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Identification of Reasons for and Socio-Economic Impacts of Persistent Floods in Dar Es Salaam

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Abstract

This paper identifies and discusses reasons for persistent flooding events in the city of Dar es Salam. The paper also discusses socio-economic impacts caused by such flooding events. Descriptive research design guided the study. A questionnaire was administered to a sample population to collect numerical data while in-depth interviews were employed to collect qualitative information. Descriptive statistical analysis was used to analyze data from the questionnaire whereas qualitative data were analyzed thematically. Findings show that topography, unplanned settlements, poor infrastructure to support rapid urbanization, poor institutional capacity, failure of local authorities to enforce land policies and legislation, centralization of land use planning, poverty, and lack of awareness are the main causes of persistent flooding events in the study area. The paper further identifies that destroyed businesses, properties damage, increased number of dependents, increased number of orphans, families separation, increased incidents of eruptional diseases, increased crime rate and increased immorality and people being subjected into deep poverty are some of the impacts of persistent floods in Dar es Salaam. The paper suggests that there should be efforts directed towards ensuring that policies are well implemented and legislation enforced in the interest of proper environmental management and sustainable development of the city.

Keywords

floods, poverty, environmental management, Dar es Salaam

1. Introduction

Flooding events are common around the world. The literature shows that governments have struggled to address disasters related to flooding in many ways. In Paris, for example the misery and destruction caused by the 1910 Great Flood of Paris, made the French government build a series of reservoirs called Great Lakes which helps remove pressure from the Seine during floods, especially during the regular winter flooding (Munger, 2015). Devastating flooding occurred in Winnipeg in 1950. To protect the city from future floods, the Manitoba government undertook the construction of a massive system of diversions, dikes, and floodways. The system been built stronger it kept the city of Winnipeg

safe for many years including during flooding events of the 1997, 2006 and 2006 (http://www. manitobaphotos.com/1950.htm).

In Africa floods are common and have a diver of impacts. During the period 1997-2001 different parts of the continent experienced devastating floods. For example, East Africa experienced devastating floods which resulted in human suffering and deaths as well as extensive damage to infrastructure and properties including crops (http://www.grida.no/publications). In Kenya, floods sparked major emergency relief as hundreds of people lost their lives and thousands were displaced from their homes (http://www.grida.no/publications/vg/africa). In some cases floods in Kenya have occurred in the river basins even with normal rains because of excess surface water runoff occasioned by deforestation and land degradation upstream. These force thousands of people living in the lowlands to move to higher grounds. The people affected are mostly in Western and Nyanza provinces and in Tana River district. Slum dwellers in towns like Nairobi who have erected informal structures near rivers are not spared. Either In Western Province River Nyando notoriously bursting its banks during the rainy season. In Southern Africa, floods have had major human and economic costs; hundreds of people in Mozambique for example loosed life and thousands were left without food and shelter. Floods in Somalia affected more than 1 million people. Generally floods have always resulted into severe impact on many aspects of development in Africa including outbreaks of diseases and hunger (http://www.tyndall.ac.uk/publications). The Intergovernmental panel on climate change (http://www.ipcc.ch/) predicts that climate change is likely to intensify flooding hazards in many areas of the world. Although models cannot definitively determine where, when, or by how much flood hazards will change, specialists suggest that existing flood-prone locations and some coastal and river-basin areas will become more vulnerable to severe flooding.

Tanzania has on record disaster occurrences since 1872 when a “cyclone” hit Zanzibar and Bagamoyo, destroying a hospital and affecting an unspecified number of people. Flood prone regions are Dar es Salaam, Tanga, Mbeya, Coast, Morogoro, Arusha, Rukwa, Iringa, Kigoma and Lindi. Of recent years the city of Dar es Salaam has been experiencing flooding events persistently. Between December 2006 and January 2007, for example, heavy rains battered the city triggering devastating floods. Many people were driven out of their homes, peoples’ livelihoods were destroyed and many people were left without means to recover from the effects of the flooding event (Red Cross 2011). Likewise, in the year 2011 the city experienced flooding events of high intensity, duration and scale (Red Cross 2011). The 2011 floods magnitude was unprecedented and the effects were the worst ever; about 14,000 people were in dire need of humanitarian assistance (Red Cross 2011). In April 2014 about 11 people were reported to have been died in Dar es Salaam because of flooding.

The Tanzanian Government identifies floods as potential hazards that if not well managed can turn into disasters, several measures have been taken by the government of Tanzania to ensure that the country is not subjected to disasters caused by floods including encouraging and sponsoring Tanzanian scholars training in the fields of disaster mitigation and management. The government also established the

Disaster Management Department under the Prime Minister's office along same reasons; this department has committees at regional, district, ward and village levels. Notwithstanding the measures taken so far, the problem of floods has alarmingly persisted in Dar es Salaam, as we are writing this research report, floods have already reported to have claimed life of about 19people and more than 5000 displaced between March and May this year 2015. Further a number of research works has been conducted and identifies some reasons for persistent floods in some parts of the city. Casmir (undated) for example reported that one of the reasons for floods in Dar es Salaam is climate change coupled with such factors as poor infiltration and outdated unfunctioning storm water drainage system. The research by Casmiri however focused much on the vulnerability of the city of Dar es Salaam to climate change and not the general causes of floods and their impacts as the case is to this study. Likewise John (undated) discusses the problem of flooding in Dar es Salaam in relation to climate change. John noted that climate change has exacerbated flooding events in the city. Therefore, post previous studies focused on the impacts of climate change on flooding as opposed to this study that focuses on the reasons for persistent flooding events in the city. Furthermore, with all the available information on the causes of floods in Dar es Salaam and the efforts made by the government to rescue the problem as pointed out in this section, yet flooding events are persistent, it is, therefore, not clear whether there are other reasons other than those already identified by the existing literature that leads to the persistence of the flooding events in the city of Dar es Salaam; it is for this reason that the researchers found it important to undertake this study. Specifically the study intended to identify and discuss reasons why flooding events persistently occur in the study area and also to identify and discuss socio-economic effects of such flooding events in the study community.

2. Research Methodology

2.1 The Study Area

Dar es Salaam is located in the Eastern part of Tanzania Mainland between latitudes 6.36 oS and 7 oS and longitudes 39 oE and 33.33 oE. To the East it borders Indian Ocean and to the other sides, it is surrounded by Coastal Region. It occupies 0.2% of the entire Tanzania Mainland (Figure 1). According to the Tanzania national Census of 2012 the population of Dar es Salaam is about 4,364,541. Climatically Dar es Salaam experiences equatorial climate where the city experiences two distinct rainy seasons—the long rains which fall during April and May, and the short rains which fall during October and November. The city experiences hot weather and high humidity throughout the year with an average temperature between 21ºC and 350ºC. The hottest season is from October to March while it is relatively cool between May and August. Average humidity is around 96% in the morning and 67% in the afternoons. The climate is also influenced by the South West monsoon winds from April to October and North East monsoon winds between November and March (Tanzania Meteorological Agency, 2013).

Dar es Salaam was established in 1862 as a port and trading centre to support new caravan routes

opening into the interior of Africa. It became the national capital in 1891, acquired municipal status in 1949, and achieved city status in 1961. In the mid-1970s, Dar es Salaam lost its official status as the capital city to Dodoma. However, it remains the centre for the permanent central government bureaucracy and has continued to serve as the country's capital city. It is the national centre for industry, education, and culture, and is full of diversity. Hosting 8 percent of the national population and generating over 70 percent of the national gross domestic product (GDP).

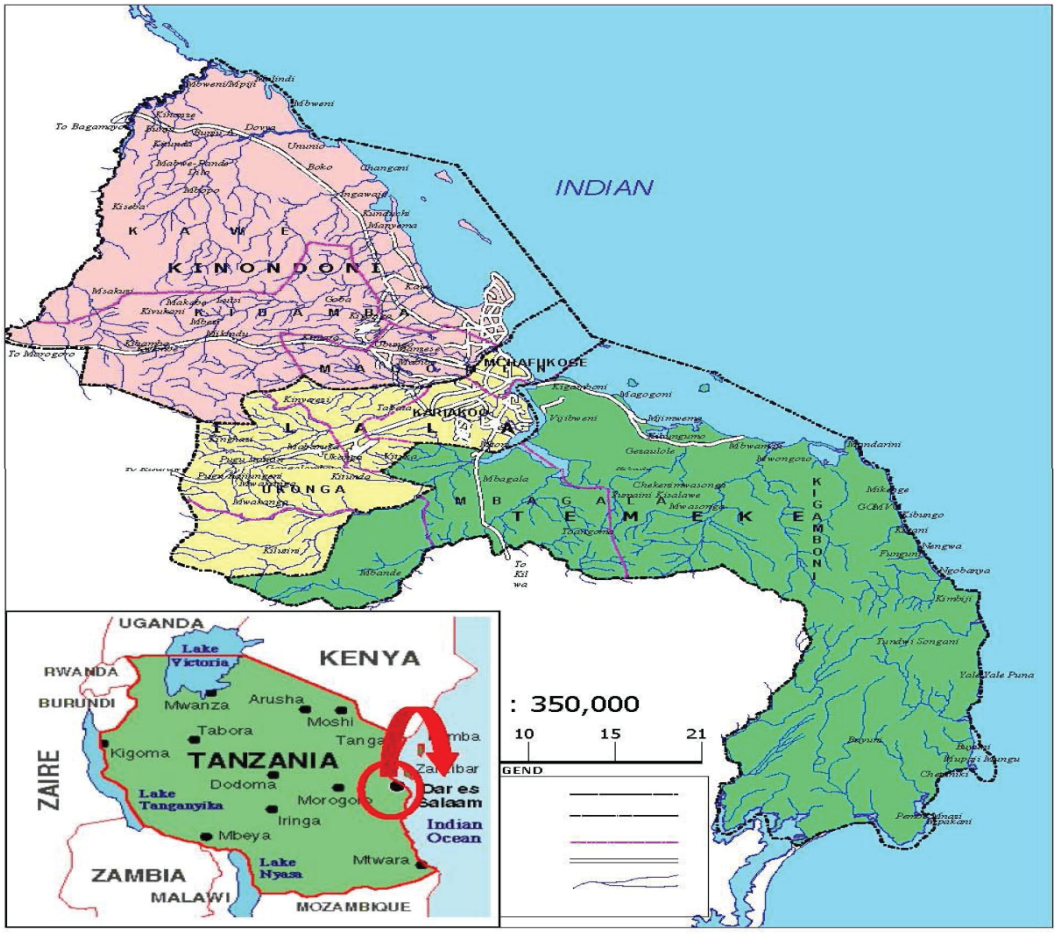

Figure 1. Location of the Study Area

Source: Cartographic unit University of Dar es Salaam.

3. Research Design and Methods

The study employed descriptive research design. This research design guided the researchers to obtain and analyze perceptions and opinions of respondents and eventually to make full description of the phenomenon at hand and establish reasons for persistent floods and their socio-economic impacts to victims in the city of Ds res Salaam.

The target population included households in flood prone areas as well as disaster management related personnel in the city. Heads of households in floods prone areas were identified in Msimbazi valley

(150), Jangwani (155), Msasani (45), Kigogo (52) and Magomeni (48). Disaster management personnel included people in the department of disaster management (65), Tanzania meteorological agency (55) and Dar es Salaam regional commissioner (30). Hence the total target population was 600 people (Table 1).

Table 1. Target Population

Category of Respondents	***Target population***	***%***
Respondent in floods prone areas		
Msimbazi valley	150	25
Jangwani valley	155	25.8
Msasani	45	7.5
Kigogo	52	8.7
Magomeni	48	8
Disaster management personnel		
Department of disaster management	65	10.8
Tanzania meteorological agency	55	9.2
Dar es salaam regional commissioner	30	5
Total	600	100

The sample size comprised of 450 respondents from the total population of 600 people. The sample size is 75% of total population. The researcher employed simple random sampling technique to obtain the sample size. The sample size from each category is shown in Table 2.

Table 2. Sample Population

Category of Respondents	***Sample population***	***%***
Respondents from floods prone areas		
Msimbazi village residents	113	25.0
Jangwani valley residents	116	25.8
Msasani	34	7.6
Kigogo	39	8.7
Magomeni	36	8.0
Disaster Management Personnel		
Department of disaster management	49	10.8
Tanzania meteorological agency	41	9.0
Dar es salaam regional commissioner	23	5.0
Total	450	100

A questionnaire was administrated to the selected sample population. The frequencies and percentages were used to descriptively analyze data collected. Thematic data analysis was used to analyze qualitative data.

4. Findings and Discussion

4.1 Respondents Profile

A total of 450 people responded to the questionnaire where 180 were males and 60 were females (Table 3). Out of 450 respondents 121 were of age group below 30years, 211 were between 30-40years, 59 were between 41-50years and another 59 respondents were above 50years of age.

Table 3. Respondents Profile

Categories	*frequency*	*%*
Sex		
Male	180	40
Female	270	60
Total	450	100
Age group		
Below 30 years	121	26.9
30-40 years	211	46.9
41- 50 years	59	13.1
Above 50 years	59	13.1
Total	450	100

Most respondents had pre-primary school education, followed by those with primary school education, secondary education, diploma, and degree in descending order (Table 4).

Table 4. Respondents' Education Level

Education level	***Frequency***	***%***
Pre- primary school education	140	31.11
Primary School Education	100	22.22
Secondary Certificate	91	20.22
Diploma	74	16.44
Degree	45	10.00
Total	**450**	**99.99**

4.2 Reasons for Persistent Floods in Dar es Salaam

The study findings show that the major reasons as to why floods persistently occur in Dar es Salaam include that, the local authority do not adequately enforce land policies and legislations, this response had a mean score of 0.45 (very satisfactory) followed by the poor institution capacity in enforcing land use planning and legislation with a mean score of 0.55 (Very Satisfactorily). The third reason appeared to be poor and inadequate infrastructure to support rapid urbanization with a mean score of 0.75 (very satisfactory). This is in line with a report by Kreibich and Lindner (2006) who reported that Dar es Salaam is one of the fastest-growing cities in Sub-Saharan Africa but over 70 per cent of the city's residents live in informal, unplanned settlements that lack adequate infrastructure and services. The other reasons mentioned were poor drainage system with a mean score of 0.72 (very satisfactory), blockage of water channels with a mean score of 0.68 (very satisfactory) and unplanned settlements with a mean score of 0.90 (very satisfactorily). Again this well connects with findings by Kreibich and Lindner (2006). The photograph in figure 1 support the perceptions by respondents that blockage of water channels is one reason for persistent floods in Dar es Salaam where the photograph show houses built in a water channel in the Jangwani valley which could otherwise allow water passage to the sea. The photograph is a representation of many such settlements within river channels that the researcher observed during field work.

Figure 2. Photograph Showing Settlement in Jangwani Valley Blocking Drainage System

Uncoordinated urbanization which leads to slums in flood prone areas with the mean score of 1.225 (satisfactory) and unchecked environmental drainage degradation with a mean score of 1.233 (satisfactory) are other reasons behind persistent floods in Dar es Salaam mentioned by respondents. Another reason for persistent floods in Dar es Salaam perceived by respondents is that since land use planning is centralized local authorities lack the capacity to monitor and supervise human settlements, this had a mean score of 1.55 (fair satisfactory). Furthermore, respondents perceived that poverty and

lack of awareness among individuals are other reasons which lead to persistent floods in Dar es Salam with a mean score of 1.61 (fair satisfactory). The findings are in line with the report by Mwakyusa (2014) who reported that in 2014 residents in Dra es Salaam had returned to the flood-prone low-lying areas just two days after flooding, as this can be attributed to poverty i.e. people have no alternative. But also this can be peoples' failure to analyze the consequences and the multiplier effects of their actions, this can partly be attributed to lack of awareness. According to Mwakyusa (2014) the Dar s Salaam Regional Commissioner made a statement that in 2014 the government could neither stop people from returning to such floods prone areas nor it could evacuate those already into such areas since residents had already filed a case in court opposing eviction of people from such areas. This supports the findings that poverty and ignorance (lack of awareness) are among reasons for flooding events in the city. Conclusively the identified factors are significant reasons since they reveal a very satisfactory mean as per the rating scale (Table 5).

Figure 3. Photograph Showing Houses Almost Inundated from Flooding Water in Magomeni Area in 2015

People can be seen standing on top of roofs as a way to save their lives from a threat to be swept away by floods.

Table 5. Reasons for Persistent Floods in Dar es Salaam

Reasons for floods in Dar es salaam turning to disaster	***Mean***	***Interpretation***	***Rank***
Poor institutional capacity in enforcing land use planning regulations.	0.55	Very Satisfactory	2
Local authorities do not adequately enforce land policies and legislation	0.45	Very Satisfactory	1
Uncoordinated urbanization resulting to increased	1.225	Satisfactory	4

slums in floods prone areas.			
Land planning decisions are centralized, local authorities lack the capacity to monitor and supervise human settlement.	1.552	Fairy Satisfactory	6
Unchecked environmental drainage degradation.	1.233	Satisfactory	5
Poverty and lack of awareness among individual	1.561	Fairy Satisfactory	7
Poor and inadequate infrastructure to support rapid urbanization.	0.75	Very Satisfactory	3

4.3 The Effects of Floods

During interview with key informants, it was reported that one of the effects of floods in Dar es Salaam has been people losing life. One of the respondents in Msimbazi narrated that a number of people lost their lives following the outbreak of dreadful epidemic which was a result of post- floods disasters that were caused by El-Niño in years 1990, 1997, 2011 and 2012. He added that most people who were found dead were women and that most of the female deaths were caused by drowning and trauma. Another reason could also be the number of women living in the flood prone areas is always greater than that of men. Findings from key informants reveled that people of old ages have been more vulnerable to floods; this was attributed to the fact that younger people might decide to take risk of swimming in floods, whereas elderly cannot, instead they opt to remain inside flooded buildings where they ultimately succumb to death there being no means to rescue them. Similar findings were reported by Red Cross (2011).

Table 4 depicts effects of floods on economy and income of victims. From table 6 it can be learnt that according to respondents, persistent floods in Dar es Salaam is one reason for unemployment among Dar es Salaam residents particularly those who stay in flood prone areas. This is perceived to be the most effect of persistent floods in Dar es Salaam. This goes hand in hand with the response that due to flooding events many businesses have been destroyed. Table 6 also indicates that floods have resulted into property damages including houses being swept away. By implications floods have led to people becoming homeless. Not only that but also the number of dependants have increased in Dar es Salaam partly because of persistent floods. The effects of floods mention in table four suggests that flooding events in Dar es Salaam destroy people's economic status and hence aggravates poverty. These findings also suggest that persistent floods in Dar es Salaam results into weakening the social status of Dar es Salaam residents in the sense that being homeless and having food stocks swept away severely undermines one's social status. Hence, poor communities may therefore be particularly vulnerable, especially when concentrated in high-risk and often environmentally degraded areas (http://www.ipcc.ch/). It is recognized that such communities tend to have more limited adaptive capacities, they are also more dependent on climate-sensitive resources such as local water and food

supplies, and are more easily overwhelmed than richer communities (http://www.ipcc.ch/). Location of settlements in the flood plains, cultivation of crops along slopes adjacent to the floodplains causing massive erosion and destruction of trees in the catchments, lack of awareness of the flood hazard by the local communities where the capacity of the soil to absorb water is reduced due to erosion or existence of concrete, and poor building materials leading to non-resistant structures and foundations that cannot withstand the running waters and high risk infrastructure are some of the factors contributing to vulnerability to floods.

Table 6. Effect of Floods on Economy and Income of Victims

Effects	***Mean***	***Interpretation***	***Rank***
Many business have been destroyed	1.554	Fairy Satisfactory	4
Many houses swept and properties have been damaged	1.249	Satisfactory	2
Many people have lost job in the area.	1.239	Satisfactory	1
Number of dependants has increased in the area.	1.252	Satisfactory	3
Average Total Mean	1.324	Satisfactory	

The evacuated residents in flood prone areas in 2011 were relocated at Mabwepande in the outskirt of Dar es Salaam. The researchers visited some victims of floods at Mabwepande with the aim of examining the post-floods situation among victims. The interviewee at Mabwepande reported that they are seriously affected by floods, they lost their beloved ones, and that larger share of their properties was taken by floods; they are now very poor; no foods and no shelter. The situation is alarming. They explained that they no longer wish to return to their previous residential areas, because of the lessons they have experienced. One of the victims explained to the researchers that “we are in a real food crisis, everything is scarce, majority of our children are facing challenges of malnutrition, lack of secure shelter and some are even not going to schools”.

According to the research findings social hazards emanating from flood related disasters in Dar es Salaam reveal that there are an increased number of orphans, separations, diseases outbreaks, increased crime rates and general immorality (Table 7). According to the World Health Organization (WHO), flooding can increase exposure to toxins and pathogens, may have implications for mental health, and can disrupt the capacity of health care systems to respond to health crises. During focus group discussion, group members also mentioned that floods have also caused a great destruction of public infrastructures.

Table 7. Social Problems Emanating from Flood Related Disasters in Dar es Salaam

Social problems	*Mean*	*Interpretation*	*Rank*
The number of orphans has increased due to floods	1.567	Fairy Satisfactory	4

Separation of families has increased due to floods	1.232	Satisfactory	1
Diseases have increased due to floods.	1.553	Fairy Satisfactory	3
More crimes have come up due to flood related disasters.	1.652	Fairy Satisfactory	5
Immorality has increased due to flood related disasters.	1.255	Satisfactory	2
Average Total Mean	**1.211**	**Satisfactory**	

5. Conclusion and Recommendations

From the study finding it is clear that most reasons given for the persistent flooding events in Dar es Salaam are mainly a result of some failures of policy implementers and legislation enforces. Policy implementation and legislation enforcement are the central issues. There should be efforts directed towards ensuring that policies are well implemented and legislation enforced in the interest of proper environmental management and sustainable development of the city. Different actors at different levels should act as per prescribed policies. Local authorities need to ensure that city plans are in place and well implemented; respective laws and by-laws are taken up against any developments that goes against prescribed plans. This includes ensuring that floods prone areas are kept out of reach of human settlements. Development and mantainace of drainage systems should be one of the important agendas among local authorities. Policy practitioners need to ensure that the general infrastructure keeps pace with the on-going rapid urbanization, the experience of Winnipeg and the government's reaction explained before can serve as a good example for sustainable city developments. Poverty alleviation and awareness creation need to be one of the important developmental agendas in the city of Dar es Salaam.

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