulations were enforced to regulate urban growth. However, since political independence most government administrators and political elites have taken over the settlements where the Europeans previously used to live and have still left the native communities develop without plan. Thus, the development of settlements under the colonial administration led to a social stratification system that spatially segregated people into administrative divisions. The colonial elites in spacious surroundings in government owned apartments, lower level civil servants in low cost housing estates, and the unaffiliated poor in peripheral squatter settlements. In the post colonial era, the lack of planning and building regulation and the

 

perpetuation of the social stratification system introduced by colonial administrators has resulted in extreme residential segregation and promoted slum and unplanned settlements.

One of the most important influences on human vulnerability to flooding in Accra is unstable political system and institutional commitment to vulnerability reduction. Since independence in 1957 Ghana's political and economic system has gone through many changes. The first government after independence spanned from 1957 to 1966 and its main goal was state control and the development of its active involvement in the allocation and distribution of resources between different groups of the Ghanaian population. This ideological order led to the formation of various state agencies, such as the State Housing Corporation (SHC) and the Ghana Food Distribution Corporation (GFDC). The major functions of the SHC and GFDC were to insure the provision of housing and food respectively to the growing urban population (Djabatey 1998). Although the intention was to solve the multitude of problems left behind by the colonial government, the programs led to more people migrating to urban centers. It also led to over dependence on the government to solve household and community problems. The perception that the state is responsible for solving all society's problems could be detrimental as it retards individual initiative, community self-help and mobilization and independence in hazard related mitigation decision-making and cooperation with government. This fact, combined with the economic potentials that Accra presents, led to a high concentration of people on flood plains. The population increased from 135,000 in 1948 to over 388,000 in 1960. Growing human populations increases human vulnerability to flooding because out of control population growth combined with high population densities severely test and stretch available resources. For example, the cost to rent a home soared to the point that even relatively highly paid employees had difficulty securing affordable housing (Djabatey). High cost of accommodation left newcomers to the city in a precarious situation, as most are poor rural folks that have migrated to the city in search of better economic opportunities. As a result slums that were created during the colonial era continued to grow and the tide of people moving into these slums increased, as majority of the new immigrants could not afford decent accommodation. The population in the slums contributed to their own vulnerability by producing more waste, much of which ended up in culverts and canals and thereby weakening the capacity of the already limited drainage system. Most of the slums are located in unsafe physical settings with weak buildings erected without suitable material or construction skills.

The problem is compounded because immediately after independence the government was struggling to provide basic services for the growing urban population and found it difficult to invest in resources to plan and model urban growth and land use patterns. As a newly independent country with the administration of the country in the hands of those with foreign-trained education and the economic elites, most of whom were inexperienced, the rapid population growth overwhelmed the government agencies, permitting the development of unplanned settlements, some of which were established in flood prone areas. The greatest variable that would increase damage in these areas of Accra is the number and concentration of people living in high-risk areas. High concentration of population in unsafe physical settings coupled with land use changes would increase the costs of providing public services and create congestion for those living there. In combination with other factors this would increase human vulnerability to flooding.

Between 1966 and 1972 during the era of the National Liberation Movement/Progress Party, a new goal was followed that was less favorable to direct government involvement in the allocation and distribution of resources between different groups within the Ghanaian population. The Ghanaian administration during this era laid emphasis on rural agriculture, and had a lukewarm attitude towards urban problems. Economic policies of the government at that time were in reaction to the urban bias notion, a notion that has intensified the neglect of the poor in many cities in Third World Countries (Djabatey 1998). The general impression was that the previous administration appeased those who were the most vocal political interest in urban constituencies by appropriating money, food, and raw material to restructure the urban economy in the face of scarce resources. Thus, attempt to correct this notion and to focus on rural areas to balance this inequality led to a series of economic development initiatives specifically directed towards rural communities while the poor in urban centers were excluded. This development approach has serious implication for flood hazard exposure and vulnerability in all major urban centers in Ghana as the neglect reduced the capacity of government agencies already overwhelmed with regulatory and enforcement problems to deal with

 

rapid urban population growth and its associated environmental impacts. This anomaly resulted in increased development of unplanned settlement, some of which were established in flood prone areas where land could be acquired at an affordable price or for free. This landscape change associated with the unregulated development and sprawl has implication on human vulnerability to flooding in the area. Rapid urban population growth increases environmental transformations and consequently human and property losses for several reasons. One of the main reasons is that, water seeks the lowest possible elevation by way of the path of least resistance. Often times, flood waters find the path of least resistance in developed areas, particularly urban areas, because development removes many of the natural boundaries and barriers that either absorb water into the water table or direct it to a larger destination like a lake or naturally occurring retention area like a wetland. As the land cover protecting the land surface from erosion is removed flooding risk increases. Thus, increased and unregulated settlement expansion increases the coverage of impermeable surfaces as both the city and surrounding land surface are cleared of the vegetation cover that moderated runoff and reduced erosion from exposed land surfaces.

From 1979, the decline of formal safety nets and their replacement with informal responses are the major issues to be considered in the analysis of human vulnerability and flooding risk in the Accra Metropolitan Area. In 1981 Ghana adopted conservative economic policies, abolishing subsidies and price controls, privatizing many state enterprises and devaluing the currency. This was reinforced in 1983 when the first phase of an Economic Recovery Program was introduced with the World Bank and the International Monetary Fund support. The problem with this austerity measure and its implications for human vulnerability hinges on entitlement failures. In the urban area, studies have shown that poverty and declining real income are the major causes of human vulnerability as they limit the ability of urban residents to acquire the needed resources to mitigate flooding risk (Djabatey 1998). The appropriateness of this assertion is underscored by the human impacts of the economic recovery programs adopted by Ghana in the early 1980's. The implementation of the program led to the end of state control in pricing, marketing and distribution, and this subsequently led to the escalation of prices, especially in urban areas (Djabatey). The program also undermined most of Ghana's social safety nets, and consumer subsidies. In addition, the program led to the termination of thousands of public service jobs through retrenchment. This affected thousands of urban residents who depended on the formal sector for their livelihood. The Ghana Living Standards Survey (GLSS) found that the number of Accra households in poverty increased from 9% to 23% between 1988 and 1992 and the Ghanaian currency experienced vast devaluation of 200% against the US dollar during 2000 (Ghana Statistical Service 2002). Thus, economic restructuring contributed significantly to urban poverty in the country and by implication vulnerability of the residents of Accra to flooding.

The austerity measures associated with World Bank and IMF economic recovery programs continued under successive governments with policies to ensure full cost recovery by agencies involved in the provision of services to urban residents. This was followed by the acceptance of debt relief (HIPC) through a plan designed by the IMF and the World Bank. These economic policies have contributed to the deprivation of the rural area forcing many farmers to migrate into urban centers. Subsidies have been removed from agriculture and petroleum products while government investment in agro-based industries and social infrastructure has been restricted, if not eliminated. Decreases in the value of real wages associated with these economic policies have also increased the vulnerability of urban residents to environmental hazards. While depriving rural areas of essential supplies, the conditionalities associated with ERP and HIPC also reduces the capacity of the state to provide adequate infrastructure to meet the needs of the growing urban population.

In summary, a set of processes rooted within the Ghanaian society gives rise to social vulnerability to flooding in Accra and perpetuates that vulnerability over time. Beneath the present human vulnerability to flooding in Accra are economic, demographic, and political processes that in the past affected the allocation and distribution of resources. While colonialism had an impact on the development of Accra, the structure of government and policies undertaken after independence have also contributed to the factors that has pulled people to unsafe living conditions in the city. Thus, vulnerability to flooding in Accra has emerged as a consequence of the interaction of factors such as unstable political system, institutional commitment to vulnerability reduction, and rapid population and urban growth.

 

*1.1.3 Education, Employment, Income and Human Vulnerability*

Social and economic characteristics, such as income level, educational attainment, and employment have been identified as important influences on vulnerability to hazards. Many researchers argue that human vulnerability to hazards increases with low formal education, less secure employment, and low income. One of the reasons is that low income reduces peoples' ability to afford areas less prone to hazards and live in structurally sound buildings that can withstand the impact of a hazard. In both developing and developed countries, studies have shown that housing occupied by low-income households tend to be less structurally sound (Bolin 1986; Bolin and Stanford 1998; Pelling 1999). For example, Research by Wisner (1998) show that low income and lack of financial reserves constrain ability to choose a safer place to live and recover from hazards. Bolin and Stanford also found that the occupation of less structurally sound settlements increases the vulnerability of poor families to hazardous events.

Human vulnerability to hazards is further exacerbated where some segments of the population have less access to education, employment, and income. In his study of flood hazard, Pelling (1999) argued that the production and maintenance of risk in urban Guyana is not the product of physical systems alone, but that they have coevolved with social and economic systems. Pelling asserts that environmental risks in urban Guyana are an outcome of the political interest that shapes the urban environment and society. In Pelling's analysis, the roots of the present vulnerability to flooding in urban areas, especially Georgetown could be traced to Guyana's colonial era and the post-colonial modernization projects that have transformed the urban environment. Thus, the methods and standards by which social institutions decides and organizes the allocation of resources since colonial era in Guyana has led to the creation of income, employment, educational inequalities and exacerbated social vulnerability.

The level of education is important in influencing human vulnerability. According to the 2000 Population and Housing Census, 14.9 % of person aged 3 years or older in Accra are not literate in English and Ghanaian languages (Ghana Statistical Service 2000). I asked interviewees about their educational background to help provide a link to human vulnerability to flooding. The response from the survey of educational background is presented in Table 1.

Figures in Table 2 show that none of the household heads sampled graduated from a university. Only 16 % graduated from high school and 30 % from junior high. Twenty-six percent have training in other areas such as catering, hairdressing, dressmaking, tailoring, carpentry, masonry, etc. People with these types of training are usually not employed in the formal sector. This offers a partial explanation why the majority of household heads in the study area are concentrated in the informal sector. A staggering 28 % of household heads have no formal education; this only exacerbates their vulnerability to flooding. This is because they are normally excluded from information dissemination in a country where English is the official language and all broadcast, print media, and government mitigation activities are printed in English. The findings from the survey of educational background confirm the assertion by some researchers that inequalities in education contribute to social vulnerability. Inequality in education contributes to factors that shape people's strategies to leave or not to leave their homes, and how they rebuild their lives in the aftermath of a disaster.

According to the 2000 population census, 13.4 % of the residents of Accra are unemployed, a figure that is slightly above the national unemployment rate of 10.4 %. More than half (51.8%) of the economically active population in Accra are self employed without employees, while 32.6 % are employees. Figures in table 2 show that majority of those sampled are without jobs (48 %). A sizable number of the interviewees were also self-employed (34%). Only 18 percent were formally employed. Participation in the informal sector constitutes an important source of income but increasing competition within this sector has contributed to a decline in household income, which has created insecurity within households.

During flood events, the first to be affected are those who work as street or market sellers, artisans, and other self-employed businesses. It goes without saying that those who work in the informal sector do not have paid leave, vacation, sick or disability pay, and thus they experience the greatest impact during flooding due to loss of income. It could be inferred that a higher concentration in the informal employment sector in Accra is a contributing factor to increasing human vulnerability in the area.

 

Although the rich may suffer higher economic losses in terms of dollar value, low income and lack of financial reserves constrain poor peoples' ability to choose a safer place to live and recover from hazards (Wisner 1998). To understand how income inequality contributes to factors that shaped people's strategies to mitigate flooding and how they recover in the aftermath of flood events, I asked respondents about their total household monthly income. Figures from table 3 show that 34 percent of the sampled households makes less that 25 Cedis a month (In June 2010, US $1 = 1.4 Ghana Cedis). Twenty eight percent of households makes between 25-50 Cedis monthly. This implies that the majority of the households in Accra (almost 62 %) live on less than 1 Cedi a day. This figure supports findings from some social science researchers that those who are financially poor are generally displaced to the margins of society, spatial margins that tend to be more hazardous. That majority of the population living in flood-prone areas had low incomes implies that the poor were more likely to occupy the floodplain of the Odaw River in Accra. This supports the well-known and accepted view that generally those who had less income, and thus less likely to be able to cope with and recover quickly from flooding, were more likely to occupy hazardous areas.

*1.1.4 Mitigation Activities*

Mitigation involves "the wide array of actions that can be taken to reduce vulnerability" (Hague and Burton 2005: 341). Household mitigation refers to deliberative activities implemented in advance by the household to reduce vulnerability to damage from future flooding. The measure of the success of household mitigation activities encompasses the decline of short and long-term risk to humans and property. Vulnerability mitigation strategies are manifold, but can be categorized into 'structural' and 'nonstructural' measures (Tobin and Montz 1997; Parker 1999; Smith 2004). Regarding household mitigation activities, structural measures refer to interventions that target building structure, such as strengthening walls and roof of homes, raising the level of the home, or generally improving the structure of the home to make it more structurally resistant to the force of storm water. Other structural mitigation activities also include household modification of drainage channels, building embankments, reservoirs and barrages near their homes to control the flow of rivers and abate or control the spread of flooding. Non-structural household mitigation activities refer to measures that are not designed to prevent floods but to reduce the short and long-term impacts of the hazard. They include emergency evacuation plans, flood warning systems, adhering to building regulations, purchasing flood insurance, relying on social capital, and behavioral adjustments. Tobin and Montz described non-structural activities as changes in the accepted norms of society – social/political organization, beliefs, and attitudes – that have contributed to the vulnerability of human to hazards.

Many households in Accra mitigate flooding risk by seeking to minimize impacts while maximizing social and economic resources. Some structural mitigation activities that many households in the Alajo community have adopted are protecting their fence, reinforcing windows and doors, and installation of sump pumps in basements. I used a survey questionnaire to collect data on household mitigation activities. Tables 4 and 5 show data on household measures used to mitigate flooding risk in Accra. Of the 180 households surveyed at Alajo, 59% undertook no structural mitigation activities prior to the 1995 disaster, 61% prior to 2001 but did not make any structural changes before later floods and 46% prior to 2007. For the homeless, 29% indicated they made no changes to their living arrangement prior to the 1995 disaster and none indicated they had a home to structurally change in 2001 and 2007. This implies that some of the homeless once had a home but had been rendered homeless by persistent flooding, economic conditions, governmental actions, or some other type of misfortune. Some of the respondents explained that they were renters and had no authority to make structural changes to homes without the consent of their landlords. This confirms the assertion that renters are more socially vulnerable. Other respondents ascribed their lack of structural mitigation activities to financial constraints. Some heads of households explained that they recognize the importance of mitigating the impact of flood risk but they simply do not have the money for structural changes and would rather take their chances.

To reduce or eliminate flooding risk, and with it human vulnerability, non-structural mitigation activities are equally important. The figures in Tables 4 and 5 show that none of the sampled households in the fixed community bought flood insurance prior to the 1995 and 2001 floods. Five percent of households in Alajo bought flood insurance prior to the 2007 floods. The majority of the households in the study ascribed lack of knowledge of the existence of flood

 

insurance policy for not buying it. Others admitted they knew of flood insurance programs but could not afford them. This is not surprising since most private insurance companies covers flood insurance in Ghana under a general umbrella of "home protection policy". For example, the State Insurance Company and Donewell Insurance Company's home protection policies cover loss as result of natural hazards, such as, earthquake, floods, and windstorm. In addition the policy covers loss as a result of accidents, theft, and water damage. One merit of the home protection policies are that they are comprehensive and cover every insurance need of the homeowner. However, it is possible that these private companies charges higher premiums (20 – 50 Ghana cedis) per month since they cover several type of losses. Thus, the fact that low cost mitigation activity was taking place (e.g., using alternative sources of energy—see below), but high cost ones were generally not (e.g., buying insurance, making structural changes to homes) suggests that financial constraints restrict the choice and effectiveness of household mitigation activities in the Accra Metropolitan Area, a fact that is common in most developing countries.

Figures from Tables 4 and 5 show that 41% of households in 1995, 33% in 2001, and 24% in 2007 made some behavioural adjustments before those respective floods. In the mobile community, 28% of homeless in 1995, 7% in 2001, and none in 2007 made other behavioral adjustment prior to the flood disasters. Information collected during the survey indicates that the changed behaviour included using alternative sources of energy, such as, battery and solar powered flashlights, electric generators, and natural gas during and after floods. This implies that some of the households may have heeded the flood-watch warning by the government and prepared accordingly whether they knew English or not. It could also be that some of the households relied on their prior knowledge and experience with previous flooding to prepare for future floods. Unfortunately, that particular option of mitigation is declining although most households continue to lose their utilities during floods, limiting their ability to receive warnings through electronic media.

Various options were utilized by residents of Alajo and the homeless in respect to the place they shelter during and after floods. Figures from Tables 4 and 5 show that some households rely on available social capital to mitigate the impact that flooding has on their households. Social networks include neighbours and communities with whom households are socially involved. The essence of a social network is the provision of financial and moral support, person-to-person contact for information regarding emergency management programs, and access to resources to mitigate hazards. In other words, social networks operate to provide opportunities for the members in the network. Some of the households relied on networks of friends, relatives, and churches in the metropolis during floods. At Alajo, 36% of households relied on social networks in 1995, 25% in 2001, and 19% in 2007. In the homeless community, 21% in 1995, 14% in 2001, and none in 2007 relied on social networks. I find that Alajo households and the homeless community that relied more on social networks coped better than those that did not. One contrast between households in the fixed community and the mobile community is that households in the mobile community have limited strategies to mitigate flooding and do not have a realistic option of moving elsewhere while the floodwaters recede. Even in extreme flood events, the homeless do not move far from where they spent the previous night. Many of these households continue to sleep at local schools and in front of shops even during flooding. It is not surprising that the mortality rate for this community is higher. Generally, the survey revealed a lack of flexibility of social networks to assist households in the aftermath of flooding. The declining reliance on social networks shown in Tables 4 and 5 suggest that community organizations, churches and relatives are themselves limited in providing assistance to households. It also implies that urban rapid population growth have constrained householder abilities to construct and maintain social networks, a vital ingredient for mitigating hazards in the absence of effective governmental programs.

According to Djabatey (1998), many households in Accra mitigate all manner of problems associated with poverty by maximizing economic resources. Hazard studies indicate that the problem of human vulnerability hinges on entitlement failures (Sen, 1981). In the urban area, poverty and declining real income are the major causes of increasing flooding risk as they limit the ability of urban residents to acquire the needed social and economic resources to minimize risk. Since Ghana embarked on economic recovery programs in 1982, the program has led to termination of thousands of public service jobs (Djabatey). In the wake of the declining resources and increasing poverty, some households in Accra have started food production in their backyard or some open spaces in the city.

 

The purpose of household involvement in food production in urban areas is to minimize household expenditure, increase food availability, and sell surplus food to increase income and savings. Thus, the use of the backyard or some open spaces in the city helps households to mitigate all manner of problems associated with poverty and by implication helps households reduce negative social impacts. This is because surplus food from the household reduces expenditure and increases householder economic resources to undertake mitigation measures that could help reduce their vulnerability to flooding. Despite these potential benefits some of the sampled respondents reported their gardens destroyed more often by government agencies than by floods, although flood damage is generally more destructive and widespread. Thus, it could be inferred that unsafe conditions in Accra result partly from socio-political processes that reduce householder access to resources necessary to the mitigation of flooding risk. This supports the assertion that hazards themselves and government policies do alter the set of resources available to households (e.g., through flood destruction of business or backyard gardens) and alter the patterns of recoverability of different households.

**1.1.5 Conclusions**

As Accra grows, competition for living quarters intensifies, and greater numbers of people have been forced to live and work in substandard and unsafe conditions. This exposes a higher percentage of the population to floods and leads to an increase in the loss of property and human lives. The growing numbers of people contribute to their own vulnerability by transforming the environment and its hydrology. More people mean more waste production. Much of this increase ends up in culverts and canals and weakens the capacity of an already limited drainage system. Increased and unregulated settlement expansion also increases the coverage of impermeable surfaces, which further increases run-off (Lavallin 1995; Konadu-Agyemang 2001; Ghana Statistical Service 2002; Grant & Yankson 2003; Columbia University 2003; Government of Ghana 2001; 2003). In short, rapid urban growth increases human vulnerability to floods faster than the rate of urban growth itself.

The prevalence of urban poverty and rising urban unemployment has intensified the problem of human vulnerability to flooding in Accra. This problem is complemented by higher cost of living in the metropolitan area, especially the cost of food and housing. The poverty problem facing the residents of Accra is manifested as human vulnerability to flooding. The majority of the households in flood prone areas in Accra live on less than 1 Cedi a day. This figure supports findings from some social science researchers that those who are financially poor are generally displaced to the margins of society, spatial margins that tend to be more hazardous (Susman et al. 1983; Wisner 1998). Thus, those who had less income, and thus less likely to be able to cope with and recover quickly from flooding in Accra, were more likely to occupy hazardous areas.

Again, I found that household participation in flood insurance programs and long-term structural changes hinges in part on the availability of funds. Very few households in Alajo have taken flood insurance because it is too expensive but government is pursuing expensive structural mitigation projects leaving the provision of flood insurance in the hands of private companies that charges households exorbitant premiums. To reduce the cost of the premiums it would be better for government to step in and cover or at least subsidize only loss due to flooding. Since the private insurance companies does not have application forms in the local language and does not fill out claim forms for the illiterate, it would be better for government to involve the Non-formal Education Division (NED) and the National Commission for Civic Education (NCCE) in educating those without formal education on the importance of taking home protection policy or flood insurance and the procedure for filing a claim.

Furthermore, information from Alajo shows that although long-term residence are more resilient than recent migrants, there is evidence that over time there is a consistent lack of ability to reduce the impact of each successive flood. Several factors could explain such a pattern. The resident's location at a place that is highly susceptible to flooding or the intensity of flooding in these areas may cancel the effectiveness of all responses. For instance, each annual flood may be causing more damage to a household's means of raising additional income, such as backyard food production. Also, previous experience or awareness may not be good predictors of behavioral changes or changes in responses if other conditions are not present such as the availability of economic resources to be able to decrease vulnerability.

 

Also, the impact of the flood disasters of 1995, 2001, and 2007 on Alajo was overall less than the homeless. A contributing factor to a better adjustment to these disasters could be their relative access to resources and demographic and social characteristics less prone to vulnerability. Another factor could be the differences in the socio-spatial organization of both communities: residents of Alajo obtain more assistance from the government and NGOs than do homeless. Generally, the survey revealed a lack of flexibility of social networks to assist households in the aftermath of flooding. The declining reliance on social networks suggest that community organizations, churches and relatives are themselves limited in providing assistance to households.

In summary, a pattern of severe impact upon a large number of households, recurrent losses of material goods, endangered lives, and limited human and social capital, are all clear indicators of rising human vulnerability to environmental hazards in Accra.

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Table 1: Education Backgrounds of Sampled Respondents

| Level | Frequency | Percentage | Cumulative % |
|---|---|---|---|
| University | 0 | 0 | 0 |
| High School | 40 | 16 | 16 |
| Junior High | 75 | 30 | 46 |
| Other Training | 65 | 26 | 72 |
| None | 70 | 28 | 100 |
| Total | 250 | 100 | |

Source: Author's Fieldwork

Table 2: Household Employment in Accra

| Status | Frequency | Percentage |
|---|---|---|
| Self employed | 85 | 34 |
| Employed | 45 | 18 |
| Retired | 25 | 10 |
| Student | 15 | 6 |
| Unemployed | 80 | 32 |
| Total | 250 | 100 |

Source: Author's Fieldwork

Table 3: Monthly Household Incomes for Sampled Respondents

| Amount (Cedis) | Frequency | Percentage | Cumulative % |
|---|---|---|---|
| Less than 25 | 85 | 34 | 34 |
| 25-50 | 70 | 28 | 62 |
| 51-75 | 55 | 22 | 84 |
| 76-100 | 30 | 12 | 96 |
| Over 100 | 10 | 4 | 100 |
| Total | 250 | 100 | |

Source: Author's Fieldwork

Table 4: Household Mitigation Activities at Alajo

| Variable/Years | 1995 (%) | 2001 (%) | 2007 (%) |
|---|---|---|---|
| Strengthened walls and roof | 5 | 8 | 13 |
| Raised level of home | 0 | 0 | 0 |
| Improved structure of house | 11 | 17 | 22 |
| Other measures done | 3 | 14 | 19 |
| Made no change to home | 59 | 61 | 46 |
| Not applicable | 22 | 0 | 0 |
| Bought flood insurance | 0 | 0 | 5 |
| Started saving before flood | 8 | 5 | 0 |
| Shelter with relatives/church | 36 | 25 | 19 |
| Other adjusted behavior | 41 | 33 | 24 |

Source: Author's Fieldwork

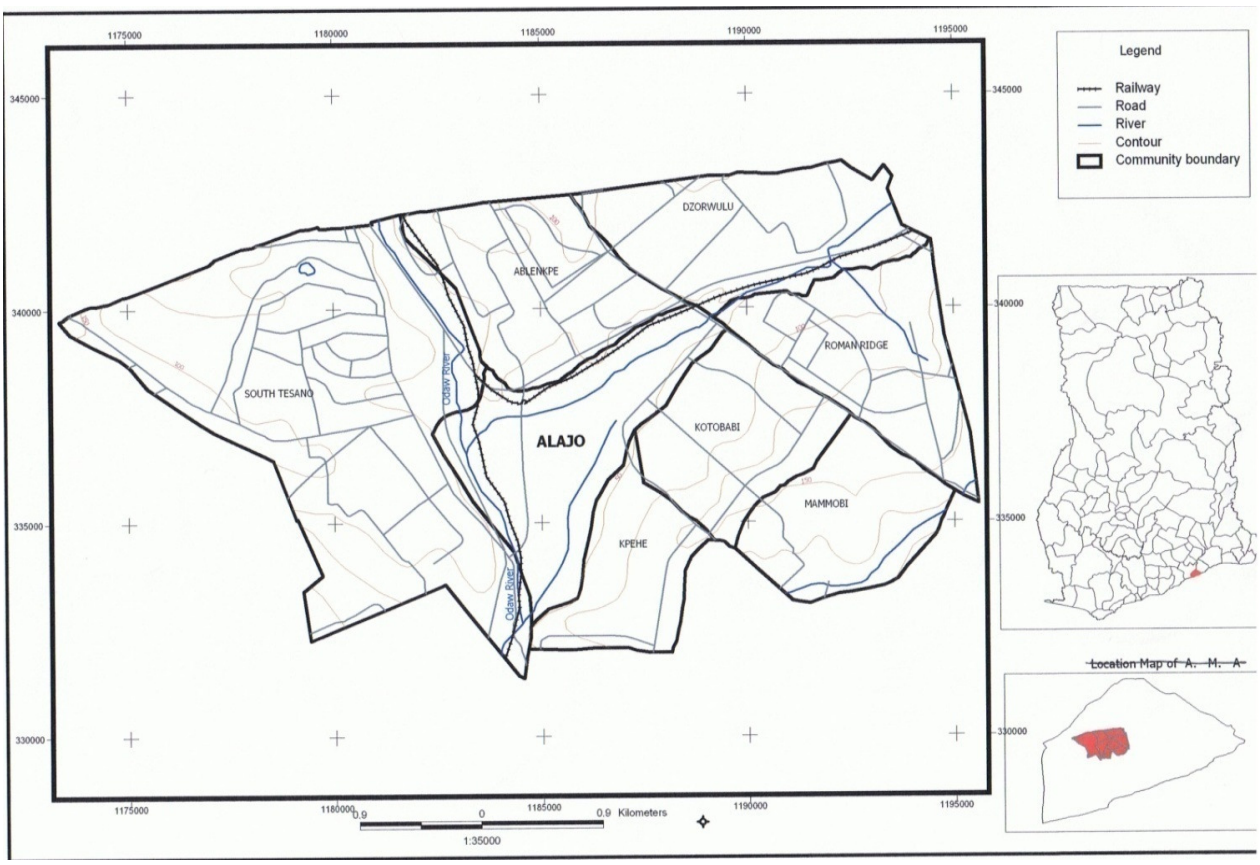
*Table 5*: Homeless Mitigation Activities

| Variable/Years | 1995 (%) | 2001 (%) | 2007 (%) |
|---|---|---|---|
| Strengthened walls and roof | 0 | 0 | 0 |
| Raised level of home | 0 | 0 | 0 |
| Improved structure of house | 0 | 0 | 0 |
| Other measures done | 21 | 14 | 0 |
| Has not made any change | 29 | 0 | 0 |
| Not applicable | 50 | 87 | 100 |
| Bought flood insurance | 0 | 0 | 0 |
| Started saving before flood | 0 | 0 | 0 |
| Shelter with relatives/church | 21 | 14 | 0 |
| Other adjusted behavior | 28 | 7 | 0 |

Source: Author's Fieldwork

Figure 1: Map of Accra




Source: Center for Remote Sensing and Geographic Information Systems, University of Ghana