Meteorological data are a set of information, which describes the characteristics of the atmosphere. When these data are available for a day or a period during the day, they are taken as describing *Weather* characteristics. However, when they are available over a long period of time (usually up to 40 years), their averages are accepted as describing the *Climate* of the place from which they are collected. The parameters of the environment commonly measured include solar radiation, sunshine hours and temperature, precipitation (mainly rainfall), humidity, vapour pressure, evaporation and evapo-transpiration, and wind speed and direction. Of all these, temperature is the most often reported in Nigeria as in the other parts of the world. This is because of its well-established influence on most other parameters that are measured.

The observation and collection of Nigerian meteorological data started in 1892 as an agricultural station under the then Public Works Department. It was about forty years later that a full-fledged Meteorological Department was established in the country.

The Nigerian Meteorological Department started operations in 1937 as the main agency responsible for all forms of weather-observations in the country. Several ministries have supervised the Department's activities, including the Ministry of Communications in 1952, Transport in 1953 and the present Ministry of Aviation. The movements of the Department from one Ministry to the other over the years are without doubt, connected with the multi-sectoral relevance of the data they generate.

Today, there is the Nigerian Meteorological Agency, a parastatal of the Ministry of Aviation.

2. Coverage, Scope, Users, and Uses of Meteorological Statistics

As the study of the weather and climate, Meteorology has to do with the understanding of the physical, dynamic, and chemical state of the earth's atmosphere, and the interactions between it and the underlying earth's surface. To effectively monitor the weather, the Nigerian Meteorological Services Department maintains a network of weather-observation stations across the country. Over the years the work-load of these stations have increased tremendously, first as the number of airports increased and second, as it became appreciated that greater spread and number of stations are needed to generate representative data on the meteorological characteristics of the country.

The data collected from these stations are processed and the resulting information have operational applications for a wide range of socio-economic activities. Thus, meteorological statistics have several users which include large-scale farmers, foresters, fish farmers, the Civil and Military Aviation Departments, marine and other shipping firms, land transport establishments such as the railways in temperate zones, the construction industry, utility and energy distribution agencies, mining and energy extraction agencies, manufacturers and the general public. Some of the key areas where the interpretation of meteorological information is relevant, are described below.

Agriculture: Meteorological data are useful in planning farm schedules such as seed and seedling planting, fertiliser application, irrigation, crop monitoring (especially against pest infestation) as well

as harvesting and storage of farm produce. They are also useful in livestock keeping and frost protection.

Forestry: Meteorological data are also important in the forestry sector for the timing of tree planting and watering (particularly in the arid and semi-arid areas), in the prevention of loss of valuable timber species and wildlife arising from fire hazards and severe drought through early warning system.

Fishery: In fishery, meteorological data are useful as a guide in the establishment of fish ponds where rain is the main source of water. They are also significant in fishing on large bodies of water, particularly oceans and seas. Meteorological data provide early warnings on fogs and wind characteristics which are critical in the choice of fishing sites and timing.

Aviation Industry: Meteorological data also provide useful information for aircraft landing and take-off, decisions on route changes, de-icing and likely inconveniences and discomfort arising from altitudinal changes in flight.

Marine Rigs: Meteorological information helps ships' captains plan their routes, cease operations and evacuate their cargoes when necessary to protect their equipment.

Land Transport: Meteorological data are also relevant in providing information about temperature and rainfall and other weather parameters that can affect land transport. In temperate zones, information on snow fall, ice removal from rail lines are given prominence, and are significant in planning the movement of vehicles.

Construction: Civil engineering works are affected significantly by weather and climatic characteristics. Thus, meteorological data are relevant for planning and decision making in the construction. The use of meteorological information in this sector is, however, still very

low in Nigeria. It is only the information on rainfall dynamics that is being used in the decision making in physical construction sites, particularly in concrete reinforcement and similar works.

Utilities & Energy Production: As electricity production in Nigeria is mostly hydro, any data that aids the knowledge of water flows and water levels in the dams are of particular relevance. Meteorological data are particularly vital in this regard. They aid in monitoring water level in most hydro electric power stations and the expected seasonal variations as well as long-term changes that may occur and which may have adverse effects on water levels. Lack of such data can result in erratic supply of electricity. Meteorological information which forecast thunderstorms also provide early warning to the PHCN officials to switch off their plants to avoid possible damage.

3. Sources and Methods Of Compiling Meteorological Statistics

The Nigerian Meteorological Agency is the primary outlet of meteorological data in the country. The various stations from which the data come include:

Rainfall stations	224
Agromet stations	167
Synoptic stations	42
Upper Air stations	5
Climate stations	13
Marine	3
Ozone	1
Background pollution monitoring (BAPMON) station	1

Methods of taking weather observations can be in the following forms:

[a] Direct reading of the basic meteorological elements from their respective measuring instruments at predetermined intervals.

[b] Extracting the elements' values from autographic charts wound round clock-driven devices, e.g. temperature, pressure, etc.

[c] Visual observation of the parameters by the observer, e.g. cloud amount.

[d] Estimating the parameters' values from satellite pictures.

[e] Deriving the parameters' values from some of the observed basic ones.

There are three principal types of climatological observatories:

Synoptic Stations are manned by full-time professional observers maintaining continuous weather watch and making hourly instrumental observations for periods up to 24 hours daily. Temperature, humidity, pressure, rainfall, sunshine and, in some cases, wind are recorded autographically. Evaporation, radiation and soil temperature are observed at most synoptic stations.

Agricultural Stations are manned by part-time observers making twice daily instrumental observations of temperature, humidity, evaporation, wind, radiation and soil temperatures. Some of these elements are recorded autographically.

Climatological Stations are manned by part-time observers making once or twice daily instrumental observations of temperature and humidity. On 1st July 1965, the numbers of stations operational were:

Synoptic Stations	28
Agricultural Stations	53
Climatological Stations	62

The density of stations over much of the country is inadequate and the present development objectives for the basic network is 2 stations per degree-square (1/2500 square miles) with locally increased densities in areas of particular agricultural and hydrological importance.

4. Current Methods Of Data Storage And Dissemination

After the preliminary quality checks on the observed data by the respective station/State/zonal meteorological inspectors, the data are transferred to the Climate Returns Section at Oshodi. Here the data are further subjected to more comprehensive quality checks before transferring them to their final repository in the National Climatological Archives Investigation Section. This section is responsible for storing the data in manuscript forms, kalamazoos, and supplying information on them on demand. It is located at the Meteorological Services Headquarters in Lagos.

In addition to the foregoing, a few of the data have been microfilmed, while a substantial amount (particularly those of the synoptic stations) now exist in computerised form.

The data base management software presently used for this is DATAEASE which is employed in the CLICOM (climate computing) system acquired by the Department in 1990. The system was developed by the World Meteorological Organisation (WMO) in 1984 to aid the standardization of the climate data storage and exchange

within its member-countries. Data processing/analysis packages like LOTUS and INSTAT are also used at the computer centre.

Dissemination of the data/information are in the form of preparation of publications or periodicals, namely:

Monthly Rainfall Summary (from January 1951).

Monthly Weather Report (from January 1949).

Annual Summary of Observations (from 1949).

Agro-Meteorological Bulletins (from August 1962).

Additional materials are published from time to time in two series of occasional publications:

Meteorological Notes.

Technical Notes.

5. NBS Data Base Coding System For Meteorological Statistics

The coding system for Meteorological Statistics is a combination of two (2) international coding systems:

(i) the International Standard Industrial Classification (ISIC) code which is being adopted for most of NBS's datasets.

(ii) the World Meteorological Organisation (WMO) code. The combination of these two gives rise to a 7-digit code for Meteorological dataset.

The coding system for the division follows that of the ISIC, revision 3 of 4th August, 1988. Meteorological statistics have no exact correspondence in the ISIC code, hence it has been assigned division code 96. The choice of code 96, though not proximate to the nearest closely-related ISIC code and contrary to the general pattern adopted by the NBS in coding datasets, has been made because meteorological data are relevant in almost all sectors.

The Items and Details Codes

The item codes have been taken directly from the Meteorological Services code to make it uniform with the international coding system of Meteorology. As can be observed, there are many gaps between the codes. These gaps represent the non-functioning meteorological stations in the country. Five digits have been used as against the four digits of the NBS's traditional coding system. The first two digits identify the division, the third digit identifies the region from which observations are made. Thus: 960 is the code assigned to the far Northern region of Nigeria; 961 is the code assigned to the Middle Belt region and 962 is the code for the South (East and West). The next two digits (4th & 5th) identify the Meteorological Station.

There are 43 items (that is, functioning Meteorological stations) as at now.

The detail codes are the 6th and the 7th digits identifying the elements on which observation is taken. There are 12 of them making 12 details. Each of them is to be repeated for all the items (Meteorological Stations).

Following this system, 'Meteorological Statistics' is coded as below:

6. CONCLUDING REMARKS

Although a vast amount of meteorological data covering a period of more than 100 years exist in Nigeria, there is considerable scope for improvement. Most of what need to be done revolve around funding. More fundS would have to be made available to the agency to:

[a] increase the density of its observation stations to the World Meteorological Organisation standards.

[b] resuscitate abandoned observation stations. There has been a drastic reduction of observing stations.

[c] acquisition of more computers to speed up the data processing at various levels, and reducing damages to which the single-copy paper media are exposed.

[d] build capacity in the areas of modern applied meteorological practices and data management. This is needed for the purpose of upgrading the quality of data particularly at the collection level.

[e] improve communications facilities, mobility of meteorological inspectors to effectively supervise the observing stations.

[f] recruit more technical staff are needed to enhance better transfer and dissemination of information. This will also facilitate the publication of special reports on the analysis of meteorological data.