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## ACQUISITION OF LAND IN FLOOD-RISK INFORMAL SETTLEMENTS IN DAR ES SALAAM

### Choices and Compromises

<sup>1</sup>Emmanuel Fares Kemwita, <sup>2</sup>Wilbard Joseph Kombe, <sup>3</sup>Huba Mary Nguluma

<sup>1</sup> Assistant Lecturer, School of Spatial Planning and Social Sciences (SSPSS), Ardhi University, PO Box 35176, Dar es Salaam, Tanzania. Phone: +255718917156, email: [fares.kemwita@gmail.com](mailto:fares.kemwita@gmail.com), ORCID: <https://orcid.org/0000-0002-6173-541>.

<sup>2</sup> Prof. Institute of Human Settlement Studies (IHSS), Ardhi University, PO Box 35176, Dar es Salaam, Tanzania. Phone: +255754554126, email: [Kombewilbard@yahoo.com](mailto:Kombewilbard@yahoo.com), ORCID ID: <https://orcid.org/0000-0001-9117-949>.

<sup>3</sup> Prof. Institute of Human Settlement Studies, Ardhi University, PO Box 35176, Dar es Salaam, Tanzania. Phone: +255786022029, email: [huba8660@yahoo.com](mailto:huba8660@yahoo.com), ORCID ID: <https://orcid.org/0000-0001-7875-8792>.

#### ABSTRACT

##### Context and background

Residing in flood-risk informal settlements is more or less regular among low-income households in most cities of developing countries. While living in such settlements presents a challenge to the quality of life, many among the urban poor resort to settle in these areas.

##### Goal and objectives:

This paper's focus is understanding why urban residents may choose to settle in areas that are considered flood prone. To understand this phenomenon, the factors that drive urban residents to acquire land and build houses in such areas are analysed.

##### Methodology:

Msasani Bonde la Mpunga in the city of Dar es Salaam was selected as a case study area. Data were collected using household questionnaires, key informant interviews, focus group discussions (FGDs) and field observations. Quantitative data were analysed using SPSS software, while for qualitative data, thematic and content analysis were employed using MAXQDA.

##### Results:

Reasons for opting for land in marginal areas, including flood-prone sites, include; proximity to workplaces, easy and cheap land access, convenient access to social services, and connections to neighbours and friends. Others who had come in the settlement as tenants due to high proximity to low rental prices, later acquired land in the area. Other reasons include failure to acquire planned plots due to stringent procedures such as urban planning and house construction standards. Poverty and little awareness about flood risk were also contributing factors for people to acquire land in the area. Whilst the findings reveal that multiple factors shape home builders' decisions to acquire land in flood-risk areas, the paper calls for rethinking the strategies and opportunities for housing land delivery for low-income households in urban areas.

##### Keywords:

Risk, flood risk, informal settlements, Land acquisition, residence, risky decisions.

## **1. INTRODUCTION**

The rapid urbanisation trend is an urban planning concern, especially in developing regions. Urbanisation, coupled with climate change, imposes a crucial challenge to the welfare of citizens in cities. Among the challenges include; poverty, inequality, and environmental hazards such as floods, among others (Ziervogel, 2019). Globally, floods contribute to over 5000 deaths, 10 million displaced persons and approximately 40 billion in economic losses per annum (CRED, 2020; IDCM, 2020). In African cities, flooding contributes to significant disruption of livelihoods with extensive consequences for economic activities and access to services (Douglas, 2017). Besides this, a substantial percentage of the urban growth population in cities is unprogrammed and exists as informal human settlements. These settlements lack formal engineering measures for guiding construction, hence low quality of construction, rendering them vulnerable to extreme natural disasters such as flooding (De Risi, 2013). Regardless of these flood disruptions, over half (56%) of the world population lives in cities, where out of ten residents in the world, seven reside in developing regions (UN-Habitat, 2022). This population is expected to grow by 2.5 billion by 2050 (United Nations, 2018). As such, more people in cities will likely acquire land and build houses in flood-prone areas because of limited land for urban expansion.

The settlement can be categorised flood-risky area after evidence of consequences for something valuable that makes them vulnerable to their impacts (Wisner et al. 2003). Some scholarly works have explained that disasters encompass results of the individuals living in a settlement that they inadequately adapted to (Osuteye et al., 2017; Satterthwaite et al. 2020 & Satterthwaite et al., 2018). However, this can not be considered a general rule and justification for people to acquire land and build houses in flood-risk areas, but can lean into a critical understanding of the reasons (influences) that lead to people's decision to live in such areas. This paper focuses on the factors that may influence urban residents to construct buildings in locations categorised as flood-prone. This understanding can help to inform the designs and execution of flood risk reduction actions, including the authority and community members forced to reside in flood risk areas.

This section has contextualised the subject of study. The remainder of this paper is organised as follows; section two presents a reflection of critical literature on the subject matter, and section three explains a theoretical discourse illuminating the decisions of residents to acquire building/housing land in flood-risk informal settlements. Section four expounds on the methodology, while section five presents and discusses the findings on drivers acquiring land in flood-risk areas. Lastly, section six provides conclusions from the study and policy recommendations.

## **2. LITERATURE REVIEW**

Informal settlements contribute to solving housing problems in cities, especially in developing countries, despite their vulnerability and exposure to flooding (Sakijege, 2019). Amid flooding, such settlements are seen as places where individuals' land rights are declared but not formally registered (Diab et al., 2020; Satterthwaite et al., 2020). UN-HABITAT (2010) argues that residents in informal settlements have rights to protected occupancy and are obliged to improve their quality of life. Parodi et al. (2021) note that in informal settlements, multiple hazards such as loss of life, environmental degradation and flood risks are evident.

Flooding is a disastrous event worldwide, with a prediction that it will increase in the coming decades due to human influence, climate change and urbanisation trends (Tempest et al., 2017; Zehra et al., 2019). Many countries suffer from flooding, especially in Asian and African countries (Okaka & Odhiambo, 2019). Africa stands among the two continents affected mainly by flood hazards (CRED, 2015). In Sub-Saharan Africa (SSA), Tanzania is no exception flood hazards remain the leading threat and a recurrent disaster among other climate change-related hazards (The World Bank & GFDRR, 2016). Unproportionately, flood hazards primarily affect informal settlements that, by and large,

accommodate the urban poor (Okaka & Odhiambo, 2019; Abunyewah et al., 2018).

The urban poor tend to acquire land in informal settlements, which are exposed to high risks of global climate changes, like; low-lying areas, steep slopes, river basins, unregulated slums, hillsides, open sewers and ravines (Williams et al., 2019; John, 2020; Abunyewah et al., 2018). Most urban poor face high flood risks because of urbanisation trends and climate change effects (Alirol et al., 2011; United, 2018; Kuddus et al., 2020). Jahangir (2018) argues that increasing urbanisation and rapid urban population growth increase the demand for urban housing and land for buildings. This dichotomy drives up competition for the limited urban land, leading some urban land seekers to acquire land and erect houses in flood-prone areas (Lindley et al., 2015). Ahiablame & Shakya (2016) argue that inadequate land use planning leads to the informal construction of building structures exposing residents to flood risks.

Construction of houses in flood-risk informal settlements develops outside laws and regulations regarding land ownership, land use, and even the mode of building construction is sometimes rampant (Satterthwaite et al., 2020; URT, 1997). Some residents build houses in flood-prone informal settlements to escape the stringent formal land use planning standards, procedures, and registration fees (UN-HABITAT, 2010). As a result, most houses constructed in such settlements need to prepare to cope with climate change hazards, and they face high flooding risks because of poor construction techniques and supervision (Salami et al., 2017; Kikwasi & Mbuya, 2019).

Some countries have demolished houses in flood areas because they are inefficacy to face climate change hazards, including flooding (Phiri, 2014). Others collaborate with inhabitants to improve tenure, secure housing conditions and public services, and provide basic infrastructure to increase resilience and adaptation capacity to climate change hazards (Satterthwaite et al., 2020). The interesting question is, do these interventions influence low-income households seeking land for housing, opting for land in flood-prone areas?

In Tanzania, studies have shown that approximately 80% of urban dwellers live in informal settlements (Sakijege et al., 2014). The current Master Plan of Dar es Salaam (URT, 2016) reports that the city suffers severely from floods yearly, affecting thousands of residents. For example, more than 400 households, equivalent to more than 2,000 people, are displaced annually, experiencing damages and losses of their properties. Despite the predicted increase in flood risks, some urban dwellers continue to acquire land and build residences in flood-risk informal settlements.

Flood risks in informal settlements have been widely discussed in previous studies across scholarly works in different perspectives, methods and techniques. Some scholars, for instance, Ramiaramanana & Teller (2021), use socioeconomic factors to examine why flood-prone areas keep accommodating part of the population. Kikwasi & Mbuya (2019) examined the vulnerability of building structures to flooding; Okaka & Odhiambo (2019) assessed the perceptions of households in flood risks in informal settlements; Sakijege (2019) calls for mainstreaming disaster risk reduction into housing development in informal settlements; John (2015) argues on social vulnerability to climate change-induced floods in informal settlements underscoring the low-income people as the most affected group. Zehra et al. (2019) assessed flood risks in informal urban settlements highlighting several challenges such as diseases and floods to mention but a few. In these studies, the reasons that influence urban home seekers to acquire land in flood-prone areas, much as land use policy, laws and regulations prohibit it, have yet to be covered; this is worth addressing in this paper.

Although studies have categorised flood-risk informal settlements as dangerous areas for habitation (Salami et al., 2017; URT, 1997; John, 2020; Abunyewah et al., 2018) and that such settlements are relatively occupied by poor people (Sakijege, 2019; John et al., 2019; John, 2020), literature remain inconclusive regarding drivers of decisions to acquire land for construction in flood risk informal

settlements. Related studies have discussed methods for studying flood risks for human settlements. For instance, Askman et al. (2018) used qualitative methodology and covered rural, semi-rural and urban contexts in Akuressa, Sri Lanka. Okaka & Odhiambo (2019) employed mixed methods, i.e. qualitative and quantitative, in Mombasa, Kenya and employed surveys, key informants and Focus Group Discussions (FGDs) to examine households' perceptions of flood risks in informal settlements. This study uses quantitative and qualitative methods to understand what drives residents' choices to acquire building land in flood-risk informal settlements in Dar es Salaam City. In doing so, the paper intends to bring to light; (i) The categories of residents who acquired land in flood-risk informal settlements; (ii) Decisions that drive their risk decisions to acquire sites for residence in flood-risk informal settlements.

### **3. FLOOD RISK IN INFORMAL SETTLEMENTS –A THEORETICAL DISCOURSE**

Durodie (2004) describes “risk” as something that happens to people and requires reactive responses to forces seemingly beyond control. Lupton (1999) and Kemshall (2002) assert that understanding risk requires humans' ability as active negotiators of risk. The authors add that people make choices about acceptable risk levels, negotiating and managing risks related to their current lives.

Santos et al.(2020) view flood risk as the probability of a flood occurring, directly and indirectly, influencing people, property, and infrastructure. Bates & Roo (2000) categorise flood risk into three fundamental levels of flood risks: the hazard (i.e., physical characteristics involving flood events and its return period), vulnerability (i.e., the potential consequences of risk events composed of exposure and susceptibility to damages) and the perception of the risk, that is how impacted stakeholders are in viewing risk effects in preference to their current needs. These three levels of flood risks, namely; hazards, vulnerability and perception, raise debate on the drivers that influence urban home seekers, especially the low-income communities, to settle in flood-risk areas.

According to Merz et al. (2004), flood hazard entails the exceedance probability that a flood can cause potential physical damages in a locality under a specific period. Birkmann (2007) adds that the magnitudes and scale of damages resulting from flooding are not only influenced by the characteristics of a flood but combine the vulnerability profile of an area. Birkmann et al. (2013) support that not all hazards are automatically disasters; catastrophic events depend on the level (degree) of vulnerability the population is to disaster risk. This phenomenon suggests that seekers of land for building may choose to settle in flood-risk areas when they believe they can cope with flood events in a given settlement. Merz et al. (2007) note that flood vulnerability involves elements at risk, such as; residents who settle in flood-prone areas, the built environment or any ecosystem subjected to flood risk exposure. Oubennaceur et al. (2022) categorise vulnerability into two components; exposure and susceptibility to damages. The exposure includes the urban settlers and their surrounding environment, while susceptibility is described by a depth-damage curve that is the percentage damage or estimated economic loss to buildings' structural integrity (Aronica & Thielen, 2009). Wisner et al. (2004) & Kuhlicke et al. (2011) add that exposure and susceptibility create resilience as the community tries to cope with risks.

While hazards and vulnerability are treated as objective measures of risk analysis, risk perception is considered a subjective and vital component in the flood risk management context (Kellens et al., 2011). Flood risk perception entails evaluating the possibility of a hazard and the perceived probability of the consequences (Lechowska, 2018). According to Lechowska, flood risk perception embodies three specific factors; awareness, worry, and preparedness. This assertion suggests that flood risk perception controls residents' attitudes and the possible behaviour toward acquiring building land in flood-prone areas.

Embedded in flood risk components (hazards, vulnerability and risk perceptions), Vogt et al.(2008) note that some building land seekers may find flood risk areas suitable if such places can offer lifestyles matching their needs. Vogt and colleagues add that people value what the area offers and choose to invest there despite the awareness of flood risks. This condition may apply in informal flood-prone settlements, where residents may value the perceived current problems, such as housing and ignore flood risk worries. Kawasaki et al.(2020) argue that poverty incidences are among the drivers of urban residents settling in flood-risk areas, hoping to prepare and cope with it.

Lechowska (2018) notes that the perceived possibility of flood risk occurrence, its frequency and effects, that is, losses of lives or damages to property, are attributes that may drive people to choose flood-prone areas. Wachinger et al. (2013) posit that physical damages to property in flood-risk areas, social context, and past experiences with flood risks make land/home seekers acquire land in flood-prone areas. Mertens et al. (2018) argue that new residents prepare to take precautionary measures through neighbours about protective response efficacy to flooding. Some residents communicate with neighbours on flood risk coping techniques like the affordability of structural measures (efficacy response) such as; home elevations, application of water barriers, higher elevations of electrical appliances and building with waterproof-building materials (Botzen et al., 2013). Some land seekers assess technical know-how regarding measures to prevent flood risk before settling in flood risk (Bubeck et al., 2018). Bubeck et al. (2012) highlight risk attitudes, social norms and public-flood risk management policies as important drivers.

Risk attitudes are related to options that, in real-life, involve risk-taking and are partly determined by preferences of risks undertaken by decision-makers (Reynaud & Aubert, 2019). People may decide to live in flood-risk areas because they have an attitude toward taking risks; they weigh flood risks in preference to the necessary choices they have at a particular time (Wang et al., 2018). Residents correctly assess the likelihood of adverse events or risks to ascertain that it possesses linear probability before making decisions (Botzen et al., 2013). Social norms, among other factors, may drive residents' decisions to live in flood-risk informal settlements. For example, some people are likely to acquire building land in flood-prone settlements if they find their friends and relatives residing in such areas (Bubeck et al., 2013).

Additionally, in the public sector, individuals' risk decisions to settle in flood-prone areas may be influenced by stringent planning standards and construction procedures enforced by formal institutions such as; building codes, building regulations, development control and human settlement policies (DELWP, 2019). For example, the conditions of elevating homes to specific standards may motivate people to take risky decisions to acquire plots in flood-risk areas because it increases their protective motivation (Aerts et al., 2013). For instance, after severe natural floods, the Federal Government of the United States compensates to assist residents' recovery (Kousky et al., 2018). The authors opine that such policy decisions may lower the economic motives of residents to take actions that limit flood risks. For example, following the 2011 flash floods in Dar es Salaam, the government of Tanzania offered token financial assistance to the affected communities for recovery (John et al., 2019). As a result, some resettled flood victims from different parts of the city returned to the same flood risk settlements after receiving some financial assistance (John et al., 2019). From this review, multiple factors and contexts may drive land home seekers' decision to acquire/access land and build in flood-prone areas.

#### **4. METHODOLOGY OF THE STUDY**

##### **4.1 Research approach and selection of cases**

This paper adopted a mixed-method case study design embodying qualitative and quantitative approaches. It was rooted in an extensive and “in-depth” description of some social phenomenon, the availability of the contemporary phenomenon in a real-life context, and the possibility of having

investigators control and access actual behavioural events (Yin, 2018). The case study design was considered appropriate for understating and exploring decisions prompting urban dwellers to live in flood-risk informal settlements.

Dar es Salaam was chosen as the best-fit case study city because it is geographically located along the most vulnerable areas in regional coastal cities (CLUVA, 2013). Thus, it portrays a high-level exposure to flood risks and informalities (Pan-African START Secretariat, International START Secretariat, Tanzania Meteorological Agency (TMA) & Ardhi University (ARU), 2011). The authors add that Dar es Salaam city has poor basic infrastructure services, such as; inadequate drainage systems, the possibility of ocean surges, local flash and riverine floods, and the city's vulnerability to sea-level rise, coastal inundations and storm surges. The case study area was selected based on various criteria. These include; informal settlements in flood-prone areas, settlements experiencing frequent flooding, settlements with various building typologies and settlements that have been declared a flood. Based on these criteria and a study by START, TMA & ARU (2011), Msasani Bonde la Mpunga settlement was selected.

#### **4.2 Data collection methods and sampling procedures**

Multiple methods were used to collect data. These include; household questionnaires, interviews, observation and mapping. Household questionnaires were administered to 188 households with systematic random sampling from 1825 households. At least every five-household unit was considered in the household group. Household units not found during the survey and children under 18 years were skipped, and the next nearby house was approached. Skipped households were later on traced back for interviews. Questionnaires gathered information about decisions that prompt residents to acquire building land in flood-risk informal settlements and the categories of settlers living there.

Fifteen key informant elders, i.e., 60+ years and those living near the flood streams, were purposely selected through snowballing technique and interviewed through Semi-structured questions. These provided in-depth information on what drove residents into the informal flood risk settlement of Msasani Bonde la Mpunga. Also, twelve government officials were interviewed; three from Kinondoni Municipal Council (KMC), three from the Architects and Quantity Surveyors Registration Board (AQRB), four from the National Environmental Management Council (NEMC) and two from the Contractors Registration Board (CRB). These provided information about the reasons that influence urban land seekers to acquire land and build in flood-prone areas despite land use regulations prohibiting it. Observations and mapping techniques were also deployed to capture the living conditions of people in flood-prone areas. Transect walks were also carried out, involving the principal researcher and the research assistants.

Data collected through questionnaires were structured and administered using Open Data Kit (ODK) software installed in the mobile phones of the principal researcher and field assistants to reduce paperwork. These data were transferred to Statistical Package for the Social Sciences (SPSS) and Spreadsheets (Excel) programs for analysis. Semi-structured interviews were recorded and later on transcribed. Both key informant households and government officials permitted interview recording in the Swahili language. Recorded interviews were transcribed into English and interpreted by the principal researcher. Interviews were then coded and categorised for thematic analysis with the aid of qualitative data analysis (MAXQDA) and Microsoft word programs.

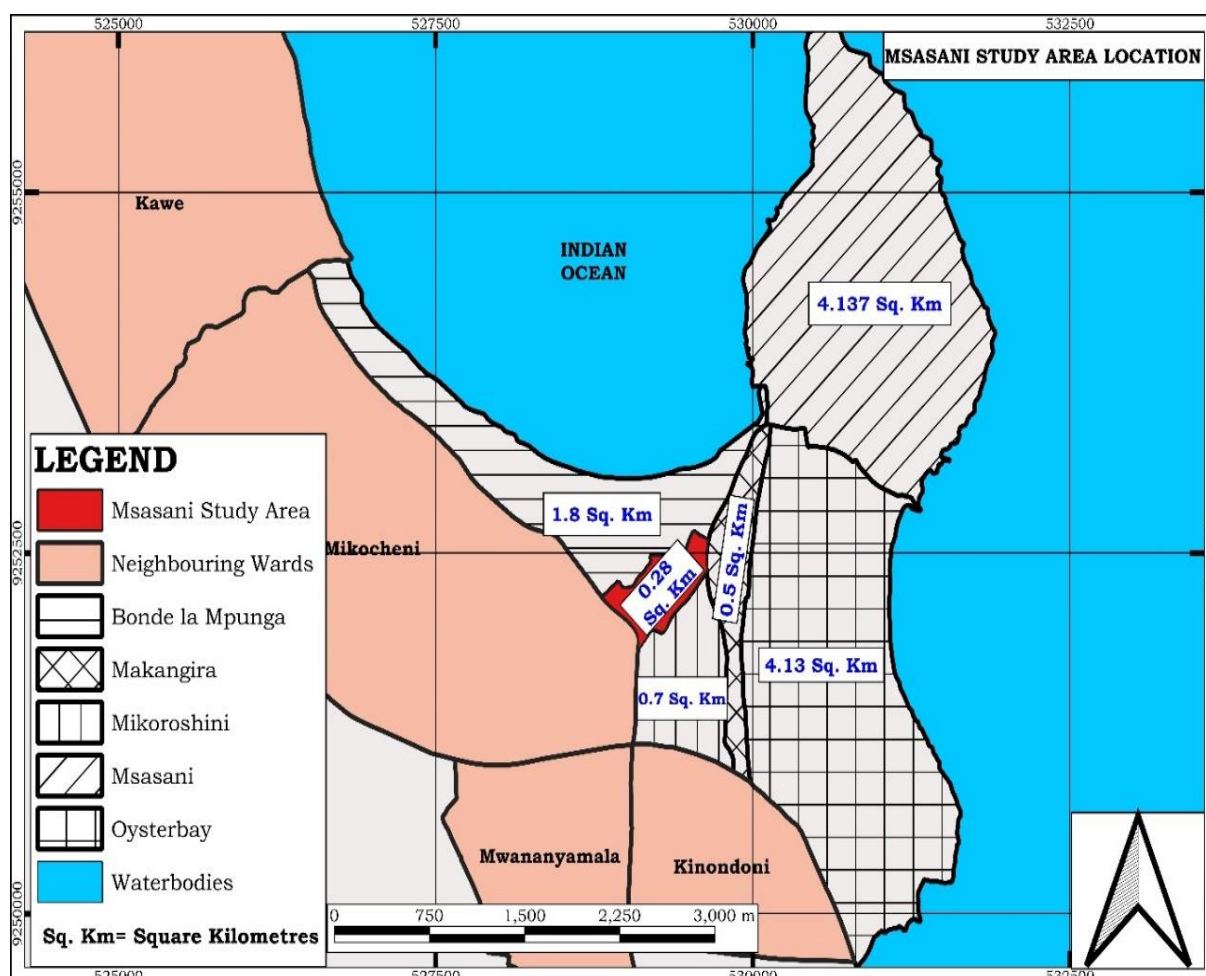
#### **4.3 The context of the study area**

Msasani Bonde la Mpunga settlement lies approximately 0 to 3-4 meters from the Indian Ocean Mean Sea Level (IOMSL). It is prone to floods (Salukele, Toamukum, & Mayunga, 2017; Juma & John, 2018).



However, the present study shows the variation of altitudes between 4-10 meters above the Mean Sea Level (MSL) because of land reclamation practices, sedimentation and alluvial deposits. The settlement is bordered by the Indian Ocean from the North (Map 1), Msasani road on the Eastern side and Maandazi road on the South-Eastern part. The old Bagamoyo road also borders it on the West and southwestern sides. Initially, the settlement was considered one of the drainage basins to the Indian ocean channelling volumes of water from the upper parts of the city of Dar es Salaam through the Kijitonyama river, University of Dar es Salaam via Sinza settlement collecting water from Mwananyamala, Tandale and Mikocheni settlements towards Indian ocean. Essentially, Msasani Bonde la Mpunga was a wetland area and outlet to the ocean as declared by the then Dar es Salaam Master plan of 1979 and was designated as hazardous and a solid waste dumping area. Initially, the settlement was used as a paddy cultivation area, hence the origin of the name *Bonde la Mpunga*<sup>1</sup>. Predominantly from the 1980s, the settlement started to undergo changes from being a wetland towards developing residential and commercial buildings (Juma, & John, 2018). Today the settlement is densely built informal/unplanned and planned residential buildings. This study was conducted in a segment with informal/unplanned residential buildings because it experiences frequent flooding.

**Map 1:** Msasani Bonde la Mpunga study area and its neighbouring sub-wards



**Source:** National Bureau of Statistics, 2017 and field study 2021

<sup>1</sup> Bonde la Mpunga is a Swahili word which means “A valley where paddy is being cultivated.”



## 5. RESULTS AND DISCUSSION

### 5.1 Socio-economic profile of Msasani Bonde la Mpunga

The findings from Msasani Bonde la Mpunga show that demographic and socioeconomic characteristics like; gender, education, employment, income and economic activities can be used to assess the status of households living in flood-risk areas. Johnson (2017) notes similar findings in the United States supporting that the capacity of individuals to cope with hazards such as floods differs depending on factors such as age, ethnicity, income, education and living situation.

Table 1 summarises the Socioeconomic characteristics of Bonde la Mpunga. About 188 household heads in Msasani Bonde la Mpunga were involved in the household questionnaire. Most of them (60%) were males aged between 18 years to 70s, and the rest were females. Concerning the education level, as shown in Table 1, half of the households (50%) were secondary school leavers, whereas less than 4.8% were graduates from Universities and Colleges. The households contributing more than half of the settlers as secondary leavers or graduates contradict observation by several scholars who have argued that the lowest level of education most likely settles in informal flood-prone areas (John, 2015; Nchito, 2007; Dube et al., 2018; John, 2020). This argument further suggests that the level of education does not necessarily influence the acquisition of land for residence in flood-risk informal settlements.

**Table 1:** Socioeconomic characteristics of Bonde la Mpunga (n=188)

Socioeconomic characteristics	Study settlement	
	Msasani Bonde la Mpunga	
<i>Sex</i>	N	%
Male	115	61.17
Female	73	38.83
<i>Educational levels</i>		
Primary	85	45.21
Secondary	94	50
Tertiary	9	4.79
<i>Sources of income and economic activities</i>		
Self-employed (petty trading)	157	83.51
Privately employed (private sector workers)	22	11.70
Government employees (public sector workers)	9	4.79
<i>Estimated income levels (monthly)</i>		
More than TZS 2,000,000 (862 USD)	2	1.06
Between TZS 1,000,000 (431 USD) -TZS 2,000,000 (862 USD)	19	10.11
Between TZS (500,000 (215.5 USD) -1,000,000 (431 USD)	8	4.26
Between TZS (300,000 (129.3 USD)-TZS 500,000 (215.5 USD)	24	12.77
Less than 300,000 TZS	135	71.80
<i>Household occupancy</i>		
House owners	136	72.3
Tenants	50	26.6
Others	2	1.1
<i>House types</i>		
Single storeys	169	89.9
Multistoreys	19	10.1

Source: Authors' construct, 2021

Regarding sources of income and economic activities, field results revealed that more than 80% of households (Table 1) are self-employed in informal sector activities, such as; petty trading, carpentry works, welding, selling vegetables, retail shops enterprises, fishing and masonry work. These are typical income-generating activities for low-income households, as has been confirmed in scholarly works (Dube et al., 2018; John, 2020; Sakijege et al., 2014). The results in Table 1 also show that most households (71.8%) earn less than TZS 300,000 (129 USD) as low-income earners. However, other results indicate that more than 25% of households' earnings are above TZS 300,000 (129.3 USD). Such difference in earnings between households implies that acquiring land in flood-prone areas is not only influenced by income. This argument is supported by some of the observations made on the qualities of houses in Msasani Bonde la Mpunga, where almost 10% (see Table 1) of the homes observed were fancy and of multistorey category, indicating a promising income to such households despite living in the flood risk area.

Results further show that there are also few middle-income persons earning a monthly income range between TZS 500,000 (215.5) to TZS 2,000,000 (862 USD) as middle-income households. This postulation suggests that even the not-so-poor may decide to build and settle in flood-prone areas, as observed by Kikwasi & Mbuya (2019), John (2020) & Dube et al.(2018). The not poor also may choose to build and settle in flood-prone areas probably because they can meet the high cost of adapting to the hazards such as floods or settling before flood incidences were noticed. This opine supports the argument of Askman et al. (2018), who note that some residents face flood risks when already establishing their permanent settlements. It suggests further that people acquiring land in low-lying areas susceptible and exposed to flooding are, therefore, not necessarily low-income, as observed by Sakijege et al.(2014) & John et al.(2019).

The presence of middle-income households in Msasani Bonde la Mpunga opposes UN-HABITAT (2010) observations that low-income earners are most likely to resort to informal flood-prone areas because they can not afford better areas in the city. Regarding house ownership, results show that most households (more than 70%), as shown in Table 1 were house owners, and more than 25% were tenants, but a small proportion (1.1%) were housekeepers. The presence of tenants in flood-prone areas suggests that despite flood risk incidences, some house owners chose to rent houses in Msasani Bonde la Mpunga. Gastinger et al. (2017) support the findings by noting that in Dar es Salaam, most people including tenants find themselves in flood-risk areas because of inadequate housing supply in areas safe from the incidence flooding.

## **5.2 Decisions to acquire land in flood risks: choices and compromises**

Based on field results, the reasons for acquiring building land in Msasani Bonde la Mpunga are diverse. Households and government officials gave responses. Based on households' responses regarding when they shifted to the settlement, three flooding phases were highlighted. While some residents had settled in the area during the moderate flooding period, others came in the preliminary period of limited flooding. Yet, others settled during the perennial flooding (see Table 2). Multiple factors prompt residents to make decisions to acquire building land in flood risk areas. These include; proximity to workplaces, Proximity to low rental prices, access to cheap land and availability of public services. Other factors which had relatively insignificance include; access to recreation, relatives, friendship and neighbourhood concerns (Table 2).

### **5.2.1 Cheap and affordable land**

Access to cheap land was revealed among the drivers that prompted residents to acquire building land in Msasani Bonde la Mpunga. In all three flooding phases, results show that about 25% of residents were driven by optimism about access to cheap land (Table 2). As expected, land and housing in flood-risk areas would be more affordable. Dudzińska' et al. (2020) assert that properties such as land and buildings are priced low if they are susceptible to flood risk. This explanation

suggests that residents may opt to acquire land in flood-prone areas because of expecting to purchase cheap and affordable land for housing construction. One key informant male aged 72 years, narrating what drove him to acquire a building land in Msasani Bonde la Mpunga, noted:

*"The most important reason I acquired land here was the influence of cheap access to land for residence. Access to land here was not as cumbersome as it appears today. The process of getting it also was easy and friendly, as just a verbal agreement was used to access a plot. You only need a connection and network with your friends and relatives around you. These things attracted me to settle here".*

From the caption above, it appears that the problem of floods was not considered. This argument shows how affordability can influence the decision to acquire land regardless of environmental challenges.

**Table 2:** Factors influencing land acquisition in a flood-prone area

Moderate flooding period/ year [1970-1980; >30 years]		Mid-flooding period/year [>1990-2000; >2000-2010;>20 & <30 years]		Perennial flooding period/year [>2010-2020;>5&<20 years]	
Influencing factors	N (%)	Influencing factors	N (%)	Influencing factors	N (%)
Cheap land	20 (9.5%)	Cheap land	17 (9%)	Cheap land	11 (6%)
Proximity to workplaces	15 (7%)	Proximity to workplaces	15 (7%)	Proximity to workplaces	42(24%)
Access to public services	10 (5.5%)	Access to public services	4 (2.5%)	Access to public services	6 (3%)
Proximity to low rental prices	33 (18%)	Proximity to the low rental price	4 (2.5%)	Proximity to the rental price	3 (1.5%)
Others (access to recreational areas, close to relatives, friends, and neighbourhood)	0(0%)	Others (access to recreational areas, close to relatives, friends, and neighbourhood)	1 (1%)	Others (access to recreational areas, close to relatives, friends, and neighbourhood)	7(3.5%)
<b>Total</b>	<b>78 (40%)</b>		<b>41 (22%)</b>		<b>69(38%)</b>

Number of sample size (n)=188: Source: Authors' 2021

Urban settlers find flood-prone areas cheap and affordable. Zhang (2016) adds that the land market in flood-risk areas in the Fargo-Moorhead Metropolitan fetches low prices pulling some urban dwellers to reside there. Another official from Kinondoni Municipal Council working as a town planner, was asked what she thinks makes people acquiring land in flood-prone areas. She noted that flood-prone areas are hazardous and are not charged levies, so they can attract some people, especially low-income individuals to reside there. This argument also contributes to low prices and thus attracts low-income households to acquire land for housing. Oates et al. (2020) support the assertion by noting that in Tanzania, even residents who can comply with land use policies, laws and regulations to obtain planned land (formal land) are hesitating to do so. Instead, they may acquire land in flood-prone areas to escape from paying property taxes. An architect working with AQRB,

when asked what drives people to acquire building land in flood-risk informal settlements, had the following to say:

*"Some people are adamant about paying statutory fees and other related costs if they buy a planned plot. For instance, on average, a planned high-density plot (20m x30m) may amount to at least TZS 5,000,000 (2,155 USD). That money can buy a piece of land in an informal flood-prone settlement and erect one, two or three simple bedrooms, and one does not owe anything to the government".*

From the caption, the affordability issue to desirable access to planned land in cities compels even the prospective home/house developers to make the compromises or choices of building land in flood risks areas hoping to cope with floods.

Results show that acquiring planned plots in urban areas involves long procedures and processes. This assertion makes residents opt for alternative plots in informal settlements. Nuhu & Mpambije (2017) make similar observations in a study of land access and corruption practices in the peri-urban areas of Tanzania. Nuhu & Kombe (2021), supporting this, note that such long procedures and processes can be solved by involving private firms, which can use a shorter time to process planned plots. The reason is that private firms urgently need to meet their clientele on time instead of the government. As a result, They are likely to shorten the procedures that delay people and lead them to acquire building land in risky flood areas in Tanzania and elsewhere. Results show that people from rural areas, their first motive is to get a space that accommodates them in cities and towns. This situation pushes them to acquire plots in flood-prone settlements because of affordability. Oates et al. (2020) note that urbanisation and rapid population growth will put more pressure on land, making other people live at flood risk. A female government official working with CRB as a research officer, when interviewed on what drives people to acquire land in flood-risk informal settlements, affirmed:

*"Formal processes to own land in urban areas involve long procedures; they also mean high costs and time. Many people, especially from rural areas, may have little knowledge of formal land acquisition. Whenever they reach urban areas and meet long procedures on land acquisition, they take risky decisions, including shortcuts to acquire cheap land, mostly found in difficult sites such as flood-prone areas, for a low cost. They avoid the cost of buying planned plots and the need to follow formal land acquisition process".*

The caption above suggests that formal urban land delivery procedures and building regulations are part of the problem. These, in turn, may fuel the development of houses in flood-prone areas.

### **5.2.2 Proximity to workplaces**

The results show that 38% of residents in Msasani Bonde la Mpunga (Table 2) in three flooding periods, namely, moderate, mid and perennial flooding periods, were driven to acquire building land at the settlement due to proximity to their workplaces. They were mainly pushed to acquire the building land in the settlement because of access to various livelihood activities, including; fishing, domestic works, sisal plantation farming, salt mining (in the past) and petty trading (i.e., vegetable growing and selling, food vending, carpentry works). Also, amenities, such as the Indian Ocean, influenced most fishermen to acquire land for residence in Msasani Bonde la Mpunga despite flood risks. The reason is that the area is close to the sea, where many conduct fishing activities. Access to potential employment opportunities in the up-market housing areas of Masaki, Oysterbay and Mikocheni, all located in less than 1.5km (Map 2), also influenced residents to acquire land in the area. Most residents worked in these areas as domestic workers. Askman et al. (2018) present similar

results attesting that overall livelihood access may drive people to choose to reside in flood-risk areas. For example, a 64 aged female who worked in an adjacent area of Masaki as a domestic worker narrated how she was convinced to acquire a site for residence in the Msasani Bonde la Mpunga area; she noted:

*"By that time, I worked for Masaki settlement's white household. I worked as a cook, cared for the children, and cleaned the house. It was easy for me to go to Masaki on foot from here, so I found this place ideal and close to my workplace. At that time, there were no severe floods as it is today. Floods were running along the main streams towards the ocean"*

Another male key informant in the settlement, aged 64 years, working as a fisherman, recalled that closeness to his working place attracted him to acquire a building land in Msasani Bonde la Mpunga despite flood risks:

*"What attracted me to buy land here was because I am a fisherman depending on the Indian ocean. So, I realised that staying in Msasani Bonde la Mpunga would only take me fifteen minutes or even less to get to my workplace on foot"*

One male participant aged 65 years from one of the FGDs conducted, when asked why he acquired housing land in Msasani Bonde la Mpunga settlement despite flooding incidences, he stated:

*"In the 1980s, when I came to Dar es Salaam, this area was used for paddy cultivation and vegetables growing activities. I acquired land from the indigenous land owner for paddy cultivation but later built my house"*

During the FGDs, the participants showed that the nature of activities in the settlement pulled them to acquire building land despite flood risk incidences. An aged female participant confirmed:

*"I came here in 1988; I grew vegetables at the settlement and worked as a part-time domestic worker for white people in the Masaki area. I first rented a mud house at Uyaoni street before I met my host when seeking building land, and he sold me a small piece of land for housing"*

From the captions above, respondents have considered flood risks as tolerable events. However, in Mombasa Kenya, Okaka & Odhiambo (2019), studying flood risk perceptions in flood risk informal settlements, note that residents ranked flood risk a minor risk among others. This view suggests that the risks of floods were not critical issues in selecting building land compared to endeavours of taping their livelihoods/living.

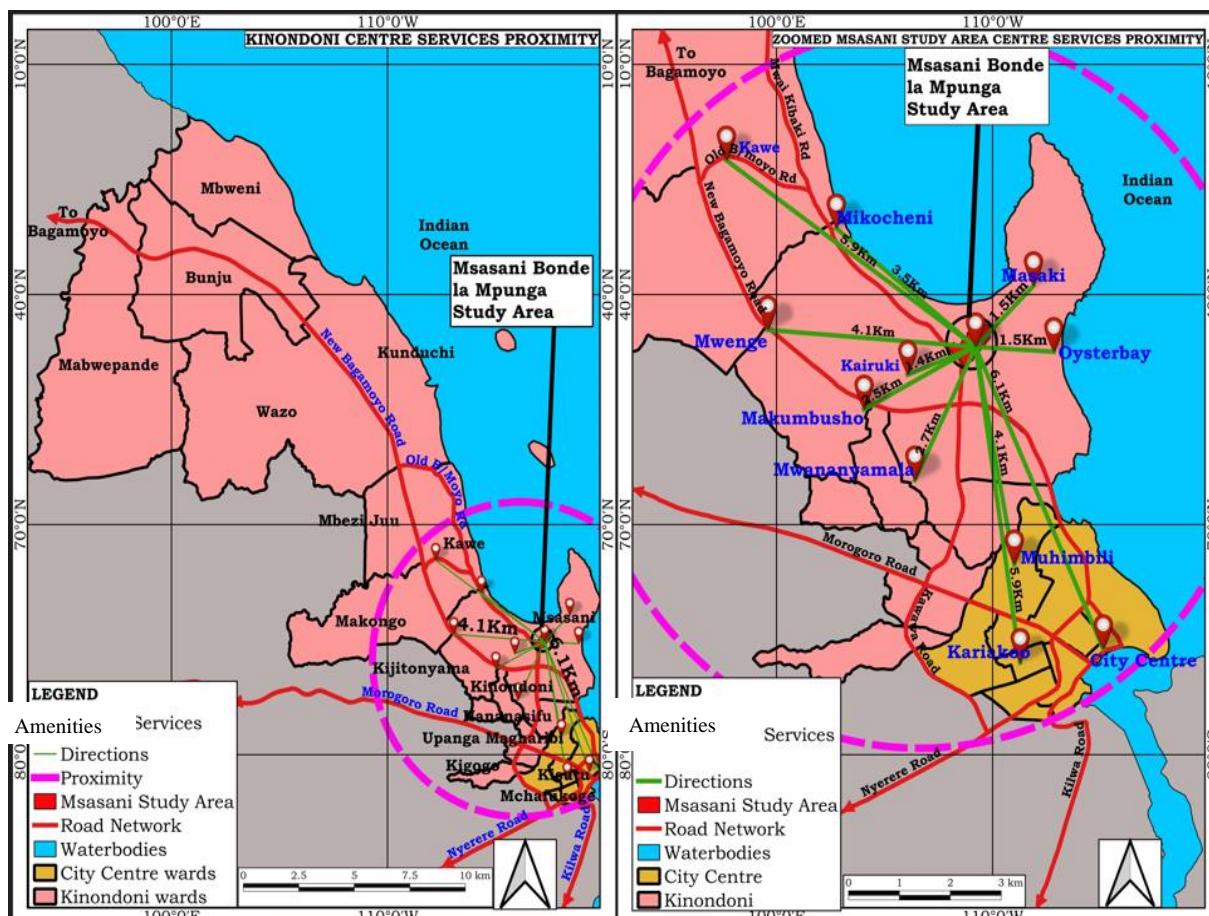
Further, it is worth noting that some (16.5%) of the settlers are living in Msasani Bonde la Mpunga because they have inherited property; as such, they never made the decisions or choices to settle there. Others (21.3%) live in the settlement because they were born there. These residents argued that they could not afford to relocate. Therefore they live in the area despite floods. Further, 26.6% of residents are tenants; they do not own land rights but opt for this housing because it is cheap, affordable, and also close to their workplaces. Askman et al. (2018) note that land and housing inherited from generations may lead to a strong connection at a location because it enhances closeness to family members and social cohesions already established in the settlement. This observation can hardly be disregarded among those who inherited property in Msasani Bonde la Mpunga.

A government official interviewee from Kinondoni Municipal Council working as the Municipal engineer, when asked why some land seekers acquire land in flood-prone areas while land use policy, laws and regulations prohibit it, he posited:

*“Some people acquire building land in flood-prone areas because they are poor (low-income), that is, they can not afford land and housing in planned or non-flooding areas”.*

Nchito (2007), in Lusaka, Zambia, joins with the caption above arguing that most households constructing buildings in flood-prone areas are low-income. The author postulates that it is hard for low-income people to stop erecting buildings in areas where they see unmanageable vacant land.

**Map 2:** Potential amenities close to Msasani Bonde la Mpunga



**Source:** National Bureau of Statistics, 2017 and field study 2021

### 5.2.3 Access to public services

Results show that almost 10% (Table 2) of the respondents attested that they were attracted to settle in Msasani Bonde la Mpunga because of access to social services such as hospitals (i.e., Muhimbili, Mwananyama, Oysterbay and Kairuki), easy access to markets (i.e., Kariakoo), schools, water, and electricity. Askman et al. (2018) observations in Akuressa, Sri Lanka, revealed that despite flood risks, some residents may settle in flood-prone areas because of essential amenities such as; public services, environment and weather, access to places for cultivation, and good friends around them to keep up their social ties. Terpstra (2011) noted that risk perception describes how an individual evaluates the prospectives of flood events, exposure to floods and their severity. A key female informant aged 63 years, when asked what compelled her to acquire land in settlement despite being flood-prone, noted:

*“By that time, there were no severe floods. Floods started when prospective developers started buying land here, blocking waterways. So I was motivated to buy land here because there were no indications of serious floods. Flood water flowed freely to the sea because, by then, the area was not as densely populated as seen today. The area was sparsely built, and one could even*

*count the number of houses. So things that attracted me to acquire land in this area were mainly easy access to social services”.*

From above, the interviewee attests that developing houses that do not respect natural drains can increase flood risks. This quote further reiterates the earlier observation that the flooding events and associated risks have changed with the increase of housing and blockage of the natural drains that channelled stormwater to the sea.

#### **5.2.4 Proximity to low rental prices**

Results show that 22% (Table 2) of residents in three flooding phases acquired building land after they had lived in the settlements as tenants. Living as tenants, they created social ties and got familiarised with landlords who assisted in connections to acquire their land. Of 22% of residents, 18% acquired building land during the moderate flooding phase, and 4% acquired it during mid and perennial flooding periods, respectively. Gastinger et al. (2017) note that seeking rental housing is among the drivers that fuel people to settle in flood-risk informal settlements. Lindley et al. (2015) support the argument that increasing urbanisation and population growth in cities make the demand for urban land and rental housing competitive and challenging, compelling people to settle in informal flood-risk areas. A 68 aged female key informant explained how she was motivated to acquire land for housing in Msasani Bonde la Mpunga, despite the risk of flooding, said:

*“I came here in 1988 as a tenant and acquired a piece of housing land afterwards. At that time, there were no severe floods. However, we started witnessing severe flooding when affluent people started buying building land from the native people and constructing more houses. They blocked natural water drains, which initially drained flood water to the ocean after erecting fence walls and buildings. As a result, during rains, water from the rooftops and upstream overflow and flood our houses”.*

Some households acquired building land in Msasani Bonde la Mpunga because flood events were mild initially. Flood water was manageable because natural water drains were not blocked, and housing densification was not higher. This phenomenon suggests that flooding risks were not apparent risks. However, results show that as house construction activities intensified on up streams areas such as the University of Dar es Salaam, Kijitonyama, Tandale, Mwananyamala, Sinza and Mikocheni B, where most runoff originates, floods increased. This phenomenon is not unexpected; Zehra et al. (2019) assert that the soil infiltration rate usually is high before the settlement is saturated, but the situation worsens when the water table rises due to increasing housing densities.

#### **5.2.5 Other factors**

Almost 8.5% of the households from the three phases of flooding in the settlement (Table 2) were driven to live in Msasani Bonde la Mpunga because of several other reasons, including; proximity to the ocean where they could easily go for recreational needs. Also, Msasani Bonde la Mpunga is perceived as safe, secure, and easily accessible. As such, some residents were convinced by their friends and relatives (neighbourhood preferences) who already had settled in the area and were coping with flood risks. Moreover, friends' and relatives' experiences convinced them that flood risks were manageable. Kawasaki et al. (2020) study in Bago city, Myanmar, shows that social networks created by community residents are an essential factors that may drive residents' choices to settle in flood-prone areas. This assertion may be so because individuals appraise threats and their coping mechanisms after ascertaining the level of exposure and expected severity of flooding (Bubeck et al., 2013; Botzen et al., 2013). Over time, residents may play down flood risks, especially when they find that their fellow residents are coping and have adopted strategies to reduce flood risks. This argument supports the findings by Bubeck et al. (2013), who posit that new residents may adapt to similar measures undertaken by their neighbours to cope with flood risks.



## **6. CONCLUSION AND RECOMMENDATIONS**

### **6.1 Conclusion**

The results show varying reasons why households acquired building land in Msasani Bonde la Mpunga despite being a flood-prone area. The social and economic characteristics of residents in the settlement vary. They include; low and middle-income groups. These have varying education and tenure security levels—for example, primary, secondary and tertiary education. Some residents were house owners, tenants and/or housekeepers. The study has uncovered multiple factors that make prospective land seekers opt for flood-prone areas. These include; proximity to workplaces, access to cheap land, availability of social services, proximity to low rental prices and other factors like; access to amenities such as recreation and security. Also, affordability and social ties (relatives, friends) and neighbourhood preferences have been instrumental. The study concludes that lived local experiences and perceptions about the severity of flooding shape risk decisions to acquire land in flood-risk informal settlements.

This paper reminds urban planners, policymakers, practitioners and public officials that, with climate change-induced flood hazards, increasing urbanisation and widespread poverty in cities, people will continue to acquire and build houses in flood-prone areas in future, regardless of their income, education, or other social status. More so, many flood-prone lands continue to accommodate low-income prospective home builders; because some of such areas are often in strategic locations close to the city centre, prime commercial and residential areas attractive to middle and high-income households. It is also important to note that not all informal flood risky settlements are associated with life-threatening flood incidences; and therefore, may not discourage potential settlers.

### **6.2 Recommendations**

The paper calls for a need to rethink inclusive urban planning policies, laws and building guidelines for urban settlers who have already acquired land and settled in flood-risk settlements. Furthermore, indicative guidelines and training on how to mitigate and build in flood-prone areas for households already settled or hoping to acquire land in the area are essential. For people already settled in the area, strategies to avoid vulnerability to floods are critical. This is because the experience of trying to relocate people from permanently established settlements in flood-prone areas, particularly in low-income economy countries like Tanzania, has not been much successful. It is worth noting that often the resettlement areas do not provide access to the needs of the displaced individuals, they enjoyed in their former settlements. Local governments should rethink lowering plot sizes to make building construction affordable and inclusive to all people; prioritising low-income households in the designating planned land for housing. This proposal shall absorb the influx of urban poor who inevitably seek cheap land and affordable accommodations in cities. The process through which land seekers acquire land and build homes in flood-prone areas, despite prohibitive urban planning regulations, needs research. In addition, importing skills and building techniques used in flood-prone areas among local artisans involved in the construction of dwellings are also critical areas for future research. Training local artisans with relevant knowledge and skills to build on the existing tacit knowledge is fundamental for inclusive urban planning and resilient building construction.

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<sup>1</sup>**Emmanuel Fares Kemwita**; As a main author, I have prepared the present study

<sup>2</sup>**Prof. Wilbard, J. Kombe**; As a main supervisor, I provided close supervision and consultation for the study

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## 10. KEY TERMS AND DEFINITIONS

**Flood risk:** Entails the exceedance probability that a flood can cause potential physical damages in a locality under certain period.

**Informal settlements:** Settlements developed outside urban planning standards such as land use policy, laws, regulations and construction standards.

**Land acquisition (access):** The freedom to use, enter, approach and transfer land rights

**Risk:** Something that happens to people and requires reactive responses to forces seemingly beyond control.