Urban Africa Risk Knowledge

# KARONGA TOWN:

# GROWTH AND RISK PROFILE

**Working paper # 9**

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## 1.0 INTRODUCTION

The paper presents an overview of the historical growth of Karonga Town, Malawi and reviews the level of service delivery, various risks in the town and how these impact livelihoods. This paper is based on document reviews, site visits, key informant interviews and consultations of stakeholders who included central and local government institutions, para-state organisations, non-government organisations and community based Disaster Risk Management (DRM) committee members.

## 2.0 HISTORICAL GROWTH OF KARONGA

Karonga Town is situated 220 km north of Mzuzu city and 50 km south of the Songwe-Kasumulu border with Tanzania. It was first established in the 1880s in Kambwe area, which is situated approximately 8 kilometres north of the town's present location. The town grew as a slave trade post when Mlozi, a Swahili slave trader set up a base and raided villages to capture slaves for shipment to the Indian Ocean port of Bagamoyo situated to the north of Dar es Salaam in Tanzania (Kalinga, 1980, p. 8). An attempt to intervene by the African Lakes Company (ALC) which had established a trading station at Karonga in 1884 led to the outbreak of the long war between the Arab slave traders under Mlozi and the ALC from 1887 to 1895 (Briggs, 2010,p.297). The war ended only when Mlozi was captured in 1895. The Presbyterian missionaries from Scotland also opened their mission in 1891, which is now known as the Church of Central African Presbyterian (CCAP). The establishment of the mission strengthened the growth of the town (Kalinga, 1980, p. 8). Karonga is also well known for the First World War (WWI) so called 'Battle of Karonga' when the town became the focus of hostilities between a German Colony in Tanzania and British protectorate, Malawi. It is reported that the British scored their first naval victory when having received information about the outbreak of war first, decided to sink the German ship Hermann Von Wessmann despite the local army chiefs having been friends (Briggs, 2010, p.299).

After WW 1 several projects were implemented including the construction of a hospital in 1931, the establishment of the Catholic mission in 1945, the construction of an airfield in 1947 (the present airport was constructed in 1967) and the foundation of St Mary's Secondary School in 1955, among others. In 1959, the town was moved to the south eastern side, which is now referred to as 'old town', because Kambwe area became unattractive due to its narrow harbour and frequent out-bank river flooding (GoM, 2013).

Apart from these developments, Karonga and the entire northern Malawi generally remained what commentators called the 'dead north' until in 1988 when the M1 Road was extended to the Tanzania border and a bridge was constructed across the Songwe River. The decision to construct the road and bridge was a result of the civil war in Mozambique that forced Malawi to seek an alternative route to the coast (GOM, 2013). The extension of the road and bridge came to be called 'the Northern Corridor.' Karonga witnessed accelerated growth as the first stop over major urban settlement on the Northern Corridor from the port of Dar es Salaam.

Unfortunately, a major flooding disaster destroyed most of the old town along the lakeshore in the 1980s. Since 1989 two major projects, i.e. the flood control project and Secondary Centres Development Programme (SCDP), have been implemented to redevelop the town. The projects significantly contributed to the attraction to local investments and migrants leading to the town's declaration as a township and also as a planning area under Town and Country Planning Act in 1992(GoM, 2013). The declaration meant that all land uses had to be regulated through land use zoning. In 2008 Karonga Town had a major boost when the Paladin Africa Energy Limited's Kayelekera Uranium Mine was opened 30km to the west of the town (Briggs, 2010). The mine increased demand for housing, social, economic services and food supplies from the local producers around Karonga Town and beyond. Karonga is currently the fifth largest and one of the most rapidly growing towns in Malawi. Despite the land use planning regulations the town continues to be at risk to different hazards such as earth tremors, strong winds and floods which damage infrastructure, and disrupt services and livelihoods. According to Lunduka et al. (2010) Karonga Town registered the largest number of disasters in Malawi between 1946 and 2008.

## 3.0 POPULATION GROWTH TRENDS

The population of Karonga Town has registered significant growth from as low as 11,242 in 1966 to 41,074 in 2008, almost tripling in about 40 years. As indicated in Table 1, growing at 4.3% per year and with a total fertility rate of over 5.7 the total population is projected to reach nearly 63,000 in 2018, the next census year for Malawi ((National Statistical Office (NSO), 2000 & 2010)

**Table 1: Karonga Town Population Growth Trends**

| Year | Population | Growth Rate (%)pa |
|---|---|---|
| 1966 | 11,242 | |
| 1977 | 12,051 | 0.63 |
| 1987 | 19,630 | 3.1 |
| 1998 | 27816 | 3.5 |
| 2008 | 41074 | 4.3 |
| 2018 (est.) | 62,575 | 4.3 |

*Source: NSO, 2000 & 2010, Census Reports for 1998 & 2008*

## 4.0 SERVICE DELIVERY

### 4.1 Health Services

Karonga District Hospital which was built in 1985 is the main health facility serving the town and the surrounding rural district. Due to increasing population the hospital capacity has been affected. Although designed with a capacity of 208 beds, about 300 patients are admitted every month, making some patients share beds or getting allocated spaces in the corridors. Apart

from serving as a local hospital for Karonga Town, the District Hospital is a referral hospital for the whole district serving 19 health facilities in the district (DHO HMIS, 2015 Report). The hospital faces the challenge of low staffing levels with a total of only 297 health workers as indicated in Table 2. Other institutions offering health services within the township are Banja La Mtsogolo (BLM), KwaMbukwa and Maneno Clinics. BLM provides specialised health services to the public related to family planning and reproductive health.

**Table 2: Health Workers at Karonga District Hospital**

| Post | Number |
|---|---|
| Medical doctors | 2 |
| Clinical officers | 14 |
| Medical assistants | 25 |
| Nurses | 72 |
| Health surveillance assistants | 184 |
| Total | 297 |

***Source: GoM, 2013,***

Mwamtobe et. al (2014) reported malaria as the most serious cause of death. For example, malaria was the cause of 92% of under-five outpatient attendance at Karonga Hospital despite government putting in place several strategies such as preventive treatment of pregnant women using sulfadoxine-pyrimethamine (SP) (Mwamtobe et. al, 2014). The major health risks recorded in Karonga are diseases such as malaria and cholera, traffic accidents, HIV and AIDS, bilharzias, maternal and neonatal mortality, poor hygiene and sanitation and malnutrition among children (section 4.2 below). For example, though data is aggregated for the whole district, reports indicate that Karonga had 29.2% underweight, 53.7% stunted and 12% wasted children aged 6- 59 months. Of interest is that male children were reported to be more vulnerable to severe stunting (16%) than female (12%) children (NSO, 2012, p.166-168).

### 4.2 Water Sanitation and Hygiene (WASH)

Karonga Town is supplied with water by the Northern Region Water Board (NRWB) which has two sources. There is a borehole at Bwiba where water is pumped, treated and supplied to the town by gravity. The other source is Lake Malawi near Club Marina. Water is pumped from the lake, treated and pumped to Nyanja Hill reservoir and then distributed to the town by gravity. The total supply capacity of the plant constructed by Paladin Africa Energy Limited is 2000 cubic meters.

Water from the two sources is supplied to over 2500 domestic consumers apart from industrial, commercial and institutional consumers. The NRWB also provided 32 communal water points (CWP) managed by local water committees to enable low income earners access safe water, an implicit recognition that the usual cost of supply is very expensive. Based on the 2008 National Population and Housing census, 14% of the households had individual connections inside houses, 37% had individual connections on the plot, 35% accessed water

from communal water points, 11% accessed water from boreholes and 3% used water from wells, the majority of these hand dug shallow wells being only 0.5- to 11-m deep. These figures suggest that 86% of households have access to safe drinking water while 14% use unsafe water. The gravity of using unsafe sources of water can be understood by linking water to sanitation access. Specifically, in the absence of any sewerage system, Karonga Town has a very poor sanitation situation with 72% of the households using traditional pit latrines and 12% practicing open defecation (NSO, 2010, p.63). Thus with only 12% using flush toilets and 9 % using ventilated improved pit latrines, it can be said that 84% of the households use unsafe sanitation. This nearly cancels out the safe water access of 86%. The situation is made worse by the low capacity and lack of maintenance of sludge ponds for sludge pumped from septic tanks because the ponds tend to overflow or get flooded during the rainy season. The risk of polluting the sources of water and spread of WASH related diseases such as diarrhorea, and cholera or Escherichia coli increases (Msilimba and Wanda 2013; Pritchard et al., 2008). These diseases have also remained a major risk in Karonga Town due to high prevalence of water canals emerging from rice farms (Banda and Nyirenda, 2000).

In view of prevailing hazards such as flooding and earthquakes, WASH related diseases are relatively high in the Town. For example, following the 2009 earthquake and floods, Karonga District Hospital recorded a remarkably increased number of water borne and water based diseases The reported cases were: 634 non-bloody diarrhorea, 1234 dysentery and 145 bilharzias (Figure 1). It was further revealed that even prior to the 2009 earthquake, diarrhorea and dysentery diseases were among the top 10 affecting the district in 2008.

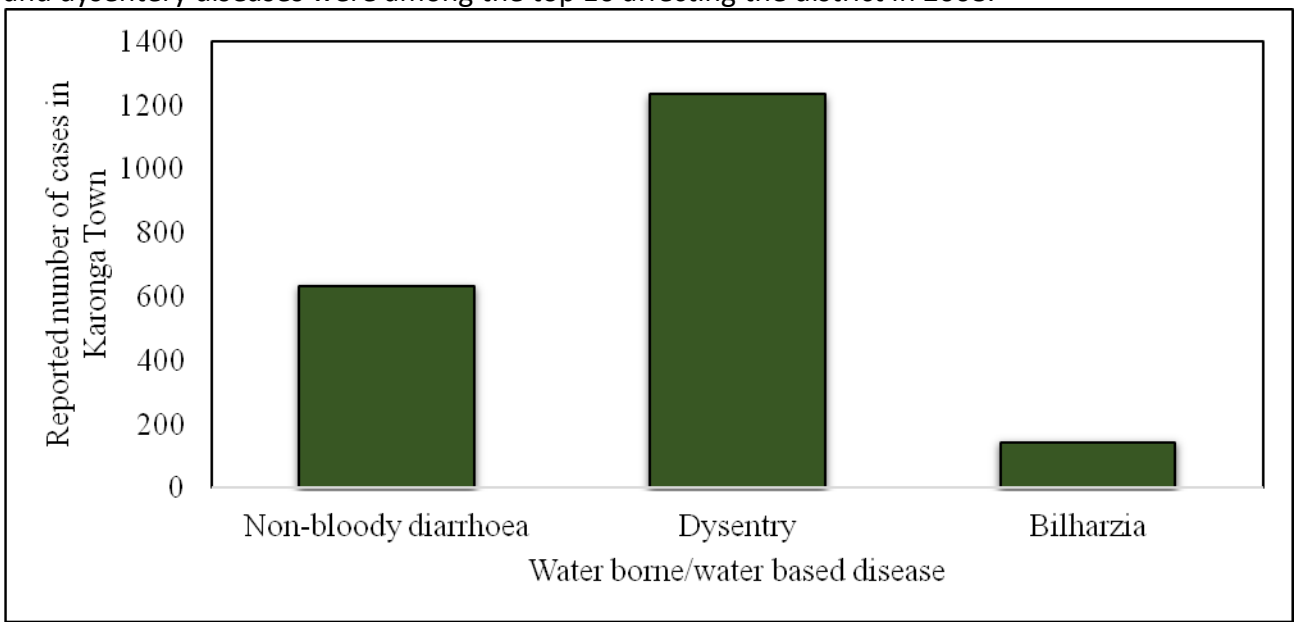



**Figure 1**: Reported cases of water borne and water based diseases in Karonga Town following the 2009 earthquake.

Nevertheless, the 2010 District Strategic Investment Plan, which utilises the number of improved water, sources per person (each tap serves 120 and each borehole serves 250 people

), reported that the coverage of safe water in the Karonga Town was 65% (Karonga District Council, 2010). This percentage as reported by the Karonga District Council (2010) decreased to 51% due to the earthquakes and floods. The most comparable national figure is the 55% estimated coverage of functioning improved water sources in 2007, which is significantly higher in areas directly affected by the earthquakes. The high numbers of non-functional water points (both taps and boreholes) caused by the earthquake and floods increased the health risk in Karonga town (see table 4) because the majority of the people in these areas ended up collecting water from the unsafe water sources such as the lake, rivers and shallow wells since the cleaner water sources had been contaminated. Since January 2016 and during the April 2016 flooding, there were 33 cholera cases recorded at the district hospital that originated from the town out of a total of 78 districts since January 2016. Of the 11 fatalities, 4 were from within Karonga Town (GoM, 2016). The main cause of cholera outbreak was drinking unsafe water, whose poor quality had been worsened by flooding following continuous. According to a report by the district health office, many people lacked safe sanitation and yet drunk unsafe water from the rivers, wells and Lake Malawi (GoM, 2016). As evident from table 3 interactions through migration appears also to be a key factor in cholera spread.

**Table 3: Reported Cholera Cases in Karonga**

| No | (O)ut/(I)n Patient | Physical Address | Sex | Age | Date Seen at Health Facility | Date of onset of disease |
|---|---|---|---|---|---|---|
| 1 | (I)n - Karonga District Hospital | Mwanganda vg, TA Kyungu, Residing at Kyera (Tanzania) | F | 20 | 31/01/2016 | 30/01/2016 |
| 2 | (I)n - Karonga District Hospital | Luhimbo vg, TA Kyungu | F | 48 | 28/03/2016 | 28/03/2016 |
| 3 | (I)n - Karonga District Hospital | Mwangolera vg, Baca Area, TA Kyungu | M | 31 | 28/03/2016 | 28/03/2016 |
| 4 | (I)n - Karonga District Hospital | Mwangolera vg, Near Mwenilondo, TA Kyungu | M | 20 | 28/03/2016 | 28/03/2016 |
| 5 | (I)n - Karonga District Hospital | Malema 1 vg, near Lake Malawi at Mandala, TA Kyungu | M | 49 | 2016-06-04 | 2016-06-04 |
| 6 | I(n) - Karonga District Hospital | Mwahimba vg, Zambia Line, TA Kyungu | M | 25 | 2016-06-04 | 2016-06-04 |
| 7 | I(n) - Karonga District Hospital | Shemu vg, Near Road block along KA-CP road, TA Kyungu | M | 17 | 2016-08-04 | 2016-07-04 |
| 8 | I(n) - Karonga District Hospital | Mwahimba vg, Zambia Line, TA Kyungu | M | 25 | 2016-08-04 | 2016-08-04 |
| 9 | (I)n - Karonga District Hospital | Malema 1 vg, near Lake Malawi at Mandala, TA Kyungu | M | 4 | 2016-08-04 | 2016-08-04 |
| 10 | (I)n - Karonga District Hospital | Mwahimba vg, TA Kyungu | F | 31 | 2016-11-04 | 2016-11-04 |
| 11 | (I)n - Karonga District Hospital | Mwambetania vg, TA Kyungu | M | 32 | 2016-11-04 | 2016-11-04 |
| 12 | (I)n - Karonga District Hospital | Laika vg, Makingo school, TA Kyungu | M | 31 | 13/04/2016 | 2016-12-04 |
| 13 | (I)n - Karonga District Hospital | Mwangawabila vg, near communal tap, TA Kyungu | F | 10 | 14/04/2016 | 14/04/2016 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 14 | (I)n - Karonga District Hospital | Mwanjabala vg, near boma la mapenenga, TA Kyungu | M | 32 | 15/04/2016 | 14/04/2016 |
| 15 | (I)n - Karonga District Hospital | Mwanjabala vg, near communal tap, TA Kyungu | F | 50 | 15/04/2016 | 14/04/2016 |
| 16 | (I)n - Karonga District Hospital | Mwanjabala vg, near communal tap, TA Kyungu | M | 21 | 15/04/2016 | 14/04/2016 |
| 17 | (I)n - Karonga District Hospital | Mwanjabala vg, near boma la mapenenga, TA Kyungu | M | 5 | 15/04/2016 | 15/04/2016 |
| 18 | (I)n - Karonga District Hospital | Mwanjabala vg, near communal tap, TA Kyungu | M | 29 | 15/04/2016 | 15/04/2016 |
| 19 | (I)n - Karonga District Hospital | Mwanjabala vg, near communal tap, TA Kyungu | F | 5 | 15/04/2016 | 14/04/2016 |
| 20 | (I)n - Karonga District Hospital | Mwanjabala vg, near communal tap, TA Kyungu | M | 13 | 15/04/2016 | 14/04/2016 |
| 21 | (I)n - Karonga District Hospital | Mwanjabala, TA Kyungu | F | 5 | 16/04/2016 | 16/04/2016 |
| 22 | (I)n - Karonga District Hospital | Mwanjabala vg, TA Kyungu | F | 53 | 16/04/2016 | 16/04/2016 |
| 23 | (I)n - Karonga District Hospital | Mwanjabala vg, TA Kyungu | M | 4 | 17/04/2016 | 16/04/2016 |
| 24 | (I)n - Karonga District Hospital | Mwanjabala vg, TA Kyungu | M | 17 | 17/04/2016 | 16/04/2016 |
| 25 | (I)n - Karonga District Hospital | Mwanjabala vg, TA Kyungu | M | 14 | 17/04/2016 | 16/04/2016 |
| 26 | (I)n - Karonga District Hospital | Mwanjabala vg, near boma la mapenenga, TA Kyungu | F | 5 | 17/04/2016 | 17/04/2016 |
| 27 | (I)n - Karonga District Hospital | Kafikisira vg, TA Kyungu | F | 2 | 18/04/2016 | 16/04/2016 |
| 28 | (I)n - Karonga District Hospital | Kasote vg, near nthola clinic, TA Kyungu | F | 21 | 18/04/2016 | 17/04/2016 |
| 29 | (I)n - Karonga District Hospital | Kasote vg, near Lake Malawi, TA Kyungu | M | 21 | 19/04/2016 | 17/04/2016 |
| 30 | (I)n - Karonga District Hospital | Kafikisira vg, near grocery, TA Kyungu | M | 13 | 19/04/2016 | 18/04/2016 |
| 31 | (I)n - Karonga District Hospital | Mwanjabala vg, near CCAP, TA Kyungu | M | 20 | 18/04/2016 | 18/04/2016 |
| 32 | (I)n - Karonga District Hospital | Mwangolera vg, near borehole, TA Kyungu | M | 34 | 20/04/2016 | 18/04/2016 |
| 33 | (I)n - Karonga District Hospital | Mwanjabala vg, TA Kyungu | | | | |

Source: Karonga District Hospital, April, 2016

The quality of water in the town is also threatened by pollution coming from uranium mining activities at Kayelekera which is reportedly releasing some of the waste into the nearby rivers that eventually empty into Lake Malawi (Chareyron *et al*., 2014, 2015). There is evidence of uranium fallout into Sere, Champwasha, and Champanji Rivers (0.22-42.5 ug/l), which flows into North Rukuru. Radon gas was found to vary from >7 to 42 Bq/l. Some of the concentrations were above WHO human threshold for safe drinking water of 30 ug/l (Chareyron*et al*. 2014). Generally communities around Karonga Town have expressed outrage at the disposal into rivers emptying into Rukuru River, which finally ends into Lake Malawi (see for example, Chanamulungu, 2016). Furthermore, there have been no clear explanations as to why fish kills have been recorded along the beaches of Karonga town fuelling speculation that uranium and other toxins might be responsible.

### 4.3 Energy Supply

Karonga is connected to the national grid through Nkula, Tedzani and Wovwe Hydro power stations. The electricity supply corporation of Malawi (ESCOM) supplies electricity and the current peak demand is 3 Mega watts. Estimates indicate that demand for electricity would grow at a rate of 6% per annum in the Town which means a rise in power consumption to 5.1 megawatts by 2016 (GoM, 2013). However, access to electricity is very low due to both ESCOM's lack of capacity to supply adequate power and the high cost of connection for the consumers. According to NSO (2010) only 5% of the households used electricity while 94% used firewood and charcoal for cooking and 1% was reported to use paraffin for cooking. With respect to lighting, 23% used electricity, 70% used paraffin, 5% used candles and 1% used firewood. These figures indicate that, due to the high cost of electricity, many households that do have power use it mostly for lighting. The high usage of bio-fuel also points to high levels of deforestations in surrounding areas, as well as risk of indoor pollution especially among women who are traditionally often responsible for the majority of household cooking. It is possible that the rising usage of battery lighting, solar bulbs and cell phones to light up homes is mitigating the usage of polluting energy sources. But research is needed on the extent of usage.

### 4.4 Solid Waste Management

The Council has two non-engineered solid waste dumping sites. One is at Katili to the south, and the other to the north about 3 km off-Songwe road. Although waste collection, transportation and disposal are the responsibility of the council, the council is faced with capacity challenges including inadequate staffing levels and lack of waste collection vehicles and skips. The council has waste collection points at designated places such as the central market. Observations reveal a very weak system as piles of waste are easily noticed along the road, at rice processing plants, around the central market and in the artificial drainage channels constructed to transfer storm and flood water to the lake. Households often dispose their waste by burning or burying in waste pits located within their plots. Common practices of waste burning and burying present everyday risks to residents through the released gases and leachates which contaminates environments.

### 4.5 Housing Supply and Quality

Housing takes up approximately 60% of total land in the town. Housing areas are categorized as low density for high income earners, medium density for middle income earners, high density permanent and traditional housing (THAs). The THAs, which are Malawi jargon for site and services, are largely informal in nature and have attained slum status due to overcrowding of multiple housing units on individual plots and a lack of basic infrastructure and services. The high density permanent housing areas comprise houses largely owned by MHC, while medium density housing is a mix of private and institutional houses within the town. Housing is also categorized according to quality determined by the type of material used for construction: permanent, semi permanent and traditional houses. Nearly one half of the houses can be categorized as poor quality. Using the criteria of the National Statistical Office, 49% of the houses are permanent, 36% are semi permanent and 15% are traditional (NSO, 2010). Traditional houses are built of grass thatch, mud floors and sun dried bricks. The poor design of many of the houses has resulted in them being highly vulnerable and unable to withstand the tremors in the 2009 earth quakes. A guidebook was developed by government to promote safe house construction (GoM, 2010). Though adoption is slow, there is evidence of local people taking up the hipped roof design as promoted in the guidebook (Figure 2 refers).

*Figure 2: developers adopt hipped roof house design, Karonga Town ©Mtafu Manda, 2016*

### 4.6 Planning Conflict and Violence

Conflicts and violence related to planning in Karonga emanate from frustrations linked to failed implementation of decentralization and lack of transparency and access to national resources. In 2009 the Malawi government dissolved the local governance structures of Karonga Town through a revision of the Local Government Act (Manda, 2014). This decision led to a merger of urban and rural functions and local leaders taking over the management of urban land leading to conflicts with the government officers because of lack of adherence to procedures (Kumwenda, 2015). The question of benefits from uranium mining activities at Kayelekera (AFRODAD, 2013) has also generated significant conflict with potential for violence. Politically motivated violence leading to lawlessness has also been reported (Nyirongo, 2014). Lack of transparency in the determination of water utility bills was recently a cause for Karonga public dismay with the utility organisation and threatened to demonstrate to force a reduction. The

cost of water had reportedly moved from K800 to over K20, 000 per month (Kumwenda, 2016). In such a situation, for impact, urban planning has to carefully position itself.

## 5.0 NATURAL HAZARDS AND RISKS

### 5.1 Earthquakes

Historically Karonga is known to experience earthquakes ever since it was established as a trading centre. Data on earth tremours has been collected since 1904 (Lunduka et al., 2010; Macheyeki et al., 2014). Figure 3 shows a number of epicenters mapped since 1904 (Macheyeki et al., 2014). However, the largest number of recorded earthquakes in the history of not just Karonga but Malawi occurred in 2009 between 6th and 20th December (Table 4). Biggs et al., (2010) reported that during the 6$^{th}$ to 20$^{th}$ December, 2009 earthquakes the 6.0$M_w$ earthquakes caused over 1000 houses to collapse while over 3000 had cracked, 4 people were killed by rubble and 300 people were wounded.

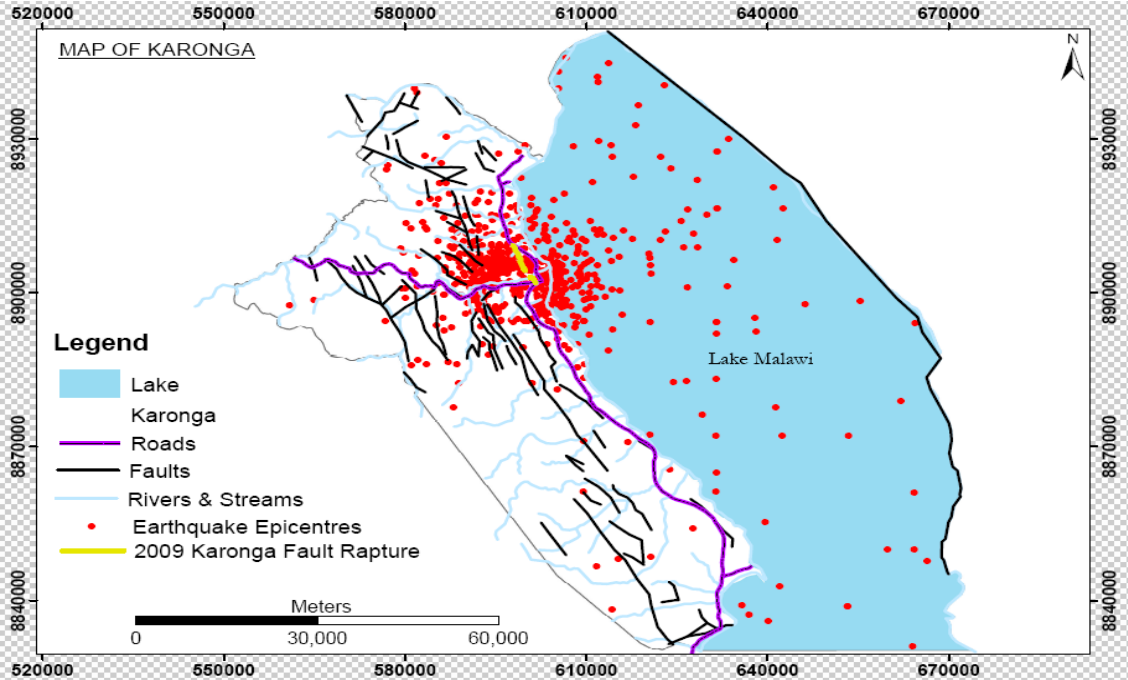
**Table 4**: Magnitudes of earthquake tremors Karonga, 2009

| Date | Local Time (UTC +2) | Magnitude ($M_w$) | Latitude | Longitude | Depth | Casualties |
|---|---|---|---|---|---|---|
| 6 December, 2009 | 19:36 | 5.8 | 10.16°S | 33.82°E | 10 km | |
| 8 December, 2009 | 05:08 | 5.9 | 9.948°S | 33.878°E | 8 km | 1 |
| 12 December, 2009 | 04:27 | 5.4 | 9.96°S | 33.88°E | 10 km] | |
| 19December, 2009 | 15:02 | 6.0 | 10.108°S | 33.818°E | 6 km | 3 |

Source: Biggs et al., 2010

On 22$^{nd}$ December 2009, the Government of Malawi released a comprehensive report on the Karonga earthquake. The verbatim report indicated that 2,752 houses were affected of which 775 collapsed while 1,154 developed cracks. Also affected were 15 Police houses, 17 school blocks, 48 teachers' houses, 1 telecentre, 1 health post, 1 water point, 7 churches, 17 business centres and 2 mosques (GoM, 2009). Scientifically tremors are associated with tectonic activities The occurrence of earth tremors in Karonga is traced back to tectonic processes which formed the lake as far back as one million years ago (Wisner et al., 2004).

**Figure 3: Epicenters, faults and rapture, Karonga**




Source: Mdala, 2016, Geological Surveys Mzuzu

Vulnerability to earthquakes therefore dates back from the times of the Town's historical development (Macheyeki et al., 2014) essentially because of its location within the East African Rift Valley. Specifically, Karonga Town lies on a fault line parallel to the Livingstone fault which forms Lake Malawi Biggs et al., 2010; Macheyeki et al., 2014). The 2009 earthquake report indicates that the 6$^{th}$ December waves read 7.2 on Richter scale and damaged several buildings, roads and a flood control dyke along the Rukuru River (Macheyeki et al., 2014). The damage to the flood control dyke rendered the town unprotected from the floods in 2011 (Manda, 2014).

Figure 4: Earthquake Damage leads to flooding, © Department of Disaster Management Affairs (2011 cited in Manda (2014)

### 5.2 Flooding

Various types of floods occur in Karonga Town including flash floods, out bank floods mainly from the North Rukuru River and Lake Malawi and urban floods due to poor drainage systems. However, records regarding floods only started being seriously recorded since 1981 following the 1979/80 floods after a feasibility study conducted by Gitec Consult. The study showed that Karonga Town was at risk mainly due to out bank flooding of North Rukuru River. The floods occurred in 1979/80 because the water level in Lake Malawi rose from 471m above Karonga reference level in 1915 to 477.8m in 1980 (Macheyeki et al., 2014). The lake level rise induced flooding damaged most of the old town and led to the relocation of the commercial centre to the current site 1987. The location of the new town centre was regarded as a much safer location from mainly Lake Level rise related floods and out bank river floods. However, flooding has continued with varying degrees of impact. In 2010/11, severe flooding after the damage to the dyke affected the whole new commercial area (Figure 5). In 2016 floods once again affected the central town and residential areas in part due to poor or blocked drainage.

Table 5: Annual Rainfall Patterns in Karonga Town, 2002-2011

| **2002/3** | **2003/4** | **2004/5** | **2005/6** | **2006/7** | **2007/8** | **2008/9** | **2009/10** | **2010/11** |
|---|---|---|---|---|---|---|---|---|
| **306.3** | 710.3 | 1079.6 | 1093.5 | 819.0 | 956.4 | 1033.8 | 954.9 | 1168.4 |

Source: Karonga Meteorological Department, 2015


Figure 5: Karonga Town Centre Floods, 2011

### 5.3 Other Hazards

The other important though less talked about hazards are strong winds and droughts.
Karonga Town's location exposes it to south easterly winds which blow off house and school roofs (GoM, 2005). The most affected tend to be infrastructures and properties along the beach. For example, Msiska et al (2016) have reported that strong winds generate strong currents on Lake Malawi which have damaged intake pipes of the Water Supply Pump at Karonga. As shown in table 6, it can be noted that Karonga also generally experiences high mean annual temperature of about 30$^{o}$C the lowest having been recorded in 203 at 19.8$^{o}$C. Karonga Town is thus one of the hottest places in Malawi. The floods mentioned earlier are largely a result of rains falling to the west. Drought is therefore an annual occurrence with serious impact on food security in a town where most households (75%) are engaged in crop

farming (maize and rice) and rearing of livestock (Manda, et al., 2013). Therefore any severe drought will have serious impact in nutrition status of the population.

Table 6: Average Annual maximum and minimum temperatures ($^{o}$C) for Karonga

| Year | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|---|---|---|
| Average maximum Temperature (°C ) | 29.5 | 30.9 | 28.5 | 30.2 | 30.8 | 30.0 | 30.3 | 31.0 | 30.2 |
| Average minimum temperatures (°C) | 19.8 | 21.3 | 21.2 | 20.7 | 21.3 | 20.6 | 20.9 | 21.3 | 20.8 |

Source: GoM, 2013

## 5.4 **Gender and Risks in Karonga Town**

The major risks in Karonga and other urban settlements in Malawi do have gender dimension even though currently information is limited. Evidence does suggest that there are variations according to hazard types, generally women as well as children and the elderly, are more vulnerable than men (Dodman, et al. 2013, p.9). In regard to exposure and capacity to respond to risks in urban areas, women would therefore be more vulnerable than men. As the UNDP (2013) observes, that fatalities from disasters tend to be higher for women than for men. Alber (2009) has outlined four factors of gender inequality in relation to risks. Firstly, he suggests that the gender division of labour makes women spend more time on unpaid work than men arguing that disasters increase the burden of unpaid work for women as they have to travel longer distances to seek water or fuel wood and to take care of the sick or the elderly much to the detriment of their education and income generating activities. Secondly, he notes that proportionally more women are poorer than men and that with increasing number of female headed households, there was gear of 'feminization of poverty'. Thirdly, he refers to differences in power relations and unequal participation in decision making. Rabbani et al (2009), for example, note that in Bangladesh impacts of water related hazards are more conspicuous on women than on males due to, among other factors, limited decision making roles. Finally, he cites cultural patterns and social roles that discriminate again women in many societies. In Bangladesh for example, women insignicantly participate in training related to climate change(Rabbani et al, 2009) and as such floods warnings either do not reach or are not understood by women (Alber, 2009).

As noted by Alber (2009) the cumulative impacts of such factors are an increasing vulnerability of women. Such vulnerability may also cause mental health problems such as stress, anxiety, depression, insomnia and irritability (see: Hadley and Patil 2006). The situation is not different in Malawi broadly and in Karonga specifically. In Malawi, White (2007) notes while some societies follow the matrilineal system where women take 'a leading role in controlling means of production' and others follow the patrilineal system where men 'take a leading role in controlling means of production,' in both systems men are in control of resources and power. In

urban governance women representation has remained minimal. For example, out of 27 councilors in Lilongwe City in 2001, only 7 were women (Lusinje, 2001). The situation has not changed. Information from the councils indicates that following the 2014 elections, while had Lilongwe City had 27 Councilors, only 6 were women. In Mzuzu city out of the 15 councilors only 2 were women, one actually an appointed member. In Karonga of the 10 councilors only one is a woman. In Karonga, there is likewise low representation of women in the local government. Such low representation goes as far down neighborhood level. Furthermore, the only female voice in the Karonga council, the District Commissioner, is under constant pressure from largely male workers, chiefs and councilors to transfer from the district to the extent that she currently operates only with the backing of a high court injunction

## 6.0 CONCLUSION

Karonga has great potential for growth owing to its location in a fertile flood plain at the estuary of North Rukuru River, on a transport route and close to a major mine. However, the low altitude due to rift valley location of the town, its high water table and the increasing amount of construction in low-lying areas including in the flood channels, raise the potential for damage from flooding while the low quality of buildings increases vulnerability to seismic risks. The failure to implement building standards and regulations because of low capacity of the local government in the town compounds the vulnerability of especially female headed, households' and the town's assets and livelihoods. This situation can become worse as a result of conflict and violence.

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