Weather Hazards in Calabar — Nigeria

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Abstract: The major weather hazards in Calabar, a coastal town in Nigeria during both winter and summer hemispheres are discussed using meteorological data for 32 years (1951—1982). Results show that during the winter months of November to March, which are usually referred to as the dry season in Nigeria, frequency of occurrence of fog and harmattan dust haze is low. Summer patterns of precipitation are typical of the equatorial zone. Since 1980, poor visibility associated with fog and harmattan haze have become serious while high rates of erosion and flooding due to heavy rain are aggravated by human activities.

Introduction

Africa is the “largest” continent when defined in terms of latitudinal extent, located within about latitudes 37° N and S of the equator, and thus spanning a distance of approximately 10,000 km (Grove, 1967). As a result of the areal extent, it is subject to almost all weather events experienced on the globe. Incursions of middle-latitude systems into the tropics are very important, especially during the winter hemispheres when cold, polar air reaches the tropics resulting in the intensification of the subtropical anticyclones. During summer, the situation is different. The transient tropical convective weather systems are the most noticeable bringing with them copious rainfall (Oguntoyinbo et al., 1978).

In West Africa, the winter phenomena which can be associated with the variable intensification of the sub-tropical anticyclone are the dry, hot-by-day and cold-by-night dust-laden NE winds usually called the Harmattan in Nigeria (Hamilton and Archbold 1945) and early morning fog in coastal areas which reduce visibility. Hence air pollution and incidence of smog are to be expected during the dry season. The rainy season has various weather events in connection with the occurrence of thunderstorm, and heavy precipitation which result in such hazards like atmospheric electricity, forest fire, erosion and flood.

Located at 04° 58’N and 08° 21’E in the coastal zone of Nigeria, Calabar (Fig 1) falls within the equatorial belt where early morning fog should be expected during Northern
hemi sphere winter and, because it is generally S of the surface position of the Inter-Tropical Discontinuity (ITD) as illustrated by Adejokun (1966), the influence of harmattan haze should be slight, if any. The coastal rainfall patterns as described by Adefolalu (1982a) show Calabar as an all-year round rainfall area but due to its local features — coastal flood-plain within the mangrove forest zone — the related weather hazard such as flooding (and erosion in areas with significant gradient) is serious. Similarly, the intense convection during pre-monsoon and post-monsoon peak periods lead to tall cumulonimbus clouds with attendant lightning and thunder.

Harmattan dust haze and fog during the dry season result in poor visibilities while severe thundershower and heavy rain during the wet months cause flood and erosion while high frequency of lightning discharges (atmospheric electricity) disrupt electric power supply. The total influence of all these events is not as disastrous and destructive as those of either the hurricanes of the tropical West Atlantic and the typhoons of Pacific region, or the outbreaks of could polar air and snow blizzards of middle and higher latitudes. However, recent experiences relating to atmospheric electricity and power failures, disruption of air transportation due to early morning fog and intense dust haze spells and the ever-increasing expenditure on road maintenance in Calabar municipality due to erosion and flood will convince one of the need for weather related planning and decision-making in Calabar and environ.

The frequency of occurrence of relevant weather phenomena such as harmattan dust haze, fog, thunderstorm and rain (drizzle, slight, moderate and heavy) are described with illustrations. Data covering the period 1951—80 were used for average conditions, while (and where necessary for comparison) observations between 1981 and 1982 are also used. The importance of incorporating these environmental factors in development planning of the city is discussed.

Weather during the Dry Season

The period between November and March is generally drier (in terms of precipitation amounts) in the coastal areas of Nigeria. It is the period when the sub-tropical anticyclone of the N hemisphere attains its maximum intensity and the Harmattan dominates flow in the lowest layers. During these five months, the surface boundary between this wind system (which is a component of the global NE Trades) and the southwesterlies in West Africa, known as the ITD is very close to the coast of Nigeria. In February, when it reaches its most southern position, it is located at about 6°N (Hamilton and Archbold 1945; Walker 1957; Adejokun 1966 and Dhonneur 1971). During these months, most of Nigeria is then within the weather zone A which, as described by these authors, is primarily dust-laden harmattan zone while the rest of the country mainly the coastal areas — come under zone B as illustrated in Fig 2.

Calabar lies squarely within zones A and B throughout the dry season. Hence the weather is dominated by the characteristic harmattan and early morning fog or mist. Hitherto, these have not been serious in Calabar but in recent years, occurrence of these two major weather events have revealed disturbing trends which, if not taken into consideration in planning, will militate against progress in Cross River State in the immediate future.

Harmattan Dust-haze in Calabar

Dust haze is made up of suspended fine dust particles which constitute major aerosols during the winter hemisphere when 60—200 million tons may be lifted to circulate per year over the entire globe (Junge 1971). The principal source of this dust is the Sahara desert, the dust settles down as part of top-surface soil (over land) and increases the turbidity over water. Kalu (1977) has demonstrated that the most important area of considerable dust transport into West Africa is from SW of the Tibesti region (Fig 2).

The incidence and severity of harmattan dust haze in Nigeria has been previously documented (Burns 1960; Aina 1972 and Adebayo 1978). The most important aspect of these studies as related to Calabar is that occurrence is usually few and it is not severe in terms of poor visibility. This generally low frequency of occurrence is depicted in