

Climate Risks and Livelihoods Assessment in Akwa Ibom Northern Region, Nigeria

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Article History	Abstract
Original Research Article	<p><i>This work assessed the impact of climate risks to livelihoods in Northern Akwa Ibom. The study adopted the Livelihood Vulnerability Index-Intergovernmental Panel on Climate Change (LVI-IPCC) vulnerability assessment technique developed by (Hahn et al 2006; IPCC, 2007). The techniques recognized the three principal components of vulnerability (Exposure, sensitivity and Adaptive capacity) of livelihoods to climate variability. Five districts comprising 3 rural communities each were selected for the study. Climatic variables including monthly temperature, relative humidity and rainfall data from 1993-2025 were collected from the Nigerian Meteorological Agency (NiMet and accuweather centre (2025). Six dominant livelihoods were identified (farming, sand mining, trading, transport services, weaving/crafts and artisan) and assessed against the LVI-IPCC technique and climate variables. LVI-IPCC technique was used to compute and classify the level of vulnerability of livelihood to climate across the 5 districts. Geospatial mapping technique was used to model the various components of vulnerability of rural livelihoods to climate. Results revealed that farming livelihood was highly vulnerable (0.17) in Ini district than others due to high sensitivity score, exposure score and low adaptive capacity score. Artisan livelihood was highly vulnerable in Ikot Ekpene district, with a vulnerability score of 0.18, as 78% of the population in the district did not have alternative livelihood, they were mostly practicing this livelihood. From the results and also these values of vulnerability, we inferred that livelihoods adaptation to climate change vary across the districts and rural communities, but weather dependent livelihoods were more sensitive and vulnerable than non-climatic livelihoods, however vulnerability reduces as better adaptive capacity were strengthened.</i></p> <p>Keywords: Climate Risks; Adaptation; Vulnerability; Livelihoods; Northern Akwa Ibom.</p>
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1.1 Introduction

Climate is a term used to refer to the average pattern of weather conditions normally occurring in a particular area, averaged over possibly 30 years or longer. Climate is not like weather which describes only short-term atmospheric conditions but climate covers long-term trends and variability of meteorological elements including but not limited to temperature, rainfall, humidity, and wind in relation to their frequency, intensity, seasonal distribution and duration of extreme events (Ayoade 2002). Climatic condition variations have substantial impact on human livelihoods, especially in developing countries where economic activities rely heavily on natural resources. As a result, variations in rainfall and temperature have become

key determinants of livelihood vulnerability because they affect agricultural production, food security, income generating opportunities and the resilience of rural communities (Apata et al., 2009).

The adaptation of rural livelihoods to the challenges posed by climate change have become a key aspect of contemporary climate policy and sustainable development discussions. Climate sensitive livelihoods such as agriculture and fisheries in Nigeria, where rural communities are generally characterized by weak human development indicators, low adaptive capacity and low policy support (Smit & Wandel, 2006; Adeleke & Fregene,

2014; Akpan, 2017) remain highly vulnerable. Decreasing climatic variability has severely impacted agricultural production and other natural resource-dependent economic activities (Akpan, 2017) across the Niger Delta region including Akwa Ibom State. Umoh et al. (2015) also reports that over 70% of the region's population is dependent on farming and fishing, including production for household consumption and providing raw materials to industry. Rural livelihood systems in the region are influenced by a wide array of political, institutional, economic and biophysical factors in addition to environmental conditions (Adeleke & Fregene 2014; Akpan 2017). Examples are government policies, taxation systems, agricultural extension services, transportation infrastructure accessibility to markets soil types land betterment and dry (Anyadike 2009) Seasonal and inter-annual variability of rainfall, temperature, and other climatic variables influence agricultural productivity in Akwa Ibom State (Ekanem 2005). In addition, rainfall varies greatly across the state with a range of mean annual totals (mm) from 2800 -4200 mm in Central areas at Etinan and Ibesikpo; to about 2000–3200 mm in Northern localities like Ini and Obot Akara (Akpan, 2014). On the other hand, climatic changes in northern Akwa Ibom would be promoted such as higher rain intensity, prolonged wet seasons and more recurrent extreme temperature events which could exacerbate the vulnerability of rural households by lacking or inadequate adaptation (Akpan, 2017).

Climate vulnerability is often seen as a function of three interrelated dimension, particularly: Exposure; Sensitivity; Adaptive Capacity (Smit & Wandel, 2006). Exposure is how much (magnitude) climate hazards or environmental disturbances a system or population experiences and how often (frequency) and long (duration). Kasperson et al.(1996). Sensitivity: The extent to which a system is affected, either adversely or beneficially by external perturbations and Adaptive Capacity: The ability of an individual, household, or community to anticipate, respond to, recover from and adapt itself completely in the face of adverse climatic events (IPCC; 2001; Yusuf & Francisco; 2009; Smit & Wandel; 2006). For example, in his own interaction of floods, Gallopin (2006) argues that besides structurally weak housing, poorly built houses are more prone to flood damage than good buildings; having economically poorer households buttered Google on the borders land which is impacted by flooding while higher financial resource families usually have immediate resources and information for repair their lost property or even moving. The examples above show that the combination of exposure, sensitivity and adaptive capability jointly determine how vulnerable a household or community is. As such, current climate vulnerability assessments commonly incorporate these three dimensions

as a basis for determining the resilience of livelihoods systems to changing climate conditions (IPCC, 2001; Adelekan & Fregene, 2014; Akpan, 2017).

Northern Akwa Ibom is one of the major agro-ecological zones in Akwa Ibom State, Nigeria; it is located in the upland zone of the State, lying between latitudes 5⁰2¹10¹¹ N and 5⁰33¹03¹¹ N and longitudes 7⁰30¹10¹¹E and 7⁰53¹20¹¹E. The zone is bordered on the East by Abia State, West by Rivers State, and on the south by the Uyo, Abak and Itu LGAs of the State. The population of the area is estimated at 380,470 with a density of 190/km², 2018 NPC projection (NPC, 2018). The district plays host to the second ethnic group of the State (Annang). As a result of heterogeneity of micro-climatic conditions in the zone inferred from available climatological records, Northern Akwa Ibom has varied climates (Ekanem 2005; and Akpan 2017), this variation posed different socio-demographics/economics, edaphic, hydrological and micro-climatic characteristics creating varied impacts on their livelihoods (Imikan et al, 2025., Jimmy, 2025). The research provides knowledge on suitable areas of adaptation by creating “space” for experimentation of new livelihood diversities to reduce vulnerability of their main livelihood in the different districts.

2.1 Review of Literature

Climatic elements vary in time and space and the variations can be noticed from one decade to another or from century to century (Ekanem and Nwagbara, 2010). Akinsanola and Ogunjobi (2014) examined rainfall and temperature variability in Nigeria using data from 25 synoptic stations from 1971-2000 (30 years). In the preliminary treatment of the climatic data, basic statistical techniques such as the computation of extreme daily rainfall for each year recording in descending order for 30years, computation of the totals, mean and standard deviation are necessary to show trends, pattern or behavior of climate to livelihoods (Wilcox, 2007). Similarly, Akpan 2014, Akpan 2017 employed descriptive statistics to assess the changes and pattern of climate in Akwa Ibom State. Findings from the seasonality index indicated that a greater portion of the state exhibited normal conditions with evidence of increased warming in the last 2 decades. Ekpenyong (2015) investigated both inter and intra-annual variability and pattern of rainfall distribution in Uyo with the rationale to refute or confirm the proposition of our changing climate. Data were sourced from NiMet for a period (1931-2013). The study showed that mean annual rainfall of 2581mm in the first climatic period was relatively higher than the second climatic period (2443.3mm). The pattern however indicated a downward trend.

Afangideh, Okpiliya and Ekanem (2005) examined the trend of mean annual rainfall and temperature of Uyo from (1971-2004) using rainfall data from NiMet and Met Station of Geography and Regional planning, University of Uyo. Mean, Standard deviations, variance, and least square regression approach were used to analysis the data and test if there was a significant change or increase in rainfall pattern. It was revealed that for 2 decades with no break (1981-2001), yearly rainfall mean coincided with 30 years normal of 2384.4mm while yearly temperature was 26.8^oc. This agrees with findings of Ekpenyong (2015; Akpan 2017).

2.1.3 Vulnerability of rural livelihoods to climate risks

Climate impacts are typically studied in isolation, without attention to climate-related biophysical, socioeconomic or policy contexts. While a more integrated approach, or so-called "second generation vulnerability assessments", hereafter (Fussel and Klein 2006; Bohle 2001) have attempted [JF11] to combine exposure to "double" risk factors in order to show how stress within a region was exacerbated by climate change via globalisation, there are few attempts. Besides climate change impact on financial asset, other contemporary pressures (for instance weakening social networks, land degradation and restricted information access) have been correlated with an increased vulnerability response (Adger et al. 2005). These persistent stressors are part of the broader socioeconomic, political and environmental context (Ref) in which livelihoods are situated.

Most recent studies on vulnerability have not only considered the biophysical drivers of household's vulnerability but a more holistic, multi-scale linkage of social, economic, political and biophysical factors that buffers vulnerabilities of households. Instances of social vulnerability assessment to climate by (Adger *et al*, 2005; Blaikie *et al.*, 2003; Smit and Wandel 2006) defined vulnerability as "the susceptibility of a given population, system, or place to harm from exposure to the hazard and directly affects the ability to prepare for, respond to, and recover from hazards and disasters".

While the concept of vulnerability varies considerably across disciplines, most definitions do converge on two basic elements of why a socio-ecological system is unable to prepare for, cope with, and recover from external disturbances (Blaikie et al., 2003; Smit & Wandel, 2006; Adelekan & Fregene; Akpan, 2017). This view acknowledges vulnerability as an evolving states or condition mediated by the interaction between socio-

environmental hazard and affected social system [2]. For present purposes, however, the methodological vulnerability assessment framework outlined by Fussel and Klein (2006) serves as a particularly pertinent starting point. The vulnerability assessments of the second generation, or those with a focus on climate change impact assessment highlight that analyses of climate vulnerability should be based not just on climatic variables alone and should explicitly recognize non-climatic drivers including demographic trends, economic conditions (including poverty solutions) and socioeconomic structures, technological development and capability as well as significant biophysical characteristics. These drivers affect key elements of vulnerability such as economic diversification, education level, institutional effectiveness, and the strength of social networks that determine local capacity or readiness to respond to climate-related hazards. In addition, the spatial and temporal differences in the intensity and interaction of these drivers (Schipper & Lisa, 2007; Smit et al., 1999) reveal why exposure, vulnerability resilience and adaptive outcomes differ among regions or change over time. A further distinguishing feature of the second-generation framework is its focus on adaptive capacity as part of vulnerability assessment. In addition to assessing levels of exposure and sensitivity, the framework assesses social systems capacity to adapt to changing climatic conditions (Anyadike, 2009; Smit & Wandel, 2006) in order to avoid or reduce risks from a changing climate range and/or seize opportunities. This adaptive capacity is mostly at the disposal of livelihood assets (natural, physical, financial, human and social capital) and the institutional arrangements along with governance practices to enable productive responses to climate drivers of risk (Burton et al., 2002; Hahn et al., 2009).

Vulnerability demonstrates how well households can absorb shock and stress in order to resume their regular lives following a tragedy (Etkin et al. 2004). According to Berke et al. (2007) and Ghani (2001), the capacity refers to the community's ability to deal with disasters, overcome them, and re-establish their way of life using techniques and information known as "resilience functions" or "operational resilience."

3. Materials and Method

This study assessed the vulnerability of rural livelihoods to climate risks in Northern Akwa Ibom and these livelihoods were farming, trading, fishing, weaving/crafts, sand mining, transport (cyclist, taxi drivers), and artisan (auto-mechanics, technicians,

carpenters). This study was limited to the Northern part of Akwa Ibom State.

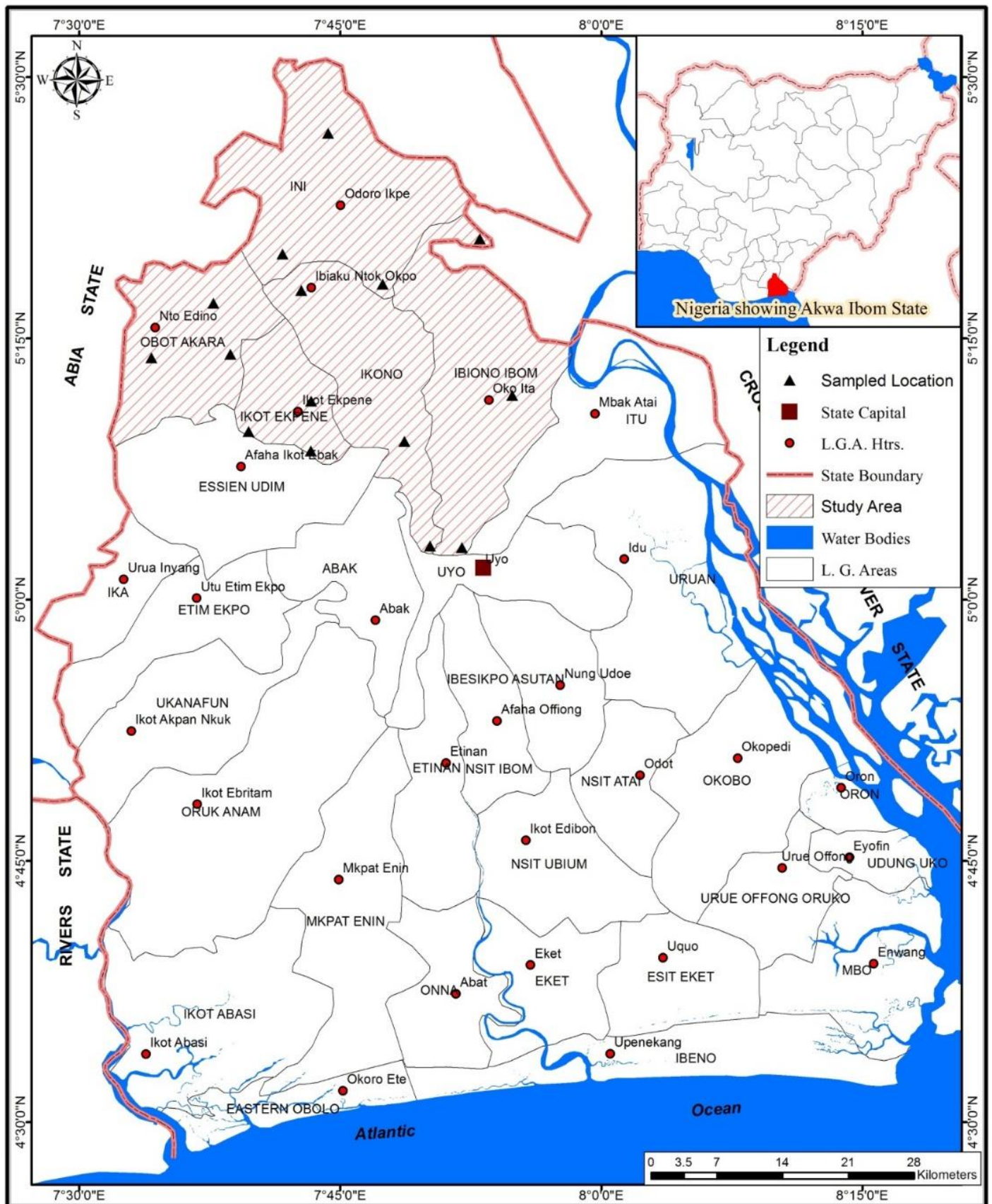


Figure 1.1: Akwa Ibom State Showing the Study Area

Source: Author's compilation, 2025

The study adopted a survey research design technique to source primary data. According to (Owens, 2002), a survey

research design has the advantage of uniqueness as information gathered is not available from other sources,

having unbiased representation of the population of interest and standardization of measurement as same information is collected from every respondent from structured questionnaires and In-depth were also used to source primary data for the study.

Taking the spatial coverage of the study area into consideration, empirical rainfall, temperature and relative humidity data from 1993-2025 were collected from NiMet while spatial data of the weather map were extracted and downloaded from accuweather website for the study as secondary data source. Although there were other climatic variables such as wind speed, wind direction, actual evapotranspiration, solar irradiance and potential evapotranspiration available for extraction, but rainfall, temperature and relative humidity records were much reliable for the study.

Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity” (IPCC 2001; Yusuf and Francisco, 2009). Thus we have; Vulnerability = $f(\text{exposure, sensitivity, adaptive capacity})$. Data sets on rural livelihood vulnerability to climate variability were captured in section 3 of the questionnaire. Adaptive capacity was based on socio-demographic characteristics of respondents and social network (Financial, Human, Physical, Social and Natural assets). Sensitivity was based on Population size in relation to farm size i.e. Human and ecological sensitivity approach of (Yusuf and Francisco, 2009). Exposure data sets were crop failure, rainfall and temperature, flood, soil nutrient loss as shown in Table 3.1.

Table 3.1: Datasets on Vulnerability of rural livelihoods to climate

	Variables	Unit of Measurement	Source
Adaptive Capacity	Ownership of radio/electronic gadget	%	Hahn <i>et al</i> , 2009, Questionnaire
	Awareness of climate change	%	Questionnaire, IPCC, 2001
	Ownership of motorcycle or taxi	%	Questionnaire
	Ownership of production tools	%	Hahn <i>et al</i> , 2009, Questionnaire
	Membership of social/financial group/pressure	%	Akpan, 2017, Questionnaire
	Access to good road network	%	Questionnaire
	Access to health facilities	%	Questionnaire
	Access to insurance/credit facilities	%	Questionnaire, Akpan 2017
	Changing sowing/cropping schedule	%	Questionnaire, Akpan, 2017
	Access to Food market	%	Questionnaire
Exposure	Non- farm employment	Count	Questionnaire
	Household income	N	Questionnaire
	Formal school enrolment (primary, Secondary or tertiary)	%	Questionnaire
	HH Dependency ratio	Count	Questionnaire, Akpan 2017
	Farm size	%	Questionnaire, Yusuf and Francisco, 2009
	Household Size	Count	Questionnaire, Yusuf and Francisco, 2009
	Flood	%	Questionnaire, Akpan, 2017
	Rainfall	Mm	Questionnaire, Hahn <i>et al</i> , 2009
	Temperature	0C	Questionnaire, IPCC 2001
	Drought	%	Questionnaire
Relative humidity	%	Questionnaire	
Crop failure	%	Questionnaire	

Source: IPCC 2001; Hahn et al., 2009; Akpan 2017; Field survey (2025)

The sample size was obtained from the population of communities in Northern Akwa Ibom State who were engaged in rural livelihood activities (farming, sand mining, artisans, transports services, weaving, trading and other services estimated at 24139 according to (NPC, 2018). The sample size for the Study was determined using Yamane (1973) method; this was seen as most suitable as it ensured that questionnaire distribution was proportional to sample size.

3.2. Vulnerability of rural livelihoods to climate risks

The Livelihood Vulnerability Index-IPCC (LVI) evaluation was used to analyse this. The index comprised the following: livelihood strategies (LS); social network (SN); health (H); food (F); water (W); natural disaster (ND) and its effects; sociodemographic profile (SDP) (number of family members under 15 and over 65 years of age belonging to dependent level, female heads of the household, education and skills level of the household) (IPCC, 2007, Hahn et al., 2009). Data were taken from the questionnaire survey that was given to respondents in order to gather information about their livelihood activities in order to assess the level of vulnerability of rural livelihoods in Northern Akwa Ibom. We calculated the climatic vulnerability of six livelihoods: farming, sand mining, trading, weaving and crafts, transportation services, and artisanal services. The study employed socio-demographic profile (SDP), social network (SN), livelihood strategies/adaptation (LS), and climate (C) as the four main components of vulnerability. Sub-components of LS (percentage of households with a family member employed in a different community, percentage of households reliant on a single source of income, average rural livelihood diversification index), sub-components of SDP (dependency ratio, percentage of female-headed households, average age of female head of household, percentage of households where head of household has not attended school, percentage of households with orphans), sub-components of SN (average receive: give ratio, Average borrow: lend money ratio, Percent of households that have not gone to their local government for assistance in the past 12 months), and sub-components of Climate (Mean standard deviation of monthly average of average maximum daily temperature since 1989, Mean standard deviation of monthly average precipitation since 1989, Percent of households with an injury or death as a result of flood or drought since 1989).

During the study, each component was measured on a different scale; it was therefore necessary to standardize the components as an index using equation (1).

$$Index_{sd} = \frac{S_d - S_{min}}{S_{max} - S_{min}}$$

Where s_d is the observed sub-component indicator for district d , and s_{min} and s_{max} are the minimum and maximum values, respectively. After each is standardized, the sub-component indicators are averaged using equation (2) to obtain the index of each major component:

$$M_d = \frac{\sum_{i=1}^n Index_{sdi}}{n}$$

Where M_d is one of the 4 major components [Socio-Demographic Profile (SDP), Livelihood Strategies (LS), Social Networks (SN), Climate or Natural Disasters(C)] for district d ; $index_{sdd}$ represents the sub components, indexed by i , that make up each major component, and n is the number of sub-components in each major component. Once values for each of the seven major components for a region are calculated, they are averaged using Equation (3) to obtain the district-level LVI:

$$LVI_d = \frac{\sum_{i=1}^4 W_{M_i} M_{di}}{\sum_{i=1}^4 W_{M_i}}$$

Or

$$LVI_d = \frac{W_{SDP}SDP_d + W_{SL}SL_d + W_{SN}SN_d + W_C C_d}{W_{SDP} + W_{SL} + W_{SN} + W_C} \text{ (equation 4)}$$

The weights of each major component, w_{M_i} , are determined by the number of sub-components that make up each major component and are included to ensure that all sub-components contribute equally to the overall LVI. Following from equations (1)–(3), Hahn et al., (2009) calculated a new variable, LVI-IPCC; this takes into consideration IPCC definition of vulnerability. The LVI-IPCC diverges from the LVI when the major components are combined. Rather than merge the major components into the LVI in equation (3), the major components were first combined according to three categories namely exposure, adaptation capacity and sensitivity using equation 5:

$$CF_d = \frac{\sum_{i=1}^n W_{M_i} M_{di}}{\sum_{i=1}^n W_{M_i}}$$

Where CF_d is an IPCC-defined contributing factor (exposure, sensitivity, or adaptation capacity) for district d , M_{dd} are the major components for district d indexed by i , w_{M_i} is the weight of each major component, and n is the number of major components in each contributing factor. Once exposure, sensitivity, and adaptation capacity are calculated, the three contributing factors are combined using equation 6:

$$LVI-IPCC_d = (e_d - a_d) \times S_d$$

Where $LVI-IPCC_d$ is the LVI for district d expressed using the IPCC vulnerability framework; e_d is the calculated exposure score for district d (equivalent to the natural disaster and climate major component), a_d is the calculated adaptive capacity score for district d (weighted average of the socio-demographic profile and social networks major components), and s_d is the calculated sensitivity score for district d (weighted average of the livelihood strategies major components). The LVI-IPCC computation for the study was scaled from 0.01-0.04 (low vulnerability), 0.05-0.09 (moderate vulnerability), 0.10-0.14 (high vulnerability), and 0.15-0.19 (very high vulnerability). The implication is that a higher net value indicated higher vulnerability and lower net value indicated lesser livelihood vulnerability.

4. Discussion of Findings

4.1 Pattern of Rainfall in Northern Akwa Ibom

Descriptive statistics technique was used to summarize rainfall records (mm) in the Study area for a period of 35 years (1984-2018) as presented in Table 4.1 which indicated the mean, maximum and minimum value, variance, Standard Deviation (SD) and Coefficient of Variation (CV) in this period. Seasonality index was used to compute seasonal/or temporal trends. Rainfall pattern showed double maxima in the month of July and September (2 peaks) and thereafter decreased abruptly from October. In most cases, cessation begins from October, November or early December due to seasonality changes.

Table 4.1: Statistics of Rainfall in Northern Akwa Ibom

Month	Mean	Max	Min	Variance	SD
January	7.4	10.4	0	11.9	3.4
February	36.2	32.2	9.5	47.8	6.91
March	141.1	98.1	31.1	323.9	17.9
April	224.4	222.3	56.9	2515.4	50.1
May	286.7	360.4	90.8	4291.5	65.5
June	404.8	501.2	119.1	7801.4	88.3
July	603.8	677.7	155	10722.1	103.5
August	387.1	297.3	103.9	3527	59.3
September	438.2	321	177.3	1926.3	43.8
October	241	177.6	97.8	18	24.8
November	102.2	109.4	8.7	1160	34
December	11.1	22	0	33.35	5.7

Source: Researcher's computation, 2025

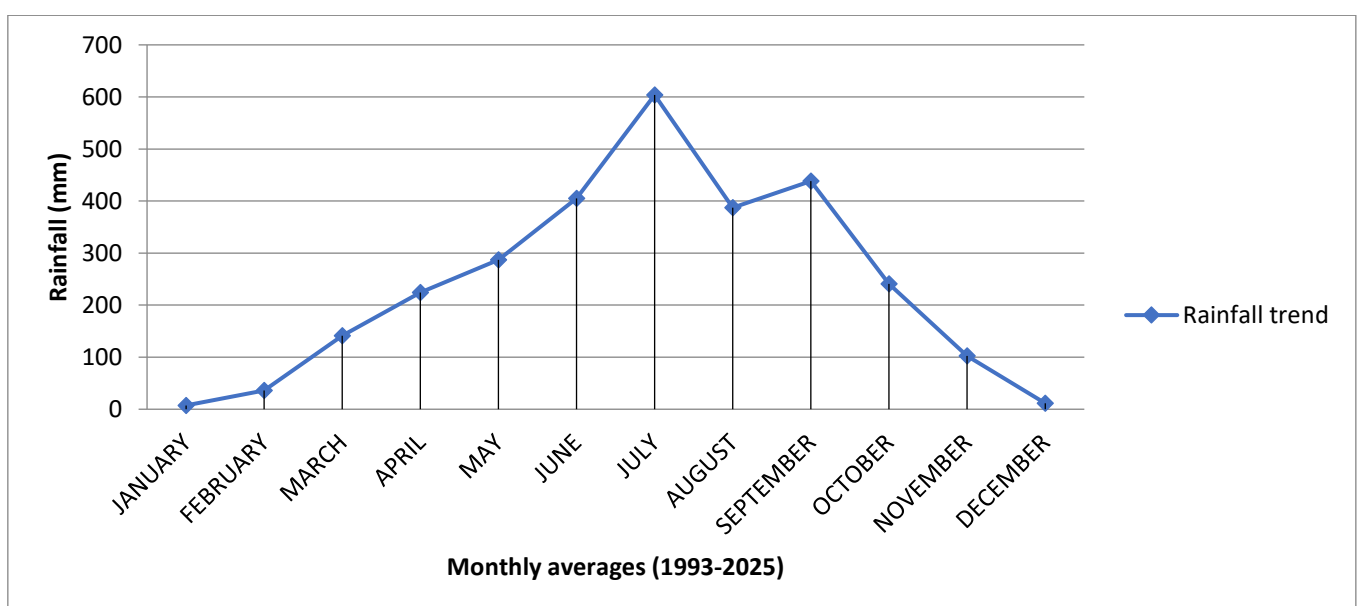


Figure 4.1: Rainfall pattern in Northern Akwa Ibom

Source: Researcher's computation, 2025

4.2 Pattern of Temperature in Northern Akwa Ibom

Descriptive statistics technique was used to summarize temperature (0°) records in the Study area for a period of 30 years (1993-2025) as presented in Table 4.2 which indicated the mean, maximum and minimum value,

variance, Standard Deviation (SD) and Coefficient of Variation (CV) in this period. There has not been any marked increase in temperature in the Study area, though monthly values for March and August recorded an increase in temperature. This was influenced by high humidity values accumulated in January, April, May and October.

Table 4.2: Statistics of Temperature in Northern Akwa Ibom

Month	Mean	Max	Min	Variance	SD
January	30.1	33.1	27.6	2.81	1.67
February	30.9	33.9	25.9	4.05	2.01
March	31.3	34.2	28.3	3.07	1.75
April	31	34.2	26.4	4.24	2.05
May	28.9	30.2	25.7	1.09	1.04
June	28.5	33	26	3.35	1.83
July	27.8	29.8	25.9	1.07	1.03
August	30.8	33.4	26.9	4.24	2.06
September	30.2	33.9	26.7	5.12	2.26
October	29.9	33.7	25.8	3.52	1.87
November	30	33.4	26.6	2.95	1.71
December	30.1	33.9	25.8	3.78	1.94

Source: Researcher's computation, 2025

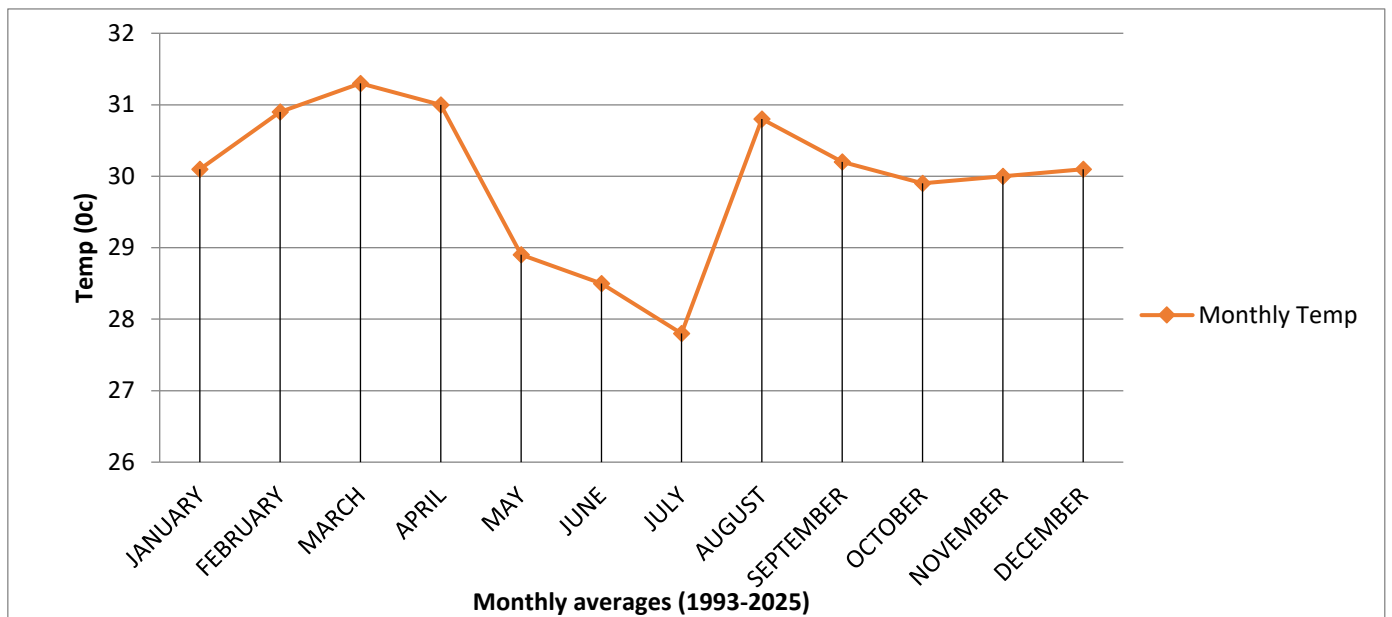


Figure 4.2 Temperature pattern in Northern Akwa Ibom

Source: Researcher's computation, 2025

4.3 Pattern of Relative Humidity in Northern Akwa Ibom

Descriptive statistics technique was used to summarize Relative Humidity (%) records in Northern Akwa Ibom for a period of 35 years (1993-2025) as presented in table 4.3 which indicated the mean, maximum and minimum value,

variance, Standard Deviation (SD) and Coefficient of Variation (CV) in this period. Monthly values in May and August recorded an attendant increase in the Relative Humidity in the Study area. This could be as a result of changes in solar irradiance, cloud cover, air velocity and wind.

Table 4.3: Statistics of Relative Humidity in Northern Akwa Ibom

Month	Mean	Max	Min	Variance	SD
January	75.3	95	44	211.13	14.53
February	74.4	92	55	80.37	8.96
March	73.5	91	54	115.49	10.74
April	76.5	90	57	81.98	9.05
May	79.6	97	57	103.28	10.16
June	77.2	95	54	152.32	12.34
July	76.1	94	53	181.26	13.46
August	78.1	96	58	82.57	9.08
September	76.6	95	59	113.08	10.63
October	77.2	97	54	146.18	12.09
November	76.5	94	58	121.15	11.01
December	76.3	96	54	129.74	11.39

Source: Researcher's computation, 2025

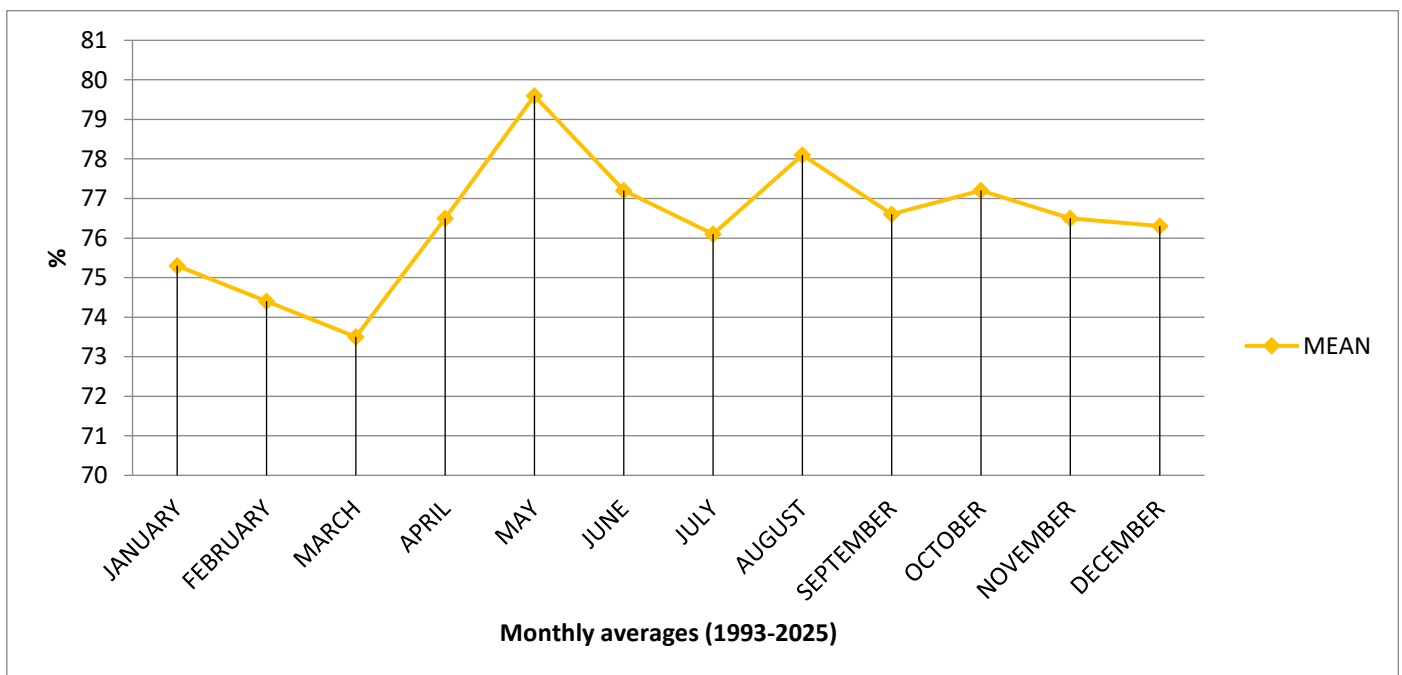


Figure 4.4: Relative Humidity pattern in Northern Akwa Ibom

Source: Researcher's computation, 2025

4.4. Vulnerability of Rural Livelihoods

At the community level, livelihoods were vulnerable as a result of climate and socio-economic characteristics acting upon them. In Figure 4.5, farming livelihood varied across the Study area. Farming livelihoods at Usuk Idim community of Ini district and Utu Edem Usung of Ikot Ekpene district were highly vulnerable with score of 0.12 and 0.10 respectively. However Ikot Uneke (Ibiono Ibom district), Ibiaku Atan (Ikono district), Ikot Idem (Ikot Ekpene district), Ikot Edem Udo (Obot Akara district) and

Mbiabong Ikot Udofia (Ini district) all had low vulnerability score of 0.02 each. The low vulnerability score in these communities was due to the fact that 64% of households were farmers and artisans combining both livelihoods to reduce shocks and stresses on farming which was weather-dependent as compared to communities who had higher vulnerability score as a result of engaging on farming as the sole livelihoods.

In Table 4.4, vulnerability of rural livelihoods differs from one district of the Study area to the other. Adaptive capacity score for Ini district farming livelihoods was 0.513, In Ibiono, adaptive capacity for farming livelihoods was 0.378, In Ikono, adaptive capacity score for farming livelihoods was 0.504, In Obot Akara district, it was 0.237 while in Ikot Ekpene district, adaptive capacity score was 0.341. Ini district and Ikono districts had better ways in building their livelihood resilience to climate, their dependency ratio was lesser, percentage of female-headed households was lower than those from Ikot Ekpene, Ibiono and Obot Akara districts. In as much as households from Ikot Ekpene district had a greater number of people who go to school, 69% of them do work at locations outside the study area.

Sensitivity of livelihoods to climate risks also varied across the districts as shown in Figure 4.5, in Ini district, sensitivity score for sand mining was 0.36, in Ibiono

district, it was 0.409 for sandmining livelihood, Ikono district recorded 0.399 sensitivity for sandmining activities, sandmining activities in Obot Akara was sensitive at 0.351, in Ikot Ekpene district, it was 0.592, the highest across the district. The high sensitivity score for sandmining in Ikot Ekpene district was as a result of high density of people who engaged in the activity in relation to the resources.

Livelihoods in the districts were exposed differently, in as much as climate variables including mean monthly rainfall, monthly temperature and relative humidity values had negligible/or no variation, results revealed that these climatic variables caused disproportionate impact on livelihoods as flood, drought and other natural hazards exposed rural livelihoods across the districts differently. For instance, in Table 4.4, livelihoods exposure score for Ini was 0.718, it was 0.709 for Ibiono, highest in Ikono with a score of 0.755, it was 0.556 for Obot Akara and 0.616 for Ikot Ekpene.

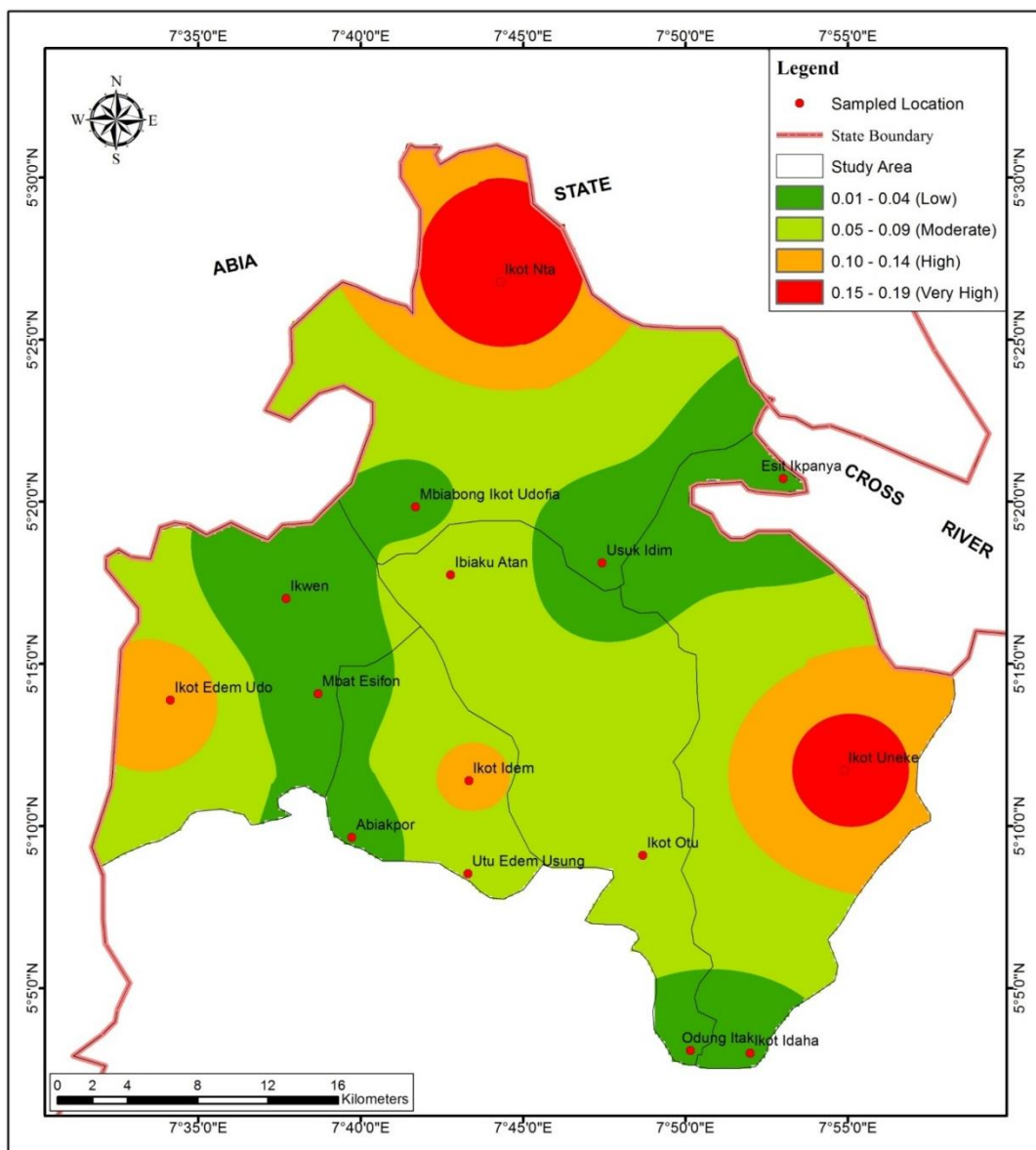


Figure 4.5 Vulnerability of Livelihoods to Climate Risks
Source: Researcher's compilation, 2025

4.5 Level of awareness of climate change impact/adaptive capacity on rural livelihoods

Adaptive strategies are very essential to sustaining rural livelihoods, however, people's perception and actions towards mitigating the impact of climate change vary from communities to communities. In Northern Akwa Ibom, awareness to climate change and its attendant vagaries

differ. As shown in Figure 4.5, Ikot Nta, Usuk Idim (Ini district) and Ikot Idem community in Ikot Ekpene district had a high level of awareness to climate change (0.11, 0.10 and 0.10) respectively. This helped households prioritized suitable adaptive strategies to build their livelihood resilience to climate change. In the other hand, Ikot Otu, Ikwen, Mbat Esifon and Ikot Edem Udo had low awareness level of climate change.

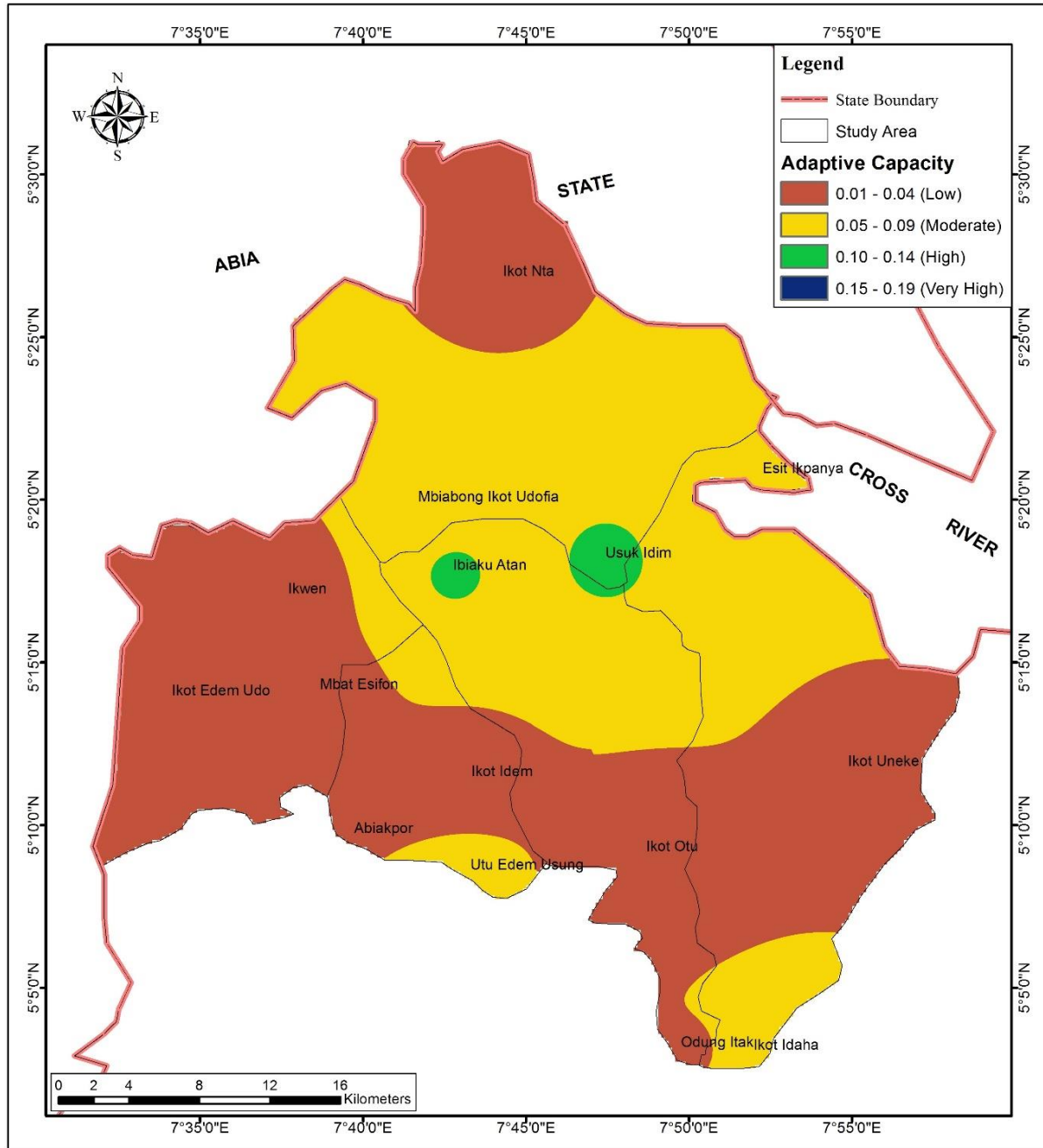


Figure 4.6: Climate Change adaptation in Northern Akwa Ibom

Source: Researcher's compilation, 2025

Whether or not people have enough land to farm, or adequate access to capital assets, or a decent home, or are determined by social factors (including economic and political processes), these same social processes have a very significant role in determining who is most and who is less vulnerable: where people live and work, and in what kind

of buildings, their level of hazard protection, preparedness, information, wealth and health have nothing to do with nature as such, but are variances of their societies. So people's exposure to risk differs according to their class (which affects their income, how they live and where), whether they are male or female, age group, disabled or

physically-fit, or access to assets, etc.

Weaving/crafts and trading livelihoods were less impacted by climate than farming, sand mining, artisan and transport services. Although, in Ini district, transport service was worst hit by climate than the rest of the district, this was as a result of the high demand of the services to convey farm produce to distant markets outside the district. In Ikot Ekpene district, transport services was least impacted as a result of the proximity to markets and commercial centres. 73.9% of rural households resort in taking a 10-15minutes distance walk than using transport services.

Findings also revealed that farming, sandmining, trading, weaving/crafts livelihoods in Ikono, Obot Akara and Ibiono district were moderately hit by climate as they had better coping strategies in building their resilience to climate change on their farms (through mixed farming, crop rotation, shifting cultivation, use of improved varieties), alternating sandmining, trading, weaving/crafts livelihoods with respect to seasonal changes. In contrast, In Ini district, in as much as farming livelihood was predominant with attendant yield and adaptive strategies, it was highly vulnerable to climate as a result of poor harvesting technique and distance to market. Poor road network in the district caused attendant crop loss and farm income as it posed increased travel time to the market and injuries and casualties on households. Most often than not, as a result of increased in casualties, most households who could not afford the risk resort to sell their farm produce at a give-away price at the farm market to traders for transportation to distance markets.

As shown in Figure 4.6, Ikwen, Abiakpor, Mbat Esifon, Ikot Edem Udo and Ikot Nta had lowest score of adaptive strategies across the Study area, this was as a result of high sensitivity and high exposure of their livelihoods to climate. Only Usuk Idim and Ibiaku Atan (0.10, 0.10) had higher adaptive strategies to build their rural livelihoods resilience to climate change in the Study area. This was as a result of the low sensitivity and exposure indices on their livelihoods to climate.

5.1 Conclusion

Vulnerability of rural livelihoods in communities of Northern Akwa Ibom varies as a result of climate (temporal changes and monthly fluctuations, seasonality index), SDP, LS and social networks. Adaptive capacity, Exposure and sensitivity of rural livelihoods to climate were evaluated using the LVI-IPCC indices, and results presented a key solution for policy and well-informed decision making for relevant authorities to implement.

5.2 Recommendations

From the result obtained from the study, these are the

following recommendations

Communities in the Northern part of Akwa Ibom and the government should adopt community-based approach to strengthen their livelihoods resilience, and explore untapped ecosystem services that will reduce vulnerability to climate.

Government should seek available opportunities of Climate financing and Green funds from the World Bank, African Development Bank and other International organizations to build weather service facilities in the region to actuate prediction of climate on rural livelihoods.

Better SDP, LS, and SN are key determinants to reduce vulnerability on rural households, and such interventions should be household specific.

Government from the local level should reform their policies as this research is a tool which can be used to formulate adaptation and mitigation strategies to reduce rural household vulnerability to their livelihoods.

5.3 Contribution to knowledge

1. Vulnerability assessment of rural livelihoods to climate in Northern Akwa Ibom
2. Agro-climate data to guide the livelihood activities in Northern Akwa Ibom
3. Increased awareness of climate change impact on sustainable rural livelihoods

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