



NBRRI REPORT NO. 4.

NIGERIAN CLIMATIC ZONES AND BUILDING DESIGN GUIDELINES

NIGERIAN BUILDING AND ROAD RESEARCH INSTITUTE

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N. B. R. R. I. REPORT NO. 4.

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NIGERIAN CLIMATIC ZONES AND BUILDING DESIGN GUIDELINES

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FOREWARD

Consideration for building research in Nigeria for a long time had naturally focussed attention on building materials for use as structural components. Thus the early Conferences on materials testing, control and research organised by the Federal Ministry of Works and Housing gave appropriate attention to specifications for concrete and sandcrete blocks. However, a building is intended to be more than a structural work: it is intended mainly to provide a suitable environment for its occupants to live a comfortable life. This aspect of the function of building was not given due attention until the recent past when a few blocks of tall building failed to provide adequate thermal comfort within them. Furthermore as more Nigerians embraced the architectural profession due consideration was given to the effect of the outdoor climate on architectural design of buildings.

This report is the first in a series from a comprehensive research programme initiated by the Nigerian Building and Road Research Institute to study the influence of climate on building design in Nigeria. As a simple start, it was decided to collate existing climatic data collected and maintained by the Meteorological Department over the past forty years or so. On the basis of the analysis of these data, four broad climatic zones are proposed for use in the architectural design of buildings. The main characteristics of these zones are given and general guidelines for their use in building design are provided.

The main aim of this report is to make the findings of this research available to architects for their use. This is regarded as vital since there is no such publication easily available to the building industries at the moment. The Institute will welcome constructive feedback from architects and builders so that improved models can be evolved.

A. O. MADEDOR
Director.

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NIGERIAN CLIMATIC ZONES FOR BUILDING DESIGN

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Introduction:

Nigeria is a tropical country. Therefore, environmental parameters for building design are entirely different from those of the temperate countries. Climatic data are required for the design of buildings which will utilise minimum energy for the provision of a thermally acceptable indoor environment. The efficiency of the building envelope in modifying the external extreme climate to an acceptable level indoors depends primarily on:

- (1) the severity of the outdoor climate,
- (2) the physical parameters and hence thermal performance of the building fabrics.

It is, therefore, necessary to know the climatic elements prevalent in a place before an appropriate building can be designed, both in terms of structure, materials and form to be able to give a comfortable indoor environment.

Climate of Nigeria:

Nigeria lies within 4°N to 14°N latitudes and 2.5°E to 14.5°E longitudes. The Southern part of the country, along the sea coast, is warm and humid; whereas the Northern part is hot and dry. It therefore has hot dry, cool dry and humid seasons of varying length depending on location. There are two upland areas in the North - the Jos Plateau and Cameroon Highlands. These have the same seasons with moderate temperatures. The South of the country has a warm to hot humid climate with a residual harmattan season and an extended double rainy seasons. The Higher delta area suffers from intensive rainfall throughout the year.

Climatic Zones:

An earlier study by the International Development Agency (I. D. A.) Education Project in Nigeria divided the country into seven zones which were specifically worked out for standardised buildings with very limited scope. The zones were not defined basically on climatic factors. From an analysis of the maximum and minimum dry bulb temperatures, relative humidity, total yearly rainfall and prevalent wind directions of 23 stations all over the country; it seems that the entire country may broadly be divided into the following four climatic zones for building design. These are: See Fig 1, overleaf pls.

- 1 Hot dry
- 2 Temperate dry
3. Hot humid
4. Warm humid.

It is not possible, nor necessary, to locate the exact boundaries of each zone on a map - as one zone merges gradually, and almost imperceptibly, into the next. The area under each zone is, however a fair representation of the climatic zone in that area for building design purposes.