Risk Assessment of Flood Receptacle Zones in University of Uyo Annex and Environs, Uyo, Nigeria

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Abstract: Flooding is the most common natural disasters worldwide which cannot be completely eradicated but mitigates through flood management measures. The study aimed at carrying out risk assessment of flood receptacle zones of University of Uyo Annex and environs, Uyo with a view to suggesting remedial actions to mitigate through flood management measures. The study employed the Geographic Information Systems (GIS) technologies, direct observation and measurement methods to generate flood hazard map of University of Uyo Annex and environs. ArcGIS 10.1 software and Golden Surfer 25.0 software were used to generate Digital Elevation Model (DEM), contours and overland flow analysis that produced the direction of water flow, and unveil stagnate water points which contribute to flood hazards in the area. 340 random spatial locations were selected during the 2025 flash flood event to identify flood risk zones in University of Uyo Annex and environs. From the results of the study, flood prone hazard areas in University of Uyo Annex and environs were identified. Flood management measure such as structural mitigation consisting of underground drainage channel construction was recommended to evacuate flood waters to Iba Oku River. The study further recommends creation of flood control zone in Uyo metropolis.

Keywords: *Flood Receptacle Zones, Flood Risk, Geographic Information Systems, Flood Control Zone, Infrastructure.*

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I. INTRODUCTION

Flooding is considered to be the most distressing natural disaster worldwide especially in less developed countries like Nigeria where heavy seasonal rains occur during raining season which usually lasts from April to October each year. During this period, excessive rainfall can overflow drainage systems and riverbanks thereby causing flooding that pose serious danger to lives, property and infrastructure. (Nura & Alison, 2023). It occurs mainly due to rising global temperatures which could be attributed to high evaporation and increased moisture in the atmosphere that result into heavy rainfall and extreme precipitation.

It could be observed that climate change has recently increased the frequency of extreme weather events such as heavy rainfall leading to floods in several regions of the world. Floods cause tragedies to life, properties and the environment every year at varying intensities and places across the globe. Flooding can cause illness, physical injury or destroy property including physical infrastructure. On a global scale, many countries have been affected by floods and it is the worst devastating natural hazards in developing countries like Bangladesh, Pakistan, India, China, Somalia and Nigeria, claiming more lives than any other natural phenomena thereby causing severe damage to property and infrastructure. Brendan *et al.* (2024), reported that about 2.8 billion people were affected by floods worldwide, and have caused over 200,000 fatalities over the past three decades.

Coastal cities worldwide face escalating flood risks from sea level rise, storm surges and extreme weather with vulnerabilities intensifying due to climate change (Klaus, 2015).

Inland flood exposure continues to rise in the USA, driven by changes in precipitation and development in floodplains. Heightened exposure has translated into

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economic impacts, as evidenced by increases in both average annual losses (Tate *et. al*, 2021). Flooding is seen as the most frequent climate-related hazard worldwide and affects millions of people and properties in low-lying areas (Wilby & keena, 2012). Charente River experienced four successive flood events in six months affecting huge territories in the valley (Duquessne & Carozza, 2024).

In Africa, rural communities are more vulnerable to flooding, particularly those that dwell in low altitude areas or live near rivers, lakes and lagoons. (Munyai *et al.,* 2021). The urban populations and infrastructure are not left behind the flood hazards vulnerability scene. In most cases, rapid urbanisation without adequate urban planning and careful infrastructure development has exacerbated the risk of urban flooding. The forecast according to Shabu & Shabu & Tyonum (2013) showed that in the next decades, flooding would likely become most common and intense in many low-lying areas especially in coastal towns due to high rainfall. However, prediction of precise locations of increased risk resulting from flooding was not feasible due to multifaceted dimensions of the natural phenomenon. This implied that flood risk dynamics have multiple, social, technical and environmental drivers that impinges on the man and his environment.

As many major cities of the world have experienced property damages, injuries and fatalities, economic and social disruptions due to flood disaster, Uyo town in Nigeria had similarly experienced series of flood threat particularly during intense or prolonged rainfall event in recent times. This has become so prevalent in recent times, the socio-economic activities in the town around State Secretariat and Akpaden market were hampered, and threatened people's livelihood in Uyo town.

Shabu & Tyonum (2013) recorded on the global scale that from 1971 – 1995, floods affected more than 1.5 billion people, out of which 318,000 people were killed and more than 81 million left homeless. Their study further noted the economic costs of extreme weather and flood catastrophes was severe, and that flooding was on increase as a result of drastic climate change, and the effects are more pronounced in poorest nations.

Cirella & Iyalomhe, (2018) noted flooding to be one of the most widespread and destructive natural perils, affecting approximately 250 million people worldwide and causing US$ 40 billion in losses on an annual basis. It affects more people on an annual basis than any other form of natural disaster due to a variety of climatic processes like rainfall intensity and dam collapse influence flooding. In general, degree of floods depends on intensity of precipitation, volume, timing and size of drainage basin. It is an extreme naturally occurring event that results in an overflowing of large amount of surface water over land that is not always inundated. It is considered to be the worst natural disaster in the world and responsible for some of the natural problems and damages on facilities around the globe. According to Onifade *et al.* (2023), Nigeria has experienced series of flood disaster in the past five decades while the trend, intensity and effects are increasing accompanied by economic losses. Flooding in the country become a common phenomenon that has a devastating impact on human livelihoods. Odiana *et al*., (2022) reported that flooding has become a yearly incidence in Nigeria where it continues to cause economic and social problems in an uncontrolled manner. It is more pronounced when poor development occurs across natural drainage channels and had caused damages to societies as a result of increased its intensity and frequency of floods worldwide especially in the less developed world.

The flooding incidence in the Uyo town may be attributed to global warming or changes in the climatic condition of the area, excessive rainfall, and unplanned infrastructural development. Although there have been series of attempts and interventions by successive governments to combat this menace especially outside the annex premises. However, such efforts did not extend to cover the University of Uyo Annex and environs.

The recent increase in precipitation due to global warming seems to results in heavy rainfalls as may be seen in University of Uyo Annex and environs. Persistent flooding seems to occur in most parts of Uyo town where University of Uyo Annex and environs is located. At certain instances, the road leading to Environmental Management Science classrooms were submerged, and waste water collects at some strategic points behind College of Health Science lecture halls and Faculty of Environmental Studies office block. This impedes proper vehicular and pedestrian circulation within the University of Uyo Annex and environs campus and the stagnant water becomes the breeding ground for mosquitos and poses an eyesore.

The general goal of the study is to carry out risk assessment of flood receptacle zones of University of Uyo Annex and environs. The objectives of the study are to:

- Lay out study area to identify areas prone to flooding in University of Uyo Annex and environs,
- Examine the factors that contribute to flooding in University of Uyo Annex and environs, and
- Suggest remedial actions to combat flooding within University of Uyo Annex and environs

The reason for the study is to carry out risk assessment of flood receptacle zones of University of Uyo Annex and environs, Uyo with a view to suggesting remedial actions. The study is justified primarily on the basis of the need to have an environment that promotes health, safety, economy and convenient for human beings. The study would contribute to building a knowledge base in risk assessment of flood receptacle zones and would serve as one among the documentary evidence of the subject area. It would also serve as an added supplement for other researchers to help investigate this subject area, thereby contributing to the stock of literature. The study's emphasis will be on flash floods; therefore, types of floods are not covered by the study.

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II. LITERATURE REVIEW

Floodplains and coastal areas in the Nigeria especially the Delta region are the most susceptible to flooding. In towns like Lagos, Warri, Port Harcourt, Oron and Calabar, flooding occurs in when there is an unusual long period of heavy rainfall. In Asia, Bangladesh is one of the most flood prone areas in the world because of its unique geographical setting and physiographic features (Rahman & Salehin, 2013). The country is vulnerable due to presence of a monsoon season which causes heavy rainfall. Other factors which have contributed to flooding are deforestation in Nepal which also caused soil erosion in the area. The erosive debris deposited within the river channel could lead to the increased silt content in the rivers. This decreases the carrying capacity of the rivers, causing the peak flow of the river to reduce thereby resulting into floods.

➢ *Urban Climate Change Impacts*

The biophysical challenges generated by climate change give rise to additional and real impacts on our cities, and the residents in such cites or towns. It is well known fact that, the impacts and threat potentials vary between cities depending on their:

- Geographic location, which will determine how they will be affected by climate change and the potential degree of those biophysical changes;
- Specific geographic features, in combination with their general global location will help determine potential threats. That is whether the town is located on the coast or in a major deltaic area.
- Area of climate change impact hazard lands, which can be ascertained by asking questions such as, in arid areas, how much development has occurred on steep or unstable slopes? Or on low lying areas, are towns located on low lying or flood prone areas? "What is the quality of development in such areas, that is, are developments in hazard areas poorly built informal settlements or are they higher quality developments built to national construction standards? and
- Vulnerable population - vulnerable groups living in the city and in its climate change hazard prone areas are more likely to be more affected by climate change impacts than other less vulnerable groups. The vulnerable groups have a lower capacity to effectively respond to or adapt to climate change impacts due to limited resources.

- *Climate Change has the Potential to Increase Flooding in Three Ways:*

✓ Sea level rise: Climate change through the action of global warming is causing rise sea levels due to increased glacial and polar ice melt. It is also causing sea levels to rise by warming the oceans themselves, and affect the overall ocean volume to increase. A combination of increased magnitude and frequent marine storms associated with events like cyclones, typhoons, and hurricanes, storm surges are becoming more devastating.

It could be observed that sea level rise cannot be uniform around the globe coastal cities. The impact of sea level rise on a given city will vary depending upon its location and level of development. Some cities may have built sea walls or preserved protective coastal areas with mangrove forests, while other cities have coastlines that are more prone to erosion. Urban planners, of course, are key players in determining appropriate actions to mitigate flood vulnerability. The urban planners' alleviation measures may include the location and scale of marine defenses like sea walls, the identification and avoidance of development in sea level rise hazard areas, ensuring that new development in hazard prone areas can withstand storm surges and related hazards. The measures may extend to cover the identification and protection of shoreline areas with mangrove forests that provide a natural defense for storm surges and coastal flooding.

✓ Increased/Intensified rainfall: Climatologists agree that intense rainfall events are likely to increase the frequency and magnitude of floods in certain parts of the world due to climate change. Tabari, (2020) recorded that extreme precipitation is expected to intensify with global warming over large parts of the globe as the concentration of atmospheric water vapour which supplies the water for precipitation increases in proportion to the saturation concentrations at a rate of about 6 – 7% per degree rise in temperature according to the thermodynamic Clausius-Clapeyron relationship. Since large amount of impermeable surface areas like roads, buildings, paved areas in cities and towns, places with inadequately designed or limited storm sewer and drainage systems are faced with flooding during storm events. Damage to properties and health impacts abound in areas with open sewage ditches and/or a combined sewer-storm water system that tends to be flooded out during storms, thereby injecting raw sewage into the flood waters.

The impacts of increased rainfall vary depending upon the region implying that different regions maintain different weather forecast. Within the same region, many areas assume substantial weather variations from other areas which may be due to the level of urban area development and infrastructure. For example, some lesser-developed cities may have more pervious or unpaved areas where rainfall can be more easily percolate or absorbed. The absorption rates would depend on the state of how parched the area is unpaved or permeability of the soil. Other cities may have more developed storm water management systems and infrastructure to manage the increased rainfall events, although the intensity of the events may well overwhelm even the most comprehensive systems.

✓ Intensified river flooding: Increased or intensified rainfall from storms and, in certain places, bigger river flows due to increased glacial melt due to climate change, ultimately leads to higher incidences of rivers overflowing their banks. In urban areas, particularly those in low-lying areas or deltaic regions, this type of flooding has been increasing. Some studies indicate

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increased runoff and earlier spring melts contributes to flooding (Yi *et al*, 2023; Li *et al*., 2025).

The impacts of river flooding vary depending upon the region (i.e., some cities are located in the hinterland off the streams, lakes or rivers, on river banks, deltas, river confluences, or around larger rivers) which may involve the level of development in some cities the construction of protective dikes or controlled development in the flood plain. Urban planners are the major players in determining the location and scale of river dikes, and other flood management systems. Local land use plans and enforcement can also regulate the location, type and scale of development in flood plains.

- *Flooding in University of Uyo and Environs*

The flooding experienced at the University of Uyo in Akwa Ibom State, Nigeria, arises from a combination of natural and anthropogenic factors that also affect the wider Uyo urban area. It implied that flood occupancies in the University of Uyo and environs are as a result of dual causation namely natural and human-induced and the University of Uyo shares the same vulnerability patterns as other parts of Uyo metropolis. Essien *et al.* (2018) has identified locations highly susceptible to flooding, highlighting the persistent and widespread nature of the issue across the metropolis, including university premises.

Natural process can be identified when prolonged, heavy, and intense rainfall occur during the rainy season. The process starts with infiltration, absorption and finally runoff. Infiltration is the process by which water on the ground surface enters the soil. It is commonly used in both hydrology and soil sciences. Infiltration is caused by multiple factors including; gravity, capillary forces, adsorption, and osmosis (Ogban & Utin, 2015).

Many soil characteristics can also play a role in determining the rate at which infiltration occurs. Ponding time (Brutsaert, 2005) is the period from the start of rainfall until water begins to accumulate on the soil surface. It occurs when rainfall intensity exceeds the soil’s infiltration capacity. Before ponding, rainfall intensity is lower than the soil’s infiltration rate, so all water infiltrates and the soil remain unsaturated. Ponding starts once rainfall intensity surpasses infiltration capacity, causing the soil surface to become saturated. As rainfall continues, the saturated zone deepens and excess water forms puddles, eventually leading to surface runoff. It is observed that the University of Uyo campus's location is in low-lying area of the Uyo town, characterised with depressions, and floodplains further promotes ponding and accumulation of water.

The human-induced factors include inadequate and poorly maintained drainage systems, both on campus and in surrounding areas which fail to efficiently divert or remove excess run-off water. Also, irritating practices include indiscriminate waste disposal that blocked gutters and channels, substandard waste management, and construction activities (such as erecting structures over or blocking natural waterways and drains), which obstruct natural water flow and worsen the problem. These repeated floods regularly inundate campus pathways, residential halls, academic buildings, and other infrastructure.

- *Flood Risks*

Recent studies emphasize that flood risk, though unavoidable, can be successfully be controlled through a combination of structural and non-structural methods, especially the presence of climate change and urban expansion (Wang *et al.*, 2022; Dipu & Snigdhya, 2024). These strategies aim to reduce short-term damage while fostering long-term societal resilience and adaptability.

Engineering measures focus on physical structures, such as dams, reservoirs, levees, flood walls, and flood-proof buildings, to contain or divert water. Other techniques include rehabilitating natural floodplains for water absorption, enhancing ground permeability, and developing flexible floating infrastructure. Non-engineering approaches include land-use regulations that prohibit building in high-risk areas, implement sustainable drainage systems, and encourage community readiness through raised fixtures and planned evacuations. They also feature policies that secure funding and assign clear roles to local authorities for resilience planning. It could be noted that floods cannot be fully eliminated, but an integrated approach of combining infrastructure, sound policies, and active public involvement can greatly mitigate risks and build lasting solutions. To enhance effective and sustainable flood management demands balancing technical solutions with environmental harmony and social fairness to counter rising threats from climate shifts and city growth. This could be achieved by implementing zoning regulations, promoting sustainable land use, and developing early warning systems and emergency response plans. Integrating flood mitigation systems into urban planning requires a holistic approach that considers the unique characteristics of each urban area (Faiz & Hussain, 2024).

- *Related Studies*

Flooding in coastal communities like Uyo has been a serious threat to life, property and infrastructure. The continued raising sea level in the Niger Delta Region and intensified flooding disrupt schools, commercial activities, emergency services and transportation links.

Abua et al., (2023) noted two types of groundwater recharge namely natural and artificial. Natural groundwater recharge is a process through which the subsurface hydrology is replenished without human technology. This is usually sourced from rainfall, rivers, lakes, streams and snowmelt. Artificial recharge, on the other hand, is an anthropogenic technology used to trap water in a basin during heavy rainfall, and such water is allowed to percolate into the water table. However, ground water recharge and subsequent discharge to the surface water bodies significantly depends on rainfall regimes.

Efforts to properly address flood in Uyo metropolis, Ituen *et al.* (2014) used Arcmap 9.2 and surfer 8.0 GIS software to assessed and visualized flood prone areas by

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creating flood hazard and control zones in the capital city. Ituen *et al.* (2014) recorded that flooding in Uyo city were caused by terrain with low lying basins and unregulated built-up activities. Visualization approach is an important tool and could assist in the identification of flood location for effective decision making.

Dano *et al.* (2019) assesses flood susceptibility of Perlis, Malaysia with a view for reducing and managing their impacts on people and the environment. The research done by Dano *et al.* (2019) employed a combined methodology incorporating geographic information system (GIS), the analytic network process (ANP), and variables obtained from remote sensing (RS) to evaluate and map flood vulnerability. They pinpointed areas classified as very highly susceptible to flood (VHSF) and highly susceptible to flood (HSF), which amounted for 38.4% (30,924.6 ha) and 19.0% (15,341.1 ha) of the study region respectively.

Baywood *et al.* (2024) proved that multispectral imagery and conventional data along with GIS tools are essential in determining areas prone to flooding. Their study utilizes an integrated approach by combining Remote Sensing and GIS techniques to effectively provide a model to manage floods in flood-prone areas within Oguta LGA, Imo state.

Oladipo (2023) suggested that individuals should not build houses close to floodplains or in areas liable to flooding. The study further recommend that governments should maintain existing dams and build new dams to take care of water released from dams in the neighbouring countries of Cameroun, Niger and Chad. Water stored in the dam reservoir should be released in such a manner as to reduce high flows and increase low flows resulting in a stable flow regime downstream of the dam.

III. METHODOLOGY

The study was carried out in University of Uyo Annex and environs, Uyo, Akwa Ibom State. Uyo local government area lies between longitudes 7°51'E to 7°59'E and latitudes 5°40'N to 5°59'N (Ituen *et al.*, 2014) as in Figure 1.

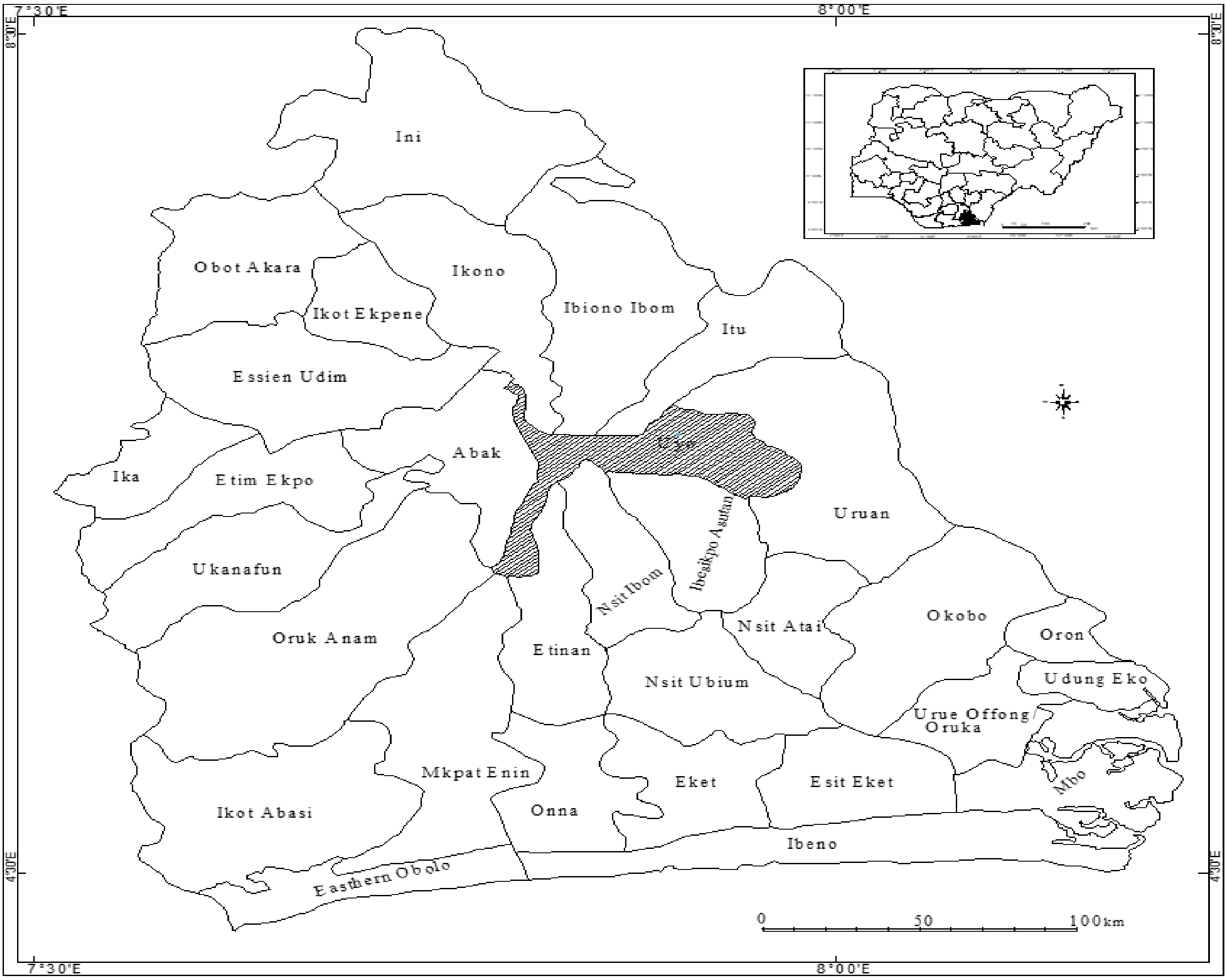

Fig 1 Map of Akwa Ibom State Showing Uyo Local Government Area

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The study area is University of Uyo Annex and environs, located in Uyo metropolis, Uyo local government area and share boundaries with Ikpa road in the east, Uyo-Ikot Ekpene road in the south, Udo Okonkwo street in the west and Udo Ekon street in the north. University of Uyo Annex and environs, Uyo covers an approximate area of 81.49 hectares as in Figure 2.

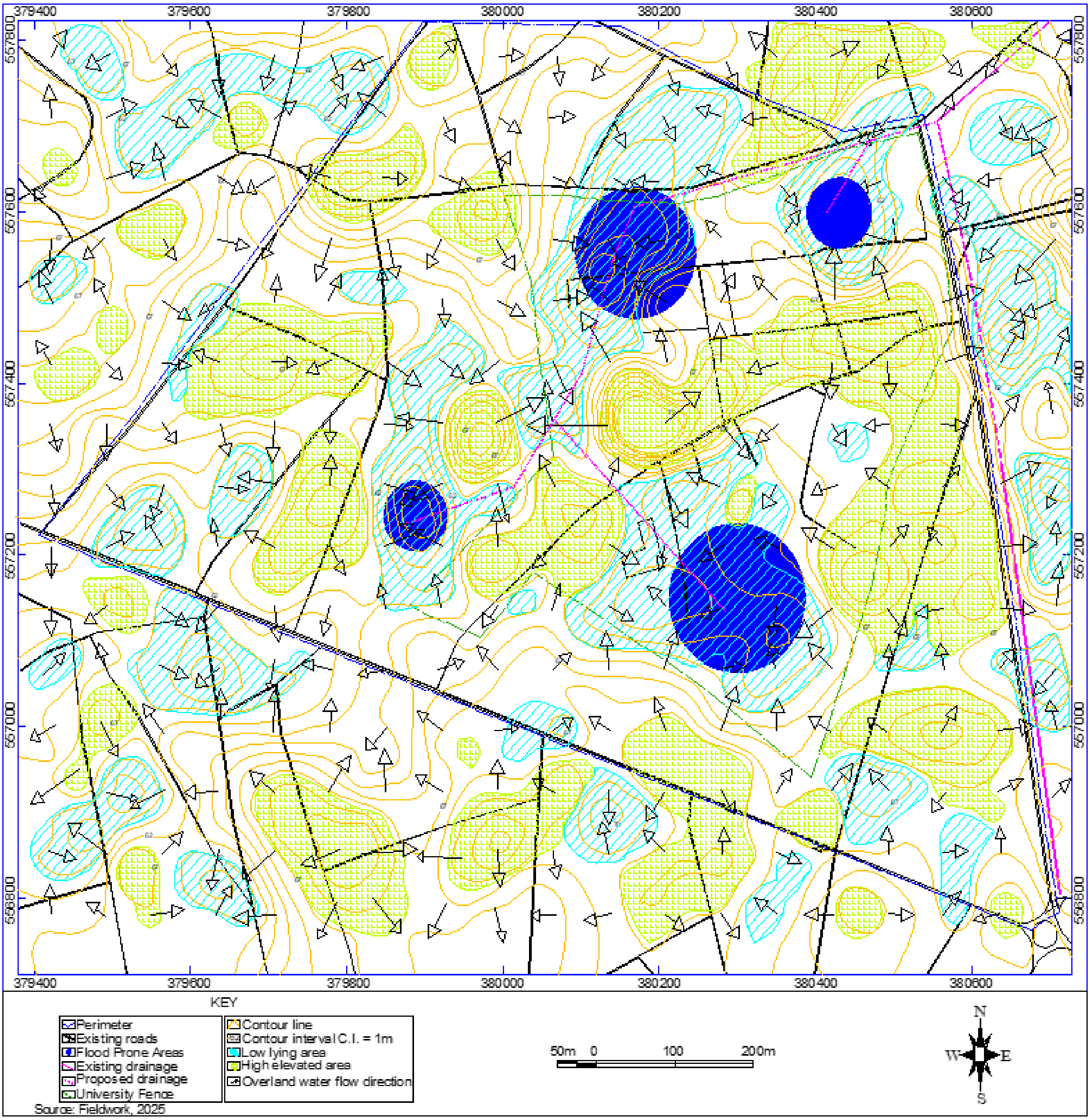

Fig 2 Map of Study Area Showing Overland Water Flow Direction

Uyo metropolises received 3172.9 mm as the highest amount of rainfall during in 2011 and the least value of 1562 mm in 1983, and with continued increase in amount of annual rainfall signify a tendency towards flood (Egor *et al.*, 2015). The temperature regimes of Uyo town were the University of Uyo Annex and environs correspond with that of the tropical humid climate and ranges between 26.2˚C and 35˚C with mean annual temperature of 28.4˚C. The area is a low-lying terrain and is susceptible to flooding that result from extreme rainfall. The University of Uyo Annex and environs is fully of infrastructural developments with some buildings like the Estate Department, College of Health Science lecture halls and Faculty of Environmental Studies

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office blocks that could induce flooding if not properly planned.

The University of Uyo Annex and environs is mainly drained into Iba Oku stream network which flows northwards into Ikpa River and empties into the Cross River Estuary. Intensive infrastructure developments in University of Uyo Annex and environs have rendered substantial part of the surface soil impervious to infiltration thereby increasing the volume of surface runoff.

The flood risk prone areas within University of Uyo Annex and environs were analysed a Geographic Information System (GIS) approach. This approach was used to map the study area and identify flood location points in University of Uyo Annex and environs, Uyo through visualisation. The study incorporates data from primary and secondary sources. The secondary data include base map of University of Uyo obtained from GIS laboratory, Department of Geography and Natural Resource Management University of Uyo. Primary data was collected from direct field observations and measurements at sampled locations. Data were acquired through the use of Garmin Global Positioning System (GPS) map 76 CS while ArcMap 10.1 and Golden surfer 25.0 software.

During the field survey, hand-held GPS was used to capture three-dimensional information (easterns, northerns and elevation) of 340 random spatial locations in the study area. The analogue maps obtained from Department of Geography and Natural Resource Management University of Uyo were scanned and converted into digital format while ArcGIS geo-referencing tool was applied to rectify the scanned maps. Re-projection of the base map was to change the WGS 84 Psudo-mercator to local projection (Minna zone 32 N) datum since the data were from multiple sources and Golden surfer 25.0 software was used to provide digital elevation model (DEM), contours, and overland water flow direction.

IV. FINDINGS

The collected data from 340 spatial locations mainly x and y values represented the easterns and northerns coordinates of the location while z represented the elevation format was analysed by performing krigging on grid data using Golden Surfer 25.0. It was observed from the terrain analysis that, flood risk locations were prevalent at low lying basins and such basins were bound to be flood sources which attenuated to nearby areas. The most affected areas are around University of Uyo secondary school gate, Estate Management Science classrooms in the University of Uyo Annex, centre for entrepreneurial scheme, and Annex campus popularly known as king Solomon palace. Although, some flood risk's locations lay outside low lying terrain, flooding occurring at those points were ascribed to disruption of water-ways by unregulated land development projects and improper drainage network.

The results from flood hazard assessment of the study area show that University of Uyo Annex and environs should be declared a flood control zone. Within this control zone, built-up activities, high rate of inundation from the low-lying basin and overflow associated with the terrain contribute to frequent flooding. Although a drainage channel was built to evacuate storm water from the university, it was narrow and cannot discharge the storm water as expected. The stagnate water usually submerge the entrance route to University of Uyo secondary school and open spaces (lawns) in the area during rainy periods. The low-lying terrain does not permit easy flow of water in the area, and it is not advisable to allow construction of more buildings to avert blockage that will result to serious flooding problems in this critical control zone. Less critical control zone located outside the university fence is characterised by moderate flood hazard and flood menace was less pronounced in the zone. Another less critical zone located around girl's hostel known as hall 'H' was also observed to be associated with less flood situations as few built-up activities blocked the waterways.

V. DISCUSSION OF FINDINGS

The surface runoff occurs in the area when heavy or prolonged rainfall saturates the soil or impermeable surfaces prevent water from percolating into the soil. The result shows that flooding in University of Uyo Annex and environs occur due to built-up interference or blockage of natural water ways causing relocation of inundated areas against the natural locations. It implied that flood risk locations were prevalent at lower points and poor orientation of buildings impedes free flow of surface water flow resulting to flooding in University of Uyo Annex and environs. The nature of surface topography should be considered as a resource to guide development. Inundation can occur even on highlands when there is a blockage on water ways. The findings from risk assessment identified two control zones that could be regarded as critical or less critical zones. These zones are characterised by high flood risk and low flood risk for critical and less critical zones respectively. In each control zone, land use development and the nature of surface terrain influence flood hazard in the area. Critical flood zone was established as a result of blocked water overflow way in the low-lying basin and improper location of buildings while less critical flood hazard zone was caused by partly built-up and absence of drainage channels in the area. The study identified two flood control zones as opposed to three flood risk zones put forward by Essien *et al*. (2018). However, this study agrees with Baywood *et al.* (2024) who established that as long as physical development continues to extend and spring up in urban centres, flooding is one of the natural occurrence hazards that cannot be completely eradicated. The area that falls within the lowest elevation faces very high flood vulnerability due to increased likelihood of inundation, whereas higher elevations have a lower flood risk. The land slope significantly affects flood susceptibility, as it influences the speed of surface water flow.

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VI. CONCLUSION

The desire to protect livelihoods and infrastructure in University of Uyo Annex and environs, calls for climate-resilient disaster planning and nature-based solutions to reduce vulnerability to climate change. In view of this, the study assessed flood prone points in University of Uyo Annex and environs through GIS visualisation method. Analyses and models were performed using Arcmap 10.1 and surfer 25.0 software. Flood prone hazard areas were assessed by mapping of existing flood locations based on the data collected from surface terrain field survey of the study area while flood control zone was created to guide flood hazard analysis by delineating areas where flood control measures could be applied to reduce harmful effects of floods. The assessment was done to ascertain parts of the area that have been inundated or found on the low-lying basin in the University of Uyo Annex and environs. Persistent flooding in the study area was found as a result of low-lying basins and unregulated built-up activities but flood interventions within University of Uyo Annex and environs can remedy the situation.

RECOMMENDATIONS

The risk assessment of flood receptacle zones of University of Uyo Annex and environs, Uyo recommend the creation of flood control zone in University of Uyo Annex and environs, and other neighbourhoods in Uyo town should emulate the strategy to curtail flood menace. This further study recommends both structural and non-structural flood control measures to be implemented in the study area. The structural measures should be construction of an underground drainage channel within University of Uyo Annex and environs campus to link the existing underground storm sewer channel along Ikpa road that empty into Iba Oku stream. The non-structural flood control measures should be enlightenment and regular campaigns on flooding. This control measures would also involve capacity building, flood awareness campaign on city managers, University of Uyo authorities and the general public. A combination of both structural and non-structural measures could drastically eliminate flood menace in the University of Uyo Annex and environs, Uyo. The control measures would ensure sustainability of social, economic, and environmental well-being of the inhabitants in University of Uyo Annex and environs, Uyo.

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