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**ENTER THE WORLD OF MAPS:
YOU CAN NEVER MISS YOUR WAY**

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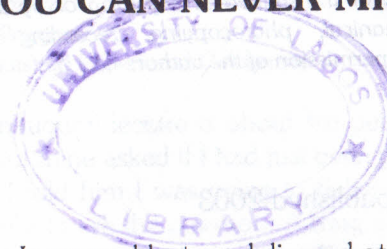
BY

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ENTER THE WORLD OF MAPS: YOU CAN NEVER MISS YOUR WAY



An Inaugural lecture delivered at the University of Lagos
on Wednesday 16th July 2003.

BY

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U. L. ARCHIVE

Vice Chancellor
Deputy Vice Chancellor
Provost and Deans of Faculties
The Registrar
My Colleagues
Distinguished Ladies and Gentlemen.

This inaugural lecture is about ten years late. I remember that a friend of mine asked if I had just been given another professorship when I told him I was going to deliver my inaugural lecture. He was right to ask the question. A King is chosen but his coronation is the ceremony at which he is officially made King. An inaugural lecture is supposed to be the "coronation" of the professor. A tradition like this is possible to keep where there is a single chair in a department. In most universities outside Great Britain, including this great University, the culture of multiple professorship is in place. My department alone is blessed with nine professors. Everybody works hard in the department and the progress of one teacher does not hold down the progress of the others. What this means is that the queue for the presentation of inaugural lectures must be very long.

This inaugural lecture gives me the opportunity to display what I profess. This is in fact very important in a society where many people do not understand the nature of geography. In the University of Lagos, for example, geography has been domiciled in four different faculties: Faculties of Arts, Science (partially), Environmental Sciences and lately the Faculty of Social Sciences. Lack of understanding of geography does not only lead to tossing geography here and there; it also affects the provision of facilities for teaching and research in the department. For instance, decision-makers have not quite realised our need for computers and laboratories, whereas geography all over the world ranks very high in the use of computers and computer hardware. Maybe the root of the problem of a home for geography lies in its nature as a field that studies the environment and its various components, some of which may pitch geography in the social sciences (economic geography, settlement geography, aspects of transportation geography), some in science (hydrology and water resources, biogeography, climatology, geomorphology, soil

geography etc.), some in engineering (remote sensing, cartography etc.), some in medicine (medical geography). Geographers seem to do well wherever geography is inhabited but the full potentials of the discipline can only be realised in a faculty of geographical sciences. When a former Vice Chancellor of this University, Prof. Akin Adesola, moved the Department of Geography to the Faculty of Environmental Sciences from the Faculty of Arts in 1986, a Department of Cartography and Remote Sensing was also to be created and the Department of Surveying was asked to move to the Faculty to complement the Department of Geography and Department of Cartography and Remote Sensing, but the Department of Surveying preferred to remain in Engineering.

My own field of specialisation in geography is known as cartography, which is defined in the Multilingual Dictionary of Cartography as the art, science and technology of making maps and using them as scientific documents. In the course of my upbringing as a cartographer, I am proud to have interacted with renowned scholars in great departments of Geography in the Universities of Ibadan, Wisconsin-Madison, Benin, London, and Lagos. When I was an undergraduate student in the Department of Geography, University of Ibadan, cartography was listed as an area of specialisation but there was no lecturer to teach the course. My agro-climatology job in the Institute of Tropical Agriculture (IITA), Ibadan after graduation did not douse the challenge this dearth of specialists in that field posed for me. The University of Wisconsin provided me the opportunity to undertake a Master's degree programme in cartography. Here, I followed the Wisconsin tradition of psychophysical studies of maps and map symbols. This led to developing and introducing the Decagraph after finding the pie-graph seriously wanting (Balogun, 1978).

In January 1977, I came back to Nigeria, a country where cartography was hardly comprehended beyond being a 'likely' branch of geography that deals with maps. My first article on the Decagraph, which the (British) Cartographic Journal gladly accepted for publication, was first reviewed for publication by the Nigerian Geographical Journal. One of the assessors gave it all

sorts of negative descriptions (bogus, verbose, unpublishable etc.). I wrote back to the editor to say that the assessor did not seem to understand what I was talking about. Of course, pioneers of a field may have some advantages of being the first to reach the 'virgin land', but they will be the ones to clear the bush and face the snakes.

The research grant of ₦ 7,900, which I received in 1979 from the University of Lagos for the study of the development of mapping in Nigeria, changed my research orientation almost completely. The willingness of Professor Isaac Ayinde Adalemo to supervise my PhD thesis in this aspect of cartography further cemented my interest in developmental cartography.

This inaugural lecture is expected to highlight the developments in mapping and map use in Nigeria. The title of the lecture reflects the most important function of the map; showing us the way. I am taking the audience on a tour of the world of maps and letting all of us see how maps can show us the way.

ENTER THE WORLD OF MAPS: YOU CAN NEVER MISS YOUR WAY

1. INTRODUCTION

Many experiences have dictated my choice of this title: *Enter the World of Maps: You can never miss your way*. I will use three of them to illustrate how maps can show the way and how people can easily go astray if they do not have the right map.

First experience: In 1981, I had cause to visit a colleague at Petyward Street in Central London from my apartment at Draycott Place. The description he gave me was as follows:

Take District, Circle or Piccadilly (underground train) line.
Get out at South Kensington Station. Turn right to Pelham Street; right again to Lucan Place; go straight to the end of the street. That is Petyward. Look for my number.

People who are familiar with the London Tube know that travelling underground is like a blind movement. Without any street map, I walked from my apartment on to Kings Road and then to the underground station closest to me (SLOANE SQ.). I followed the instruction. On my way back, I was going to follow the same route when my host asked about my address and brought out a map. We both discovered that I really did not need to take a train. The distance between my apartment and Sloane Square Station was even longer than the distance from my apartment to his own apartment. Fig. 1 shows the locations of my apartment, my host's apartment, Sloane Square Station and South Kensington Station. If I had used a street map to locate my destination before taking off from my apartment, I would not have walked that distance to Sloane Square, which took me farther away from my destination nor travelled by train to South Kensington, which took a lot of time waiting for the train, travelling by train and getting out of the station. I also would not have spent some money travelling by train. The *Israelite* journey, of course, finally took me to my destination. This is how people who do not use maps still execute their projects; but the question is: how efficient is the process? Money and energy are often

wasted, which would not have happened if they had used the right map.



Fig. 1 Part of Central London

The second experience is a common one: a description I received at the back of a wedding invitation card:

From Ijora roundabout, turn to Apapa Road (Simbiat Abiola Road). After Ajayi Memorial Hospital and a petrol filling station on the right, take the first turning right etc. (see fig. 2)

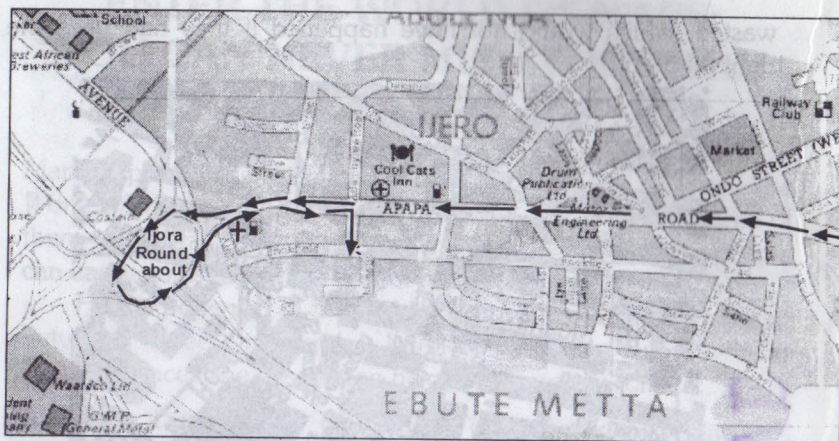


Fig. 2. Apapa Party Venue

But I was coming from Oyingbo, and I was on Simbiat Abiola Road going towards Ijora round about. Without a map, how would I know the last turning left before Ajayi Memorial Hospital? Thus, I had to first drive to Ijora Roundabout, turn round, back on Simbiat Abiola Road, past Ajayi Memorial Hospital so that I could find the first turning right after the Hospital and the petrol station. Imagine how many people had missed their roads before they could finally find the way.

The third experience comes from the cartoon in Fig. 3. A child is asked for the direction to his house. He demands to be taken to his school first. Even if his house were on the next street, he might not know unless he is on the route that he normally takes between his school and his house. Fig. 3 shows how close the child and the driver are to the child's house but he does not know because he has failed to use a map that can show him his present position in relation to his destination. A lot of people take wrong turnings because they have no maps to show them the way. They are like the proverbial stranger that has eyes but cannot see. The stranger is on a street but he is still asking for the location of the street.

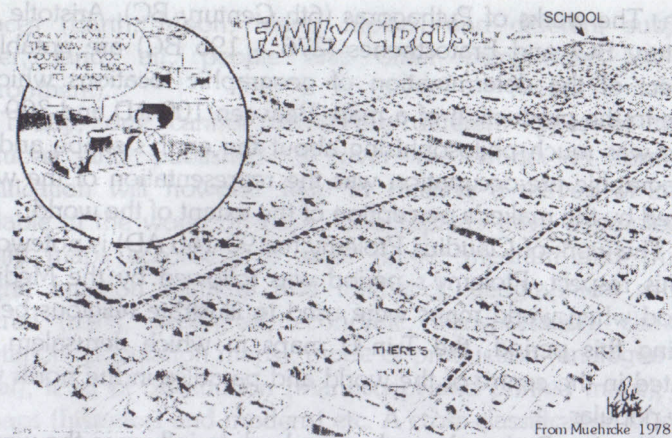


Fig. 3 The Way to a child's house

2. THE WORLD OF MAPS

The map is a visual representation of a geographical space. The map therefore represents spatial relationships and makes it possible for us to observe a large area, even extending beyond the horizon, at a glance. A verbal description of how to reach a place may provide a mental map of the route to one's destination, but a little unexpected obstruction such as a party going on in the middle of the road, a traffic hold-up or a trench dug across the road by a plumber, could destabilise the journey maker. The map, on the other hand, shows the whole of the area including the roads in the description and the ones that can serve as alternative routes. Thus, the map is by far better than a verbal description because it provides a graphic image, a mental picture in addition to giving a silent verbal description.

2.1 HISTORICAL BACKGROUND

The production of maps dates back to several centuries before Christ. Over time, the subject matter of maps changed dramatically. The earliest attempts at producing maps was in the form of figurative maps by which primitive people used sticks, stones and other objects to indicate locations of fishing points in relation to their own positions. The efforts between 6th century BC and 100 AD were geared toward the measurement of the

earth. The works of Pythagoras (6th Century BC), Aristotle (4th Century BC) and Eratosthenes (276 – 195 BC) are notable in respect of the determination of geographic locations which is basic to the production of a map. Between 100 AD and 300 AD, there was much philosophising about the earth's shape and the cartographic pre-occupation was the representation of the world limited by the maker's perception of the extent of the world.

The work of Claudius Ptolemy (ca 90-160 AD) is noteworthy in this respect. Ptolemy's period was followed by the Medieval Period when world maps were used to illustrate religious beliefs. During this period, the T-in-O maps in which Jerusalem was located in the centre of the world and paradise in the north were very popular.

Claudius Ptolemy's work came back to influence the work of cartographers in the Renaissance Period when his GEOGRAPHIA was translated to some other European languages. Following the revival of Ptolemy's GEOGRAPHIA, the whole of Europe was inundated with maps of various kinds, most of them more decorative than precise. The second half of the 17th Century saw the French Academy revisiting the problem of determining the shape of the earth and a practical method of measuring the longitude. In the middle of the 18th century, the French initiated a detailed topographical surveying of a country. From then on, topographical surveying and mapping spread to other European countries and later to their colonies all over the world.

Just as the subject matter of maps increased in varieties with time as techniques of data collection in social sciences, geology, statistics, geography, meteorology and hydrology improved and the society became more complex, the techniques of producing them also metamorphosed as a result of inventions and innovations in some other fields. Map production, for instance, has been tremendously influenced by developments in astronomy, physics, surveying, photography, printing, space technology and lately, computer science and technology. The latter has revolutionised cartography.

2.2 VARIETIES IN THE WORLD OF MAPS

The world of maps consists of several maps produced at various scales (large, medium and small), focusing on parts of different

surfaces (Earth, Moon, Mars, Jupiter) and different subjects (water, land, air, people and other components of the environment).

Today, one cannot count the different types of maps produced and published all over the world. A form of classification will however help in making a survey of maps available in the world of maps. Geographers have attempted to classify maps according to scale (large, medium and small), general function (general and thematic), geographical subject covered (relief, geological, economic, transportation, climatic, vegetation, population maps), mode of production (analogue and digital), level of distribution (manuscript and printed maps), age of maps (historical and modern) etc. A cross-classification of scale and function as shown in the matrix in table 1 should summarise the whole spectrum.

TABLE 1: CROSS-CLASSIFICATION OF SCALE AND FUNCTION

Scale	Function	
	General	Thematic
Small	Small-scale general map e.g. one-sheet atlas map of Nigeria	Small-scale thematic map e.g. Map of Nigeria showing vegetation distribution.
Medium	Medium-scale general map e.g. 1:50,000 topographical map	Medium-scale thematic map e.g. 1:50,000 Vegetation and land use map
Large	Large-scale general map e.g. 1:1,000 township map	Large-scale thematic map e.g. 1:1,000 map showing property ownership in Lagos

2.2.1 Small-Scale General Map

A small-scale general map shows a large area such as the whole of a country or a state, in a single sheet and covers varieties of subjects such as roads, administrative boundaries, settlements, relief, vegetation, railways, drainage etc., in a highly generalised way. It gives at-a-glance view of a state, a country, a continent or even the whole world.

A small-scale general map of a country is the 'oracle' the President of a country should consult every morning. Such practice engenders patriotism, and familiarisation with the

positions of states and local governments in relation to one another. The President will see the pattern of the distribution of settlements and the roads linking them. The governor should look at the state map in this category in a similar way. I am sure that any person desirous of ruling the world will gaze at a world map every morning.

2.2.2 Small-scale Thematic Maps

A small-scale thematic map is a map of a country or a state (or the world) concentrating on a geographical theme such as population distribution, ethnic groups, vegetation cover, agricultural products, forest reserves, manufacturing industries, geology and mineral distribution, transportation (roads, railway, inland water ways etc.), power resources, distribution of telephone exchanges, coverage of GSM, distribution of health facilities, educational facilities, voting pattern in the last election, etc. Maps in this category, covering different subjects, should be mounted in a map gallery in the office of Mr. President or the governor of a state. Such a map gallery is the place the President should visit to have first hand information about the distribution of social facilities before he discusses with political delegations demanding for some facilities or creation of new states. Seeing these maps from time to time will generate the desire to know why some facilities are not here and there. The President's assistants, advisers and ministers too should have these maps bound in form of an atlas which they should consult regularly when advising the President.

2.2.3 Medium-scale General Map

The medium-scale general map is a map produced at scales such as 1:25,000, 1:50,000 and 1:100,000. This category is made up of topographical maps that attempt to show every feature that can be found on the surface of the earth but at a less generalised manner than the small-scale general map. Mr. President and the governor should not be bothered with these maps. They are the tools of his advisers, the regional planners, road engineers, dam engineers etc. With these maps, the cost of road construction or any other land-based projects can be estimated with a high level of accuracy and the president's advisers can explain why a project

cannot be sited in a place. A complete set of topographical map covering a local government area will be very useful to Local government administrators.

2.2.4 Medium-scale Thematic Map

Medium-scale Thematic Map has a theme and covers a single subject matter such as land uses, farmlands and farm sizes, forest reserves geological structures, soil types etc. This type of maps is useful to the advisers of Mr. President and the governor. Investors in the fields of agriculture, manufacturing and oil exploration and researchers can derive some benefits from the use of the maps.

2.2.5 Large-scale General map

Large-scale General map has a scale of about 1:10,000 or larger. The township map falls within this category and shows all the streets, buildings, sidewalks, drainage channels, open spaces, and relief of the city. This class of maps is very useful for project planning and execution within the city such as construction of drainage channels, assessment and collection of tenement rates, water rates and electricity bills, and distribution of mail. Every local government chairman and city engineer must have a full collection of township maps covering the settlements within their local government area.

2.2.6 Large-scale Thematic Map

Large-scale thematic map is a map drawn to a scale of 1:10,000 or larger but concentrates on a subject matter such as streets (street guide), utilities (showing locations of electricity cables, water pipes, gas pipes, telephone cables, water works, gas pipes, transformers etc.), landed properties and their owners, property uses, etc. Such maps are good for rates collection and utility planning and maintenance.

All general maps are compiled from data derived from reliable sources such as land surveying, aerial photographs, satellite imageries, existing authoritative maps etc. Thematic maps are compiled from field survey data using general maps as base maps. They display data collected by different agencies to report their activities or for operational use. For example, a vegetation and land use map may be issued to the public but a utility map or property map is not necessarily issued to the public but

information can be extracted from it by the officers in charge for anybody that asks for it.

3. THE CULTURE OF MAKING MAPS

There is a vicious circle of supply of and demand for maps. Which one comes first? One may expect that the availability of appropriate maps should generate the desire to use them but one could also say that the demand for or desire to use some maps should generate the desire to produce them.

3.1 SUPPLY INDUCING DEMAND

The first situation is appropriate in respect of map supply to the general public. The map producer takes a risk. He thinks of maps that may interest the general public and produces them. Then the question is: which maps may interest the general public? The maps that have interested the general public most are maps that enable them move around with ease. Everybody, for instance, needs a street map for journeying around the city and a road map for travelling within the country. Bus route maps are good for planning bus rides within a city that has a good and orderly bus transportation system. For instance, without a London tube map and a bus map, it is difficult to move around London even if you have a car.

There are maps that the government has to produce but which may not necessarily interest the general public but specialists of different callings. Individuals, private organisations and government departments use such maps for collecting data and probably as bases for producing some other maps. Topographical maps are produced by governments all over the world as a social service. Until recently, when fund flow to government agencies has become problematic, topographical maps were not produced with the aim of recovering a substantial part of the cost.

Most maps that are meant for the use of the general public are issued free to promote some other products. A tourist map, for instance, is used to promote tourism. A bus route map is designed to promote municipal bus transportation. Road maps issued by oil marketing companies are meant for sales promotion.

Some associations such as the American Automobile Association, produce road and itinerary maps to promote membership and as a service to members.

Maps that are not meant to promote a product are produced for sale by private profit-oriented enterprises which are driven by the desire to recover cost and make some monetary profit. Profit-oriented mapping outfits are not many in Nigeria largely because the level of map awareness is very low. Such mapping companies are mainly interested in two maps: administrative (political) map and street guides for big cities. The latter category of maps sells steadily once there is a good marketing channel. The administrative map is relevant and sells fast when it depicts newly created states.

Some of the existing mapping companies tarry a little about producing new maps while waiting for official maps showing new states and/or local government boundaries and issued by the authoritative agency. Incidentally, by the time such an authoritative document is released, the country is already jingling another bell of new state and local government creation. This situation makes it difficult for a rational cartographer to invest in the production of a new administrative map because once new states are created, the map becomes obsolete. The repercussion is not palatable. In the absence of crops on a fertile ground, weeds thrive: some roadside artists and printers, as a result, often venture into the scientific trade of making maps. Their maps are poorly designed and grossly inaccurate, but in the absence of better and accurate maps, the general public still buys them. The example of the administrative/political map of Nigeria is very useful. The last time new states were created was 1996. Neither the Federal Surveys Department nor the National Boundary Commission issued a new administrative map showing the new boundaries of states and local government areas until 2001. Cautious academic and professional cartographers and geographers might have compiled the new administrative map based on the information published in the government gazette, but they would not produce and publish it until they had cross-checked with the official map. This did not come until 2001, leaving room for quack map makers to produce maps for the

public. Up till now, in fact, many states' Survey Departments have not published their state maps.

3.2 DEMANDS FOR MAPS INDUCING SUPPLY

The second scenario is a situation where users tell cartographers what maps they desire and cause them to produce such maps. The map maker may conduct a survey of potential map users asking them which maps they might desire, at what scale, how much they are willing to pay; what information they want on the map etc. The Ordnance Survey of Great Britain commissioned such surveys in the past, but not necessarily for the purpose of introducing new maps, but to know what topographical map users wanted most so that map produced could be sold such that the organisation could comply with guidelines that directed it to maximise revenue from all products and services (McGrath, 1982).

Users of topographical maps and other specialised maps are easy to identify and target. This is not true of myriads of other maps. Most of these other maps are not ordinarily thought of except the user commissions the production. Oil exploration companies and some government agencies whose activities require spatial information sometimes set up cartographic units or engage contractors or both to produce maps for them. Shell Petroleum Development Company (SPDC) and Chevron, for example, have elaborate set-ups for the collection and mapping of topographic, seismic and environmental data. In the late fifties, lack of appropriate topographical maps covering Niger Delta area forced Shell to embark on the topographical mapping of the Delta area using photographs produced by the Federal Surveys Department. The company established control points and produced maps at scales 1:25,000 and 1:12,500. In 1962, it even started flying its own aerial photographs to augment the efforts of the Federal Surveys Department (Shell, 1963).

Any government agency, whose activities have anything to do with the environment, needs maps to carry out and report its activities as aforementioned. The map needs of such agencies for carrying out their activities may be met by the products of the federal and/or state mapping agencies; but they also need to produce their own maps to give an account of what they have

been doing and for the use of the public. For example, the Ministry of Education will use base maps to determine the best locations for educational facilities. It should also issue maps to appraise its decisions, show the distribution of different categories of educational institutions, students' enrolment in them, distribution of different categories of students, distribution of citizens of school age etc. The Ministry of Water Resources should produce maps showing distribution of different categories of streams, bore holes, dams, water supply infrastructure, depth of underground water etc.

Government agencies that have made tangible efforts to produce maps to satisfy their needs and the needs of the general public include the following:

1. Federal Surveys Department, which formulates survey policies, executes national triangulation, topographical mapping and aerial photography, and produces the National Atlas;
2. National Population Commission that must find the way to every house in the country if a national census must be complete and therefore produces enumeration area maps covering the whole country;
3. Federal Department of Forestry that shows details of vegetation covers and forest resources;
4. the Geological Survey Department that produces geological map sheets designed to cover the whole country and show the way to all the mineral resources of the country, and
5. Federal Agricultural Land Resources Department that produces soil maps of Nigeria;
6. Nigerian Ports Authority which produces Nautical Chart;
7. Army Mapping Centre producing military grid maps taken over from the Federal Surveys Department etc.;
8. State Survey Departments carrying out extension of triangulation, cadastral surveys and mapping and production of state maps etc. (see Adalemo and Balogun, 1989).

3.3 State of Official Mapping in Nigeria

Some mapping projects are worthy of special mentioning. Here we shall concentrate on maps that have been institutionalised and are produced by some of the agencies mentioned above as a government service to the citizenry. People and private and public organisations use such maps as bases for the production of thematic maps, for collecting data on the environment and for taking decisions on the location of projects. These maps include topographical maps, administrative maps, township maps, geological maps, vegetation and land use maps and soil maps.

3.3.1 Topographical Maps

The Federal Surveys Department is responsible for the topographical mapping of the country in addition to the formulation of survey policies, national geodetic survey and the aerial photography of the whole country (Balogun, 1985). Since colonial times, topographical maps have been produced at different scales: 1:500,000, 1:250,000, 1:125,000, 1:100,000, 1:50,000 and 1:25,000. Table 2 shows the coverage of topographical map series.

The series that really records a good success in terms of coverage, details, accuracy and in fact, standards and quality of production is the 1:50,000 topographical map series which was introduced in the First National Development Plan (1962-1968). The output of about 1,122 sheets out of a total of 1372 has been courtesy of the UK/Nigeria Mutual Technical Assistance Schemes arranged by the Commonwealth Relations Office after Nigeria's Independence, the Canadian Government and the Nigerian Government (see Fig. 4). The maps were produced in Great Britain by the Directorate of Overseas Surveys, in Canada by Canadian Aero Services Ltd and Pathfinder Engineering Ltd, and in Nigeria by the Federal Surveys Department.

TABLE 2: STATE OF TOPOGRAPHICAL MAPPING IN NIGERIA

MAPPING PROJECTS	YEAR STARTED	NO. OF SHEETS COVERING	NO. OF SHEETS PUBLISHED	% COVERAGE	REVISION
1: 500,000 (old Series)	1952	16	16	100	10 sheets revised up to 1960 & 6 revised to 1965
1: 500,000 (New Series)	1960	33	10	30.3	
1:250,000	1957	100	70 (24 planimetric)	70	1 (Wari) sheet revised in 1983
1:100,000/ 1:125,000	1938/ 1910	329	270 (93 planimetric)	82.1	18 sheets revised once, 1 sheet 3 times and 1 sheet four times
1:50,000	1946	1,372	1,122 (300 planimetric)	81.8	
1:25,000	1972	c. 5,117	196	03.83	

The 1:25,000 scale map series was adopted as the national basic topographic map series in the Third National Development Plan while the 1:10,000 scale was introduced for the mapping of areas of close settlement. These two map series together would have made the enumeration area mapping of the National Population Commission a lot easier and less expensive, and provided the base data needed for the street mapping of all the towns in Nigeria. However, the projects became moribund after the production of 196 sheets of the estimated 5,117 sheets of the 1:25,000 map to cover the country (see fig. 5).

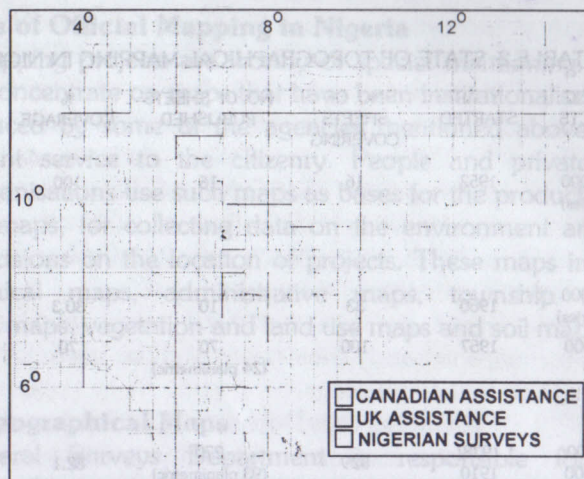


Fig. 4 1:50,000 Topographical Mapping

3.3.2 Administrative Maps

Administrative maps fall into the category of small-scale general maps because of the general information it provides: administrative units, roads, drainage, settlements, relief, railway etc. An administrative map of a country is an essential base map because it provides data on national, state and local government boundaries, which private mapping companies, individuals and agencies wanting to produce small scale thematic maps can build upon.

Nigeria has produced several administrative maps since Independence because of frequent changes in boundaries. Scales used before were 1:1,000,000 (4 sheets), 1:1,500,000 (1 sheet) and 1:2,000,000 (1 sheet). States produce their own administrative maps at scale 1:250,000 or 1:500,000 depending on the size of the state. Mapping agencies seem to be unable to cope with the need for frequent revision and publication of administrative maps arising from frequent creation of states and local governments. Since 1996 when the country had the last state creation exercise, many states have not published their state maps. Even the Federal Surveys Department, after failing in its bid to produce a digital administrative map, went back to its

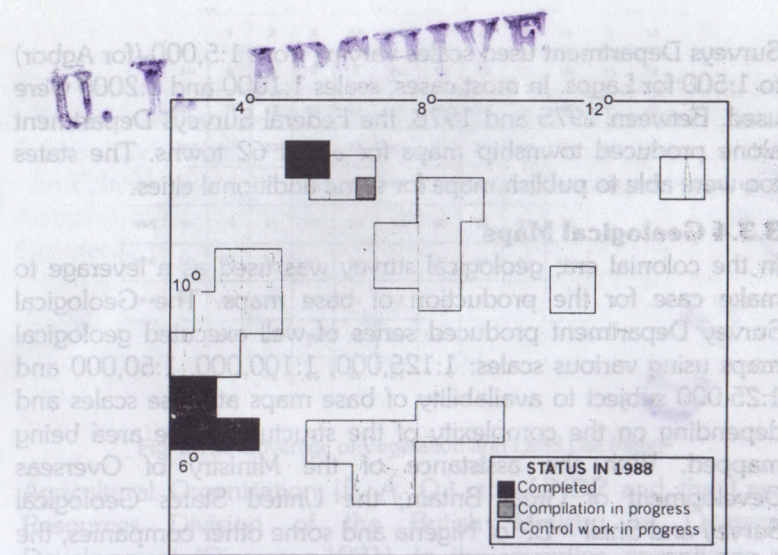


Fig. 5 Status of 1:25,000 Topographical Mapping

analogue cartographers who are still waiting to be trained in the new technique of map production, to produce the new administrative map which was finally issued to the public in 2001 although it carries a publication date of 2000.

3.3.3 Township Maps

Township maps, as earlier mentioned, are very important for urban planning, inventory of urban land uses, for planning and execution of engineering and social services within the town and for rate assessment and collection. Township mapping started before 1930 at varying scales. Two scales, 1:1,200 and 1:2,400 were adopted after 1930 for large towns and small towns respectively. After independence, and in the First National Development Plan Period, township maps were produced at 1:1,200, 1:1,250 and 1:2,500 under the Canadian Technical Assistance Programme. The United Kingdom and the Federal Surveys produced Lagos area at 1:1,250.

In the Third National Development Plan Period (1975–1980), the government budgeted a sum of N35 million for the Federal Surveys Department to carry out township mapping of federal and state capitals and other areas where such maps were needed for federal projects. At the same time, every state made provisions for the mapping of some other towns. The Federal

Surveys Department used scales varying from 1:5,000 (for Agbor) to 1:500 for Lagos. In most cases, scales 1:1000 and 1:2000 were used. Between 1975 and 1978, the Federal Surveys Department alone produced township maps for about 62 towns. The states too were able to publish maps for some additional cities.

3.3.4 Geological Maps

In the colonial era, geological survey was used as a leverage to make case for the production of base maps. The Geological Survey Department produced series of well executed geological maps using various scales: 1:125,000, 1:100,000, 1:50,000 and 1:25,000 subject to availability of base maps at these scales and depending on the complexity of the structure in the area being mapped. With the assistance of the Ministry of Overseas Development of Great Britain, the United States Geological Survey and Shell – BP of Nigeria and some other companies, the 1:100,000 maps have covered up to 80% of the land area of Nigeria. The 1:250,000 mapping has not achieved up to 50 percent coverage.

The Geological Survey Department also commissioned airborne geophysical survey of Nigeria by 1966 and contracted out systematic geophysical mapping in 1972.

3.3.5 Vegetation and Land Use Mapping

A very successful vegetation and land use mapping project was carried out in the late seventies using side-looking airborne radar and aerial photographs as sources of data. A total of 69 sheets, based on Joint Operation Graphics 1:250,000 maps produced by the US Defence Mapping Agency, were published. The department has recently completed a revision of these maps which have been re-designed. The map coverage is now in 100 map sheets (see fig. 6) instead of 69 sheets in the first edition

3.3.6 Soil Maps

Agriculturists and road and building engineers test the strength and other characteristics of soil before farming or building on it. Preliminary investigation can start from a soil map. Several soil surveys and mapping were carried out between 1951 and 1970 for the purpose of selecting suitable land for different crops by Ministries of Agriculture and National Resources, Food and

	1	2	3	3A	3B	3C	3D	3E	4	5	5A
5A	6	7	8	9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24	25	26	27	28
29A	29	30	31	32	33	34	35	36	37	38	
39A	39	40	41	42	43	44	45	46	47	48	48A
49A	49	50	51	52	53	54	55	56	57	58	
59A	59	60	61	62	63	64	65	66	67	67A	
68A	68	69	70	71	72	73	74	75	76		
	77A	77	78	79	80	81					
		82	83	84	85						

Fig. 6 The Coverage of Vegetation and Land Use Maps,

Agricultural Organisation (F. A. O.), the UNDP and the Land Resources Division of the British Ministry of Overseas Development (Ojanuga, 1981). In the seventies, consultants of River Basin Development Authorities and some research institutes carried out several soil surveys and mapping.

A soil map of Nigeria was published in 1951 at a scale of 1:5,000. More comprehensive maps were published about two decades ago at scales 1:250,000 and 1:1,000,000 by the Federal Department of Agricultural Land Resources.

3.3.7 The National Atlas

Thematic maps of a country display the nation-wide distribution of the attributes of the nation's physical, human and economic resources. Since an atlas is a collection of such maps accompanied by textual description, a national atlas provides basic information need for the planning of a country. A very comprehensive national atlas tells the whole geography of a country (Balogun, 1991).

In the 1930s, atlas map series was started at the then Nigeria Survey Department. In 1981, a complete and bound atlas of Nigeria was launched. This was a commendable project even though state creation in 1976 had necessitated the revision of some of the atlas maps which became obsolete before publication (See Balogun, 1996). The Working Committee for the atlas was set up on 19th February 1963, meaning that the atlas took about

18 years to produce. The second edition of the atlas, which was started immediately after the first edition was launched, is still awaiting publication twenty-two years after. Within the period, there have been three state creation exercises (1989, 1991, and 1996)

4. THE CULTURE OF USING MAPS

A map is like a technical drawing with precise scale and directions and with details that enable users make calculations of time, distances, heights depth, area, perimeter, bearing and even makes it possible to determine dispersion, densities, connectivity, shapes, slope angle and direction, gradient along rivers and roads and even estimate population. Robinson, Sale and Morrison (1978) buttress this claim by saying that the map is a carefully designed instrument for recording, calculating, displaying, analysing and in general, understanding the inter relation of things in their spatial relationship. This accounts for the wide use of maps for various activities such as military operations, socio-economic development planning, urban and regional planning, engineering construction, industrial locations, estate management sales and marketing, trip planning and even architectural design.

From the classification of maps we have made above, it is apparent that there are 'different strokes for different folks'. The versatility of maps is so overwhelming that it is important for everybody to look at an appropriate map before setting out on any spatial adventure. In literary parlance, one can even say that if one maps out one's activities before setting out, one cannot miss his way. Let us look at great examples of the use of maps to show the way.

4.1 MILITARY USE OF MAPS

The first point that comes to mind because of recent happenings in the world is the use of maps for military purposes. The nature of maps makes them a very important tool in the hands of war planners and commanders. The recent Iraqi War portrays to us the extent to which advanced countries of the world have used maps for diplomatic manoeuvres, military planning and logistics, war reporting and post-war reconstruction. There were more than

300 maps of Iraq and Baghdad on the Internet alone during the war and television stations all over the world used maps freely to illustrate the progress of the war.

The Military was deeply involved in the early survey and mapping of Great Britain. The role of the Geographical Section, General Staff (GSGS) of the War Office in the mapping of British colonies was very significant. In all advanced countries, the military goes on with the mapping of land and water of their respective countries and collection of maps of other countries irrespective of the cartographic activities of their national mapping agencies.

The United States epitomises the extent to which the military can be involved in the use and production of maps. The U.S. Defence Mapping Agency has the personnel, the equipment and the database necessary for the mapping of any part of the world within a short notice. The agency for instance developed and published the Digital Chart of the World (DCW), a comprehensive vector database of the world derived largely from the 1:1,000,000 Operational Navigational Chart (ONC) (Robinson *et al*, 1995). It also produces maps of foreign countries at larger scales. According to Muehrcke (1978), the annual map output of this agency is over 100 million copies. Working through three mapping units: Topographical Centre, Aeronautical Centre and Hydrographic Centre, the agency produces maps for ground forces, aeronautical charts and marine navigational charts throughout the world.

The U.S. Department of Defense organs do not only engage in mapping; they also develop mapping systems and equipment. The NAVSTAR Global Positioning System (GPS) is supported by the US Department of Defense. With a Global Positioning System (GPS) receiver, the size of the GSM handset, one can quickly fix the position of any point in three dimensions (latitude, longitude and altitude). The GPS was developed for military use, but small error is introduced in the readings of the system for civilian use (selective availability).

Several para-military and civilian agencies in the United States collect data about different parts of the World. The Central Intelligence Agency's (CIA's) Cartographic Division supplies maps

of current events all over the World to the office of the President of the United States and its advisors (Muehrcke, 1978). My first digital map of the world in 1975 derived data from CIA's World Data Bank. During the Nigerian Civil War, the CIA's Cartographic Division was on a daily basis producing maps of Nigeria depicting the relative positions of the Biafran and Nigerian soldiers in the battle front to brief the President of the United States.

The National Aeronautics and Space Administration (NASA) has a project, the Earth Resources Technology Satellite (ERTS) program which has launched several Landsat satellites producing imageries and digital image data which are important sources of data for rapid mapping and map revision. With these resources, the United States military can monitor the environment in any part of the world. If the government gains anything at all from technical assistance in the area of mapping to any country, it is not to acquire maps of the country, but only to obtain details that cannot be seen from the air. For this purpose, the US has developed a good culture of map collection. A unit in the U.S. Department of State sends out highly educated and qualified staff to go round the world to collect maps recently produced in different countries.

With all the above investments in mapping and cartographic resources relating to different parts of the world, it is no wonder that Libyan President Gaddafi's bedroom could be bombed with precision in 1986. It is no wonder that the United States could have the courage to travel thousands of miles to the Persian Gulf, Afghanistan and Iraq to wage successful Persian-Gulf War (1991), Afghanistan War (2002), and Iraqi War (2003) respectively. During the Persian Gulf War, more than 12,000 new maps were produced of Kuwait, Saudi Arabia, Iraq and Syria made up of line maps (760), city maps (26), Joint Operations Graphics maps (125), terrain maps (380) and hydrographic charts (76) (Sha, 1999).

Military mapping and map use go on in different countries even if at varying degrees. In Nigeria, there are units in the Nigerian Army and the Nigerian Navy handling the production of maps and charts respectively. In the last Civil War, they seemed to rely very much on the Federal Surveys Department whose staff

and equipment they commandeered to produce numerous map sheets at short notice.

Why are maps so important? They are so important because they show the way. With detailed maps of the Gulf region, American and British soldiers became very familiar with the region. They knew the way to the cities to capture, the roads leading to them, obstacles on the way, the climate, drainage and topographic conditions of the region, the distribution of different ethnic groups and their political relationship with Saddam Hussein, the countries around Iraq and their relationship with Iraq etc. All the above information acquired from maps enabled the soldiers to determine their operational base, the vehicles and machines to take along, the engineers and other workers to go with them, the clothes to wear, the supplies to take along, the time it would take to move from one settlement to another, alternative routes to their destination, the mode of attack and strategy for defence. From a map, the exact position of a target can be determined and a missile can be directed at the target. In front of the military commander, one often finds a cartographic model of the war front showing movements of his soldiers and the positions of enemy soldiers from time to time.

4.2 MAPS AND NATIONAL DEVELOPMENT

The planning process involves problem definition, data collection, analysis, evaluation and choice, solution generation, and plan implementation and appraisal. Maps are needed in all these facets of planning. The fact that the map can represent an area beyond the horizon, which is the limit of man's view, makes the map unique as a planning tool. It can show a whole country at a glance, displaying her various mineral, water, forest, agricultural and even human resources. The map can zoom on a small area to show details required during project execution.

National development planning requires both general and thematic maps. The general map shows the characteristics of the topography and the layout of various components that may be considered in taking decisions as to where to site projects. This is why all nations of the world invest heavily on topographical maps. Any country that is too poor to produce topographical map coverage readily seeks assistance from rich countries as

mentioned earlier. Canadian and British governments produced 1:50,000 topographic maps covering almost 50 percent of Nigeria after Independence.

All activities, carried out within a country contribute to national development, favourably or unfavourably. Therefore, maps showing any form of human activities within a country are important to the national development planning process. Such maps show us areas that have benefited from social, educational, economic development and medical programmes of the government and enable us see areas that are still in dire need of some government attention. As Adalemo (1982) points out, the availability or non-availability of appropriate maps can make a difference between success and failure of any development project. Mabogunje (1982), arguing that maps can create "order on the land", says that greater appreciation of mapping in our development activity ensures higher degree of social justice, helps to identify areas with resources which are currently untapped and under-utilised and improves our ability to guide and manage our development. He alludes to the success of agricultural revolution in Great Britain and distribution of blocks of land in the United States of America in which surveying and mapping played a significant role and how lack of maps in Nigeria frustrated the Operation Feed the Nation.

4.3 MAPS AND SOME SELECTED NATIONAL PROJECTS

We have seen how maps can be of use in military activities and for national development. The two broad headings almost cover the whole spectrum of institutional map use. However, it is necessary to mention some specific national projects in which maps have been of immense importance.

4.3.1 National Census

A national population census is an important national project. In civilised countries all over the world, census is taken at a regular interval. Regularity of intervals makes population projection for years in which census is not taken a lot meaningful and reasonably accurate. Census figures are needed to plan social amenities. In planning for the people, it is necessary to

understand the various components of the population and where these components are located. To plan educational facilities, for instance, we must know where people of school age are located.

According to Adegbola (1992), the first step in the preparation for a census is to know the exact location of all places where people live throughout the country before the census day. Once all towns, villages, hamlets and other human habitats in a country have been represented on maps, the process of population enumeration is almost completed. Thus, the success of a population census hinges on the success of the census mapping programme (Balogun, 1992). An enumerator holding the right maps, such as Enumeration Area (EA) maps and a street guide cannot miss his way to where people live.

Maps are used in the planning, execution and reporting of a national census. The United Nations (1987) lists the following specific exercises for which maps are needed in respect of planning for national censuses: assignment of enumerators, estimation of travel time and cost, establishment of field offices, assignment of geographical codes, determination of best routes of travel to and within enumeration areas, and measurement of distances. The execution stage of the census also requires different kinds of maps for the use of the enumerators, enumeration area (EA) supervisors, local government supervisors, state supervisors, zonal supervisors and national supervisors (Balogun, 1992). The third category of maps required in connection with censuses consists of maps which graphically display the population census data. These are post-census maps.

Again, Mr. Vice Chancellor Sir, allow me to establish a correlation between national greatness and census cartographic activities. The level of comfort of the people living in a country and the success of the people in controlling their environment are a good measure of civilisation and greatness. Of course, we know that a country that can count her people accurately and understand their varying characteristics is able to plan social and economic activities and the environment better. If proper maps of the country can be produced, we shall have a good chance of counting everybody in the country. The United States of America's counterpart of our own National Population

Commission is the U.S. Bureau of the Census. The U.S. Bureau of the Census, apart from the statistical data on population and houses, which it issues out every ten years, also publishes a variety of useful geographic data. Its Topologically Integrated Geographic Encoding and Referencing (TIGER) system generated in collaboration with the US Geological Surveys (USGS) is a masterpiece. The TIGER database covers map features such as roads, drainage, streets and street names, address numbers, boundaries of countries, states, tribal jurisdiction etc. It has also provided a good foundation for most of the computer-based or digital street guides published by many data vendors in North America. With this, the map has become an important aid to salesmen, postmen, the police and almost everybody in the US. Used in conjunction with census data, it enables the country and commercial and industrial establishments to plan effectively.

For our last national census which took place in 1991, our own population agency, the Nigerian Population Commission, did its best in the face of dearth of fund which often comes too late and lack of the right calibre of consultants and commissioners while flying the Nigerian flag of social justice. The Commission was able to produce Enumeration Area 'Maps' (better described as sketches) which were not geo-referenced. The poor situation regarding the base map coverage of Nigeria could not guarantee adequate EA map and census coverage. In fact, the National Population Commission spent its hard-earned fund to commission the production of maps that the Federal Surveys Department should have produced for the use of all government agencies and the public. Since the Commission's duties do not include the production of such base maps, the distribution of such maps for the use of other government agencies is not its priority. It is most likely therefore that every project requiring the same maps will be producing its own.

4.3.2 Maps and the Land Use Decree 1978

The failure of the Land Use Decree (Adalemo, 1982, Mabogunje 1982) is no more news. What is of interest here is the cause of its failure. One aspect of the decree is that the land is vested in the government. Another aspect is that nobody must own more than half hectare of land. With respect to these two aspects, it is

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essential to have maps covering a state indicating the ownership of each parcel of land. Details that should be on such maps or land information system data should include parcel boundary, parcel size, parcel ownership and sales history, parcel use and use history and land status (lease, rent or freehold). With the right map, it should be possible to query a parcel of land for such details and it will show clearly whether or not the land is under acquisition or show if the owner has other pieces of land.

If we assume that all pieces of land are registered, it can be assumed that the data is there in the form of property surveys registered with the Lands Department of a state. All that is now needed is to mosaic them or update the maps on which the properties are charted. If this process is done in a land information system or geographical information system environment, updating will be easier, retrieval of land information will be less cumbersome and it will be easy to know how much land each person in the state has. The state government can easily identify parcels of land that can be acquired for development projects.

4.3.3 Maps and National Elections

The Independent National Electoral Commission (INEC) is saddled with the responsibility to conduct elections throughout the country. The electorate that the INEC is expected to reach and plan for are spatially distributed. The body therefore needs various kinds of maps for planning and executing elections and reporting the result of such elections.

In delineating electoral wards, senatorial districts etc., the INEC needs street maps or township maps and small-scale general maps. Such maps will also be used to determine the location of polling booths and for the supply of materials to them and the collection centres. Using the base maps, the commission can delineate boundaries of various units on which the numbers of registered voters will be displayed. Similarly, the results of the elections can be graphically displayed in various ways: total number of votes, votes won by each political party, the winner in each ward and each district and the areas with disputed votes.

Some news media may have strong cartographic units or consultants to produce maps illustrating their election reports; but

it is doubtful if any of them will take the trouble to contract out the job of delineating constituencies and electoral wards. But such a map issued by INEC will serve as a base map for them and their readers to visualise their reports. Without this type of map, existing maps showing administrative units such as states can only be used. The level of aggregation of votes will not show the required details.

4.4 OTHER USES OF MAPS

Apart from the above national projects, all human activities that are spatially distributed require the use of maps – maps that will show where the activities should take place and maps to display the results of the activities.

The Nigerian Police Force, for instance, should train its staff in map reading and geographical information system. The Police need maps to take decisions as to the location of the next police station, putting all the criteria, which can be displayed on a map, into consideration. They also require current maps for combating crime.

The next step to receiving a call reporting an on-going armed robbery is a study of the map of the area in question. A computer-based map will facilitate street search. Knowledge of the special features (such as population, roads, drainage, topography) of the area will enable the police effectively plan the apprehension of the armed robbers. Armed robbers do not rob unless they have their escape routes such as the bush, swamp, lagoon, alternative roads etc. These are clearly depicted on a large-scale general map of the area. With the information obtained from the map, the police can plan its own strategy for blocking escape routes and avoiding ambush.

A Police station should display a map showing all the roads and residential blocks, if not all the houses in its area of jurisdiction for every policeman to read and study before going out on official duty.

Every one of us needs a map for one thing or the other. Whether you are a teacher, a salesman, an industrialist, a civil servant, a tourist, a journalist, a driver or an oil worker, there is one way or the other by which the map can show you the way. In moving around the city, a street map is our best companion. We

are lucky that we are endowed with the African hospitality. Otherwise, we would have been forced to seek our information about a street from maps instead of stopping on the road to ask pedestrians or asking a boy to enter our car to take us there. There will be a time when the urban area will become more complex and the level of interpersonal relationship will be so low that nobody will have time to describe any street for anybody. If any of us here does not use maps, listen to a warning from Muehrcke (1978):

“Proper map use can open existing new realms of experience. In contrast, misusing maps, or not using maps at all, can result in serious spatial disorientation.”

God knows how many policy makers and how many politicians, along with their good ideas and projects have missed their ways because they have not used the right maps or they have not used maps at all. In years ahead, Mabogunje (1982) warns, “without a better knowledge of streets and housing development, it will be virtually impossible for us to effectively deal with problems of fire and police protection, refuse collection and disposal, mail collection and distribution, census and electoral data collection as well as the assessment and collection of property and other rates and taxes” (Mabogunje, 1982).

5. IMPACT OF COMPUTER AND INFORMATION TECHNOLOGY

Computer technology has impacted positively on cartography as it has on all human activities. The last forty years have witnessed the increasing use of the computer and computer equipment for the production of maps. Initially, these pieces of equipment were simply used to simulate the cartographic design processes. Map digitising was like map scribing and map plotting was like map drafting. Work-heads were introduced as attachments to plotters such that one could change from drafting pens (different colours) to scribes, cutters and point light source using different media such as paper, drafting film, scribe-coat, peel-coat and photographic film (see Balogun, 1985). Improvements in equipment and introduction of CAD software made the

interaction between cartography and the computer more meaningful in later years. The resolution of digitisers improved to the extent that, now, one cannot see the difference between a river drawn manually and the one drawn with the computer. The revolution in output devices has made it unnecessary to even probe into the way the map is printed any more. There are laser-jet printers with high resolution, design-jet plotters that can print large maps in colour and image-setter for outputting on large photographic films at resolutions as high as 5200 dpi. Recent technological innovations even make it possible to output straight onto a printing plate or directly to a printing machine.

The full benefits of computer technology could not be realised in cartography until it became possible to relate graphics to data such that when we manipulate data in various ways (separate, aggregate, delete, add, select, etc), graphics too will automatically be correspondingly manipulated. The desire to achieve this led to the development and introduction of Geographical Information System (GIS). GIS, simply defined, is a system of integrating and manipulating spatial and attribute data using appropriate software in a computer environment. According to Robinson, Morrison, Muehrcke, Kimerling and Guptill (1995), "GIS is becoming the cartographic tool of choice in a growing number of situations. A trend toward greater analytical use of cartographic data has increased the popularity of GIS technology". GIS has in turn popularised the map since visualisation turns out to be the most fascinating functionality of GIS.

Several software packages have been developed to handle, store, retrieve and communicate large volumes of spatial and attribute data. Apart from enabling the perfection of the compilation, production, printing and publishing of maps, it has also impacted on the use of maps. When a map is produced in a digital form, one can easily search for any place. In fact, we can perform queries (feed in all necessary conditions) to get what we need for a good and effective decision-making and finding answers to questions such as: where do we locate the next nursery and primary school; where should we site a wheat farm or a supermarket; where can we find detached houses with at

least four bedrooms, tarred access road, two-bedroom boys quarters and with rents not more than N500,000 a year, etc.?

Now, there are digital street maps covering USA and the whole of Europe. The Microsoft Auto-route software enables us plan our trips. We can also list the landmarks we would like to see along the route and demand for the duration of the journey and the amount of fuel we will consume. General Motors was reported to have mounted a *TravTek* map screen in some cars and many highways in the US have developed highway travel simulation based on interactive video-disk technology and web mapping (Robinson *et al*, 1995). By attaching a GPS to a mobile computer (notebook) one can find his real life location on a map.

But a Yoruba proverb says the obvious: that what is after 120 is beyond 140. The live wire of a digital cartographic system or GIS is geo-spatial database without which queries do not bring out any result. Secondly, there must be the desire to communicate cartographic data whether by private and public agencies wanting to sell or exchange data or maps or by public agencies wanting to communicate spatial data relating to their activities or governments trying to well-inform the citizenry. When we all browse the Internet, we always feel the urge to search for Nigeria, click on it, Lagos and Yaba to find some information, preferably a map. But somebody has to put the information there before anybody can access it. If the authoritative bodies do not upload the right information, somebody will of course put the wrong information. There may be elephants for want of cities if we can borrow words from Crone (1952) when he was referring to the depiction of Africa in incunabula maps:

It is apparent that in the cartographic arena, we are all conscious of the importance of computer and information technology for map compilation, design, production and map analysis. We only need to match awareness with assimilation of the technology. Unfortunately, the educational system in the country is not responding positively by making computers available for the teaching of geography in general and cartography and GIS in particular. Design programmes in most Nigerian universities are still teaching the use of drafting pens and drafting aids. There is no fund to buy computers and necessary

accessories and teachers have lost their cherished opportunities to travel out of the country to learn some new tricks in their fields. In fact, some students exposed to computer-aided design through some other means may be more sophisticated than their teachers. In the "mapping" agencies, unrealistic budget estimates made for the purchase of computer hardware and software for GIS and digital cartography have become spanners in the wheel of progress. The only computer eventually funded by the government almost invariably ends up on the table of the head of department who does not use it.

In recent years however, we have seen efforts toward the conversion of analogue maps to digital form. The Federal Surveys Department has not only succeeded in acquiring some computers, digitisers, scanners and printers for the production of maps; but has also awarded contracts for the conversion of its topographical maps to a digital form. If the department had the right manpower as it has the right equipment, it would have done a trial conversion on its own and used that to give specifications to the right contractors and sensitise the interest of users. Then, interested people would have made some useful contributions and known exactly what to expect.

The Niger Delta Surveys recently converted the topographical maps of the Niger Delta areas in SPDC's (Shell Petroleum Development Company's) possession to digital form. The Geological Survey Department has been romancing with a South African mapping organisation that came to launch a geological map of Nigeria produced with the computer some years ago as if Nigerians had never produced computer maps before. The latest edition of the Vegetation and Land-use Map commissioned by the Federal Department of Forestry and completed in 1995, used digital techniques even though hard copies were also printed. One only hopes that the department will release the map to the public in digital form as well. Some oil companies have, for a long time, been producing digital maps using the most sophisticated computer facilities one can think of. In the universities, there are disjointed individual efforts in deriving data from different sources mainly for the purpose of calibrating the geographical information system.

6. PROBLEMS IN THE WORLD OF MAPS

From the foregoing, we can see that the culture of making maps has been firmly rooted since the colonial times. But from the level of mapping, the extent of map coverage and the dated-ness of our maps, it is apparent that something went wrong along the line. For almost twenty years, the tempo of mapping activities has declined considerably both at the federal and state government levels. It is no exaggeration to say that no mapping has been going on at all. Figs. 7a-c show the number of map sheets produced yearly since Independence. We shall notice that the peaks of mapping activities were 1960 and for 1:125,000 and 1:100,000 topographical mapping, 1961 and 1979 for 1:250,000 and 1960, 1964 and 1968 for 1:250,000. In case we would like to know, the Surveyors-General around these peak activities were R. B. McVilly (1956-1962), D. Woolhouse (1960), Chief Oluwole Coker (1963-1978) and Olumuyiwa Adebekun (1978-1984). The Working Committee for the National Atlas was formed in 1963 but the atlas was published in 1981 and the second was flagged off immediately. As a member of the Editorial Board for the Atlas, I know that all maps were ready more than six years ago. By now all the data, sketches, maps, graphs and write-ups contributed by geographers must have become obsolete.

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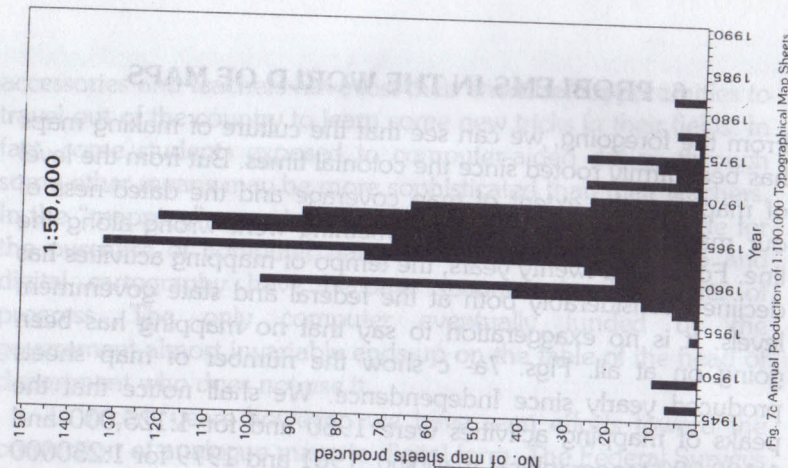


Fig 7c Annual Production of 1:50,000 Topographical Map Sheets

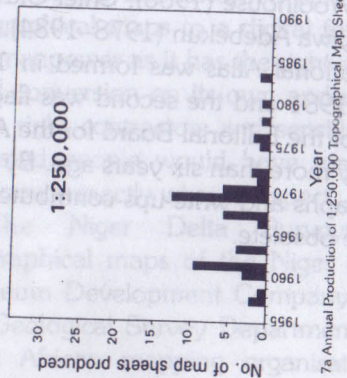


Fig 7a Annual Production of 1:250,000 Topographical Map Sheets

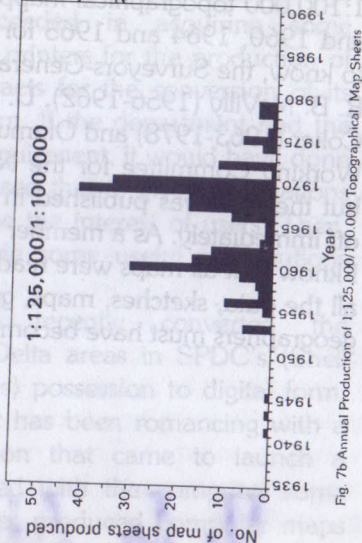


Fig 7b Annual Production of 1:125,000/1:100,000 Topographical Map Sheets

We should note that base map production has virtually stopped not because we have got full coverage of the country. The 1:250,000, which is a very popular base map for vegetation, geological, soil mapping and the production of state administrative maps, has only got a 70 per cent coverage. More than 23 per cent of the country has not got contoured topographical maps at 1:50,000. Soneye (1998) is already calling for a redesign and an improved symbolisation of the topographical map series. This means that the production of

topographical maps should be a continuous exercise. If we are not producing new maps, we should be revising the old ones. From the point of view of map use, the situation is not better. People and agencies that would have performed creditably well with maps do not ask for maps. It is necessary to find the causes of this lull in mapping activities and map use so that, at the end, we can proffer meaningful solutions.

6.1 FREQUENT STATE CREATION

First of all, the rate at which states are created in Nigeria is enough to destabilise both private and mapping organisations. In the last twenty years, there have been three state creation exercises: Twenty-one states in 1989, thirty states in 1991 and thirty-six states in 1996. This often creates situations that are not conducive for private investment in mapping because any state creation makes the administrative map of Nigeria immediately obsolete. Any cartographer with integrity must wait for an authoritative map showing the new boundaries. By the time this is done, the government may have started warming up for another state creation exercise.

In respect of official mapping, creation of states has often caused fragmentation of surveying and mapping resources. Most times, creation of states has separated the competent surveyors and cartographers from their equipment, which may fall to the other side. The result is that the staff of most Survey Departments now simply sits down doing virtually nothing. At best, cartographers are only assigned the job of charting survey plans.

6.2 INADEQUATE FUNDING

The second problem in the world of maps is the lack of fund to buy equipment, to train staff and to buy materials. Since the reduction in the real worth of the naira, which started in the mid-80s, many government departments and parastatals have witnessed drastic reduction in the purchasing power of their annual budget. Unfortunately, mapping is not an item of conspicuous consumption. Therefore, it does not appear on the priority list of a politician. When a politician lists his achievements, he mentions roads, buildings, introduction of communication gadgets, renovation of schools etc. None of them

have been proud enough to mention mapping projects completed – if any.

If the politician runs out of fund, one of the first victims is the mapping programme. Since it is not conspicuous, it is not noticed if it is stopped. It cannot talk; so, it can neither protest nor go on strike. It is not appreciated; so it is not missed. It is too technical; so it is not a project any influential politician can pressurise the government to give out to him as a contract.

6.3 MAP AWARENESS PROBLEM

The problem of lack of adequate funding can be traced to the level of map awareness. We are not aware of what “miracles” maps can perform: how it can show us the way to our electorates, the way to the population we are governing and planning for, the locations and ways to our natural resources, how skewed the distribution of our social facilities are, the way to our tourist attractions etc. In my presidential address to the General Assemblies of the Nigerian Cartographic Association in Benin in 1997, I ‘commended’ Nigerians for being such wonderful magicians who can plan without maps, move about without maps, carry out military activities without maps, market products without maps, distribute mails without maps, combat crimes without maps, manage the environment without maps and even teach geography of the world without maps (Balogun, 1999).

I wonder if we have performed all the above functions effectively. Meanwhile, some scholars who have studied map use in Nigeria have not said yes. Uluocha (1998) says that lack of relevant utility maps has contributed greatly to abysmal failure of utility companies in the areas of service delivery, facility management and revenue generation. Olaniyi (2001) has observed that lack of reliable maps in the Nigerian Armed Forces hinders their progress and “handicaps military training and operations and in addition constitutes serious operational hazard for the Nigerian Navy and Nigerian Air Force because of unreliable navigational information”. Tourism is a very important source of revenue for many countries. After a study of tourism in Lagos State, Uluocha (1999) concluded that one of the greatest factors militating against the identification, planning, development, promotion and management of tourist sites in the

state is lack of appropriate maps. Filani (2002) corroborates this by asserting that we would have understood tourism better and improved research on tourism planning and policy analysis if we had used appropriate cartographic products. Rilwan (2001) has traced widespread environmental degradation in Nigeria to lack of effective monitoring and mapping.

6.4 ORGANISATIONAL STRUCTURE

The organisational structure that obtains in mapping agencies does not favour innovative map production system. What we have is still the colonial structure: The British colonial officers set up a survey department in Nigeria whose surveyors collected data in the field. The data was sent to Great Britain for the Directorate of Overseas Surveys to compile and produce the maps (Balogun, 1987). As a result of this arrangement, it was not necessary for the colonial government to develop cartographic manpower at professional level in Nigeria. The apparatus for cartographic work and the cartographic staff were based in England. What we had in Nigeria were survey draftsmen engaged in the drafting of survey plans which, at present, constitutes the main preoccupation of cartographers in state survey departments. Since Independence, the establishment structure has not changed from what it was before. The employment of highly qualified cartographers is precluded. No graduate cartographer or geographer would like to work in any government mapping agency unless he is prepared to be trained in surveying because this is the only avenue the present structure allows for ascending the management ladder to the top (Adalemo, Ayeni and Balogun, 1984; Balogun, 1985). This has serious implications on training, staff morale, products of the department and innovations in other areas of mapping and data collection and manipulation such as cartography, remote sensing, photogrammetry and GIS.

6.5 DEVELOPMENTS IN INFORMATION TECHNOLOGY

Developments in information technology, which are supposed to catapult mapping to greater heights, have rather paradoxically killed any existing desire to produce maps. When geographical information system (GIS) was developed, the aim was to make the production of maps from various databases less cumbersome.

In fact, software packages have been developed to put the technology of making maps within the reach of the layman. GIS is useful to anybody that deals with spatial information including those people looking for markets for their goods, salesmen looking for the ways to their potential customers and my Vice-Chancellor trying to ease transportation problems or seeking information about the facilities in each of the buildings within the campus.

Our mapping agencies are carried away by the visualisation aspect of GIS and, in the process, they become rather confused. Initially, they thought that with GIS they could side-line cartographers. They trained a category of their staff who came back to pretend as if they were cartographers. By this, they fail to realise the full benefits of GIS in surveying, photogrammetry, cartography and generally in geography. Training in GIS does not necessarily make one a cartographer, a surveyor, a geographer or a photogrammetrist. However, most people forget the analytical aspects of GIS and get too fascinated by the visualisation functionality. Many GIS trainees parade themselves as map makers and thus vindicate Robinson, Sale and Morrison (1978) who observe that "the adoption of a new technology is usually accompanied by instances of persons who are adequately trained in the technology but utilise the technology inappropriately, because they are not trained in the discipline to which they apply it". This accounts for the failure of the Federal Surveys Department to digitally produce the administrative map of Nigeria three years after acquiring all necessary equipment. Yes, everybody can make maps for his own use and for visualising his spatial data, but not everybody that can make maps can make them for the public. The Federal Surveys Department is supposed to make maps and publish them for the use of the general public.

GIS syndrome has done more harm than good to many of the mapping agencies. Many agencies have rightly thought that it is no longer fashionable to produce maps manually. They try to acquire computers and essential software but their budget estimates are often outrageous and somewhat mystify computer technology. A budget estimate of about a billion naira looks like an impossibility to a politician who does not know the value of

maps and is only interested in items of visible nature such as roads and buildings and cannot imagine such need for maps to warrant investing so much. The result is that no mapping is going on whether manually or digitally.

6.6 MANPOWER DEVELOPMENT

Training of staff involved in the production of maps is much skewed. The Federal School of Surveying has several programmes for the training of surveyors: Basic Course in Surveying, Advanced Course in Surveying (or ordinary national diploma), a higher national diploma course and a professional diploma course (2 years for non-surveying university graduates). Manpower development in other mapping fields is not as elaborate (Balogun, 1985). Only Basic Cartography and Advanced Cartography courses are offered in the school. For any higher course in cartography and photogrammetry one has to go to Kaduna Polytechnic and lately RECTAS. There is no university in Nigeria offering a degree in cartography. Several universities have degree programmes in land surveying (Balogun, 1983).

6.7 MOVEMENT TO ABUJA

Some years ago, it became unavoidable for the Federal Surveys Department to move to Abuja like the other government agencies. This has virtually paralysed mapping activities in the department. Possibly, the field offices, which did not need to move, are still carrying out surveys, but the Cartography and Printing Sections are badly affected. Most of the staff have moved from Lagos to Abuja but the Abuja office does not have enough space for all the equipment which were therefore left in Lagos.

One wonders if such an organisation must necessarily move to Abuja even when the necessary infrastructure had not been put in place. The Ordnance Survey of Great Britain is in Southampton and not in London. Its American counterpart is in Virginia and not exactly in Washington.

6.8 POLITICISATION OF THE POSITION OF SURVEYOR-GENERAL OF THE FEDERATION

We all know that surveying and mapping is a serious academic and professional business. That was the way I regarded the activities of the Federal Surveys Department in the seventies and

the early eighties. The change of the designation of the head of the department from Director of Surveys to the Surveyor-General of the Federation (SGF) politicised the position of the mapping agency as outsiders thought that SGF had the status of a Director-General and therefore lobbied for it once they are surveyors. Outsiders, including an army officer, were brought in to head the department at one time or the other. Of course, apart from the fact that his aspirations might differ from the normal serious objectives of the Department, the outsider would need time to study the organisation and its programmes. The permanent staff, who had been working hard and hoping that they would become the head of the department one day, lost their morale. For many years, no serious mapping was going on.

7. RECOMMENDATIONS

Mr. Vice Chancellor sir, in previous sections of this lecture, we discussed various uses of maps. The only use I did not mention is the use of maps as a form of wall decoration because this is an improper use of maps. Since the 17th century, we have stopped putting pictures of headless or hydra-headed monsters and fanciful lettering on maps to attract buyers. Maps are now scientific documents capable of providing better data than one could even get in the field. I always warn my graduate students that they should first look at the map before setting out to do any fieldwork. What they are looking for in Sokoto (a town in the far northern part of Nigeria) may be in the pockets of their "sokoto" (trousers). There are many measurements and analyses one can do on the map which are not possible on the ground. For example, how does one measure distances between settlements for the purpose of analysing the dispersion of the settlements on the ground when one cannot see all of them at a glance? How can one measure the length of a section of River Niger unless one desires to behave like an explorer of the calibre of Mungo Park?

A section of the lecture also looked at the efforts toward contributing products to the world of maps, while yet another part discussed the problems militating against the world of maps. Without these problems, the world of maps would have been richer, rosier and much better patronised. The following

recommendations are being put forward to improve the mapping and map use situation in Nigeria.

7.1 MAP AWARENESS DRIVE

The first step toward improvements in the world of maps whether in the sector of map use or map production, is creation of map awareness. The policy maker must understand the nature, uses and importance of maps in bringing order to our environment and in executing all activities that are spatial in nature. Without maps, the nation and the people shall be losing in terms of time, money and energy wasted in the process of doing things by trial and error. We have seen how maps helped the colonial government to locate minerals, agricultural and forest resources within our country. We have seen how maps aided soldiers to find their ways in foreign lands and discover their own local areas, and we have seen how developed nations have been investing a lot on mapping since the 17th century. I am sure that they know what they are doing. The effective control of their environment has proved them right.

What we need is to continue the map awareness programme, which the Nigerian Cartographic Association has started since 1978. The Association's conferences, seminars and workshops over the years, have covered application of cartography in petroleum industry, agricultural development, national censuses, rural development, solid minerals development, education and the military (Balogun, 1998). The attention we received in the early years is far more pronounced than what we receive now. The hill we have to surmount is getting the policy makers to listen once again even if we are not party members.

7.2 CATCHING THEM YOUNG: MAP EDUCATION IN SCHOOLS

Apart from talking to the present crop of policy makers, we should catch the future policy makers young. Let us imbibe in them the spirit of working with maps. Let maps be used in educational institutions freely so that our children can get used to finding their ways with maps. I remember when we used to study the geography of Europe, which we had never visited. Maps of Europe were the next to being there.

Nowadays, even geographers are getting used to teaching geography without maps because schools cannot afford to buy them. Some departments that used to borrow wall maps from us for teaching do not ask any more. This situation has to be reversed. Let people naturally think of maps when they think about space because the map is the best instrument for displaying spatial relationships.

7.3 LEGISLATION FOR THE PRODUCTION OF MAPS

The network of map production and map use is like a factory production line. Malfunction of one section of the line affects the whole production line. Failure on the part of one mapping agency to produce required maps affects other agencies that base their activities and mapping on the products of that mapping agency. We have observed that 1:100,000 and 1:250,000 geological mapping has been constrained by the provision of 1:100,000 and 1:250,000 topographical maps. When the National Population Commission did not get the required base maps for the 1991 census, it had to spend a large percentage of its hard-earned budget on the provision of base maps which was not its business.

Lack of certain maps at different levels of government has retarded important national projects such as national census, election, planning for health, education and transportation projects. It is expedient therefore to call for pieces of legislation that will compel all agencies and all the three tiers of government to produce certain specified maps (Balogun, 1999). If we do not do this, mapping will always be sidelined in favour of conspicuous projects, which can boost the political image of politicians in government.

In my last presidential address to the Nigerian Cartographic Association in Kaduna (Balogun, 1999), I recommended legislation that would specifically require:

1. every local government to produce and publish local government maps showing all towns, villages, wards and communities within the local government and depicting various attributes of the local government. In addition, every local government should produce township maps at a scale not smaller than 1:5000 depicting all the houses within the local government area. It may then, on its own,

go ahead to collect data on the attributes of every house for a database that will provide information, which may help it in revenue collection;

2. each state government to produce state administrative maps and a state atlas;
3. the Federal Government to concern itself with the production of administrative and topographical maps at appropriate scales covering the whole country;
4. the military to produce military maps of Nigeria and the neighbouring countries, collect maps of other countries especially the neighbouring ones, and research into fast methods of producing maps; and
5. the Presidency to establish a National Map Library that will be a depository for all maps produced in Nigeria and attempt a collection of all maps produced outside the country. Map libraries should also be encouraged in states and educational institutions. At regular interval, the library should acquire satellite imageries and aerial photographs covering the whole country.

If there is legislation, we can then borrow from a commercial (an advert) in Wisconsin, USA that says that limiting driving speed to 50 miles per hour is not only safe; it is the law. Producing necessary maps will not only be wise and expedient; it will be the law.

7.4 NATIONAL THEMATIC MAPPING AGENCY

It has been learnt from a reliable source that there is a bill with the National Assembly for the creation of a National Mapping Agency. It is not clear if this is an attempt to change the name of the Federal Surveys Department to reflect what it does or to leave the Federal Surveys intact and have another organisation that faces mapping squarely. It must have been noted in the course of this lecture that there was frequent reference to mapping agencies. At the national level, the Federal Surveys Department was being referred to. There is nothing wrong with the Federal Surveys Department carrying out topographical mapping without changing its name. After all, the Ordnance Surveys produces topographical maps of Great Britain and the US Geological Surveys and the Institut Geographique National do similar jobs

in the United States of America and France respectively. Topographical mapping requires serious survey work to determine control points for aerial photographs and for field checking and field completion. Thus, the Federal Surveys Department is still very relevant in topographical mapping and can still perform without its name being changed provided its management structure reflects the collaborative efforts of surveyors, photogrammetrists and cartographers

What Nigeria needs now is a National Thematic Mapping Agency that will produce thematic maps to depict all activities imaginable in Nigeria. Its output will be in form of an atlas and loose thematic maps. Surveyors and cartographers have worked together for a long time - since the colonial period. Their alliance is still desirable in respect of several base maps, but as Mabogunje (1982) notes, "every surveying activity must result in a plan or map, but not all maps need to have involved the act of surveying." The cartographer also makes use of data supplied by other government departments and private and commercial organisations. More data are in fact derived from statisticians, geographers, forestry personnel, remote sensing, economists, etc., than from surveyors. While the cartographer can continue to collaborate with surveyors in the production of maps that deeply involve the act of surveying, he also needs an establishment where he can freely produce maps that need data from these other sources.

The establishment of a Thematic Mapping Agency will remove the burden of the National Atlas from the Federal Surveys Department and give it room to concentrate on maps that require survey work such as topographical maps.

7.5 LASTING SOLUTION TO NATIONAL REGROUPING AND BOUNDARY DELINEATION

Nothing destabilises mapping of administrative units more than changes in the units being mapped, occasioned by creation of new states or local government areas. There is need to have a lasting solution to national re-grouping and state creation. This will enable us produce maps without fear of maps getting outdated before we sell enough to recover cost.

The issue of boundary delineation should be handled more cautiously and with despatch. This will not only prevent frequent boundary clashes but will give cartographers materials to produce new administrative maps. The Boundary Commission should arrange boundary delineation and demarcation when necessary. They may make use of government surveyors but the commission should publish the boundary maps. One way of precluding delineation surveys and boundary clashes is to do state creation on maps before announcing the exercise. Communities will simply look at the maps to find out where they belong. Thus, a new state map should pre-date announcement of state creation.

7.6 IMPROVED LEVEL OF FUNDING

We know that mapping does not usually fall into the category of projects that politicians want to list as one their achievements in Nigeria. In very enlightened societies, the reverse may be the case. However, since the success or failure of most of the projects the politician may take home to his constituency depends on the availability or non-availability of appropriate maps (Adalemo, 1982), it is wiser to vote adequate part of the government budget on maps. If the government refuses to do this, it will pay for mapping as a part of cost of some projects and duplication of efforts and expenses cannot be avoided.

The heads of mapping agencies should also learn how to cost mapping projects and prepare budgets that will be acceptable. They should also learn the techniques of justifying and lobbying for their budgets. In the seventies, budget estimates from states for the production of township maps were ridiculously low. This is why the project did not eventually take off in many states even when money was voted for it. Conversely, in recent times, the proposals for the computerisation of mapping activities by State Survey Departments asked for ridiculously high amounts as mentioned earlier. To be honest, a modest budget estimate of less than N4,000,000 will provide two computers, one A0 digitiser, one A0 plotter, two medium-end GIS software packages, one cartographic design software and one software to interface between GIS and graphic software. With this modest beginning, staff may start to experiment with the conversion of existing analogue maps to digital format if they have the right training.

7.7 ESTABLISHMENT STRUCTURE

The establishment structure has been listed as one of the problems facing mapping organisations in Nigeria. A structure that makes every graduate employee prefer to work only as a surveyor because it is the only way to ascend the management ladder (Balogun, 1985) should be corrected. Every section of any mapping agency should have a management cadre and every staff must have the right to rise to become the head of the organisation even if it is only in theory. This way, highly qualified cartographic graduates can be attracted to the agencies. A graduate cartographer should look at issues more critically than a cartographic technician and therefore frequently come out with innovations that can move the organisation forward in the area of cartographic compilation, design and production. Nigerian universities will complement this by introducing degree programmes in cartography.

7.8 MAP GALLERY FOR POLICY MAKERS

I will define a map gallery as a place where maps are displayed covering different subjects in respect of an administrative unit for the head of the unit to observe the performance of his unit. An atlas, such as a national atlas or state atlas can serve the same purpose, but atlas maps are bound to be small in size. It can be closed and kept like a book, which may not be opened for a year. A map gallery displays larger maps covering several subjects which can indicate the development efforts and progress made in the country or state. Such a display of maps naturally invites people who sometimes involuntarily look at them.

Each map shows a country or a state at a glance. By exploring the maps in the gallery once in a while, the head of a government can easily determine the areas lacking social services and may thereby ensure social justice. Maps in the gallery are expected to be updated regularly so that they do not mislead the President or the Governor. This is no longer difficult in these days of information technology and digital cartography. Data from ministries and the field are easily transmitted. The computer enhances quick map update and printing of new maps to replace obsolete ones.

7.9 STANDARDISATION AND CONTROL

Many of us have noticed that maps have been added to the products being sold 'on the run' on Nigerian roads. This should give us some concern especially when we think of those boundary conflicts that have taken several lives.

The Bakassi Peninsular case had some exhibits in which maps produced even in Nigeria favoured Cameroon's argument. The colonial masters delineated the boundary to Rio del Rey (Balogun, 1989). At one time or the other, maps were produced in Nigeria that inadvertently extended the boundary line to allocate the peninsular sometimes to Nigeria and sometimes to Cameroon.

Similarly, while professional cartographers wait for an official map showing new boundaries each time new states are created, some roadside printers, artists, possibly mechanics, bricklayers and artisans looking for money, produce administrative maps of Nigeria for sale to unsuspecting Nigerians. Their maps are grossly inaccurate, poorly designed and grossly mis-educating.

With developments in information technology and geographical information system and introduction of software packages that put map making on the desktop of the layman, more people will show interest in map production. Some of them will turn mapping to a graphic art exercise. But the map deals with reality. There is no room for flexibility in placing marks on the map. The effect of the miscarriage of map message is far-reaching. All assumptions based on wrong premises will be faulty. Wrong boundaries and placement of towns or villages in wrong local government areas may cause war between communities.

There is therefore a dire need to set up a body that is legally charged with the control and standardisation of cartographic practice in Nigeria. Such a body will register qualified cartographers, ensure that people interested in cartography are properly trained, monitor cartographic activities in the country and ensure that the ethics of the profession are adhered to.

7.10 NATIONAL DATABASE INFRASTRUCTURE

The introduction of digital cartography has increased the accuracy of map compilation, improved quality of map design and reduced the time it takes to produce maps. However, if care is not taken,

especially in these days when GIS has made map making easy for non-cartographers, we shall be producing inaccurate maps that will give false impression of accuracy simply because they were produced on the computer. At present, several people capture data from different sources using different standards. Such standards are dictated by several factors such as the source of data, the resolution of their digitisers, the integrity of the person digitising, the level of accuracy allowed by the data capture software used and the consciousness of the computer map producer as to the implications of moving map elements around.

Apart from varying standards, duplication of efforts in data capture and storage is becoming worrisome as a drain on our individual pockets and the nation's economy. At present, every person producing maps captures his own data. Even in a geography department which cannot afford a digitiser and employ a computer laboratory technologist to capture data into a common database, academic staff end up buying their own individual digitisers and employing their own assistants. God knows how many people have individually digitised the boundaries, drainage, settlement and roads of Nigeria. This is a duplication of efforts and energy which should have been used profitably in some other areas of endeavour.

All government authoritative agencies in charge of various types of maps should be mandated to develop and publish data sets related to their activities. The Federal Surveys Department or National Boundary Commission should provide data sets on all boundaries; Ministry of Water Resources should issue data sets on water resources of the country etc. Any agency that cannot cope should engage individuals, universities and private organisations to capture data for it. Private organisations and individuals can then add to or refine such data for some other purposes. Just as we regard maps produced by the national mapping agency as authoritative, we shall be bound to accept its datasets too as authoritative.

Of course, for any dataset to be authoritative there should be proven measures to ensure required **standards**. For the datasets from various organisations to fit together, there must be a **co-ordinating body** such as the National Geo-spatial Information

Agency suggested by Kufoniyi (2001) to spell out the specifications for the datasets – such as projection, coding of geographical elements, data resolution, data storage, data transfer etc. There must be adequate information as to where different datasets are domiciled how to get them and at what cost. A **National Geo-spatial Information Centre** should be set up to disseminate all the information pertaining to all maps and data sets generated in respect of the country such as geographical coverage, description of data, storage format, data quality, contact information, date of last update etc. All the metadata related to the datasets will reside in the centre even if the datasets do not. It will be a one-step catalogue shopping centre. Such a centre must have a website that runs twenty-four hours a day and seven days a week and must have links that can take browsers to all the data providers.

7.11 COMPREHENSIVE NATIONAL MAPPING POLICY

The development we have made in the mapping of the country does not show that we have co-ordinated our efforts in the mapping of the country. We are still lacking in terms of coverage, in terms of map details, in terms of variety of maps, in terms of the right map format and in terms of timeliness of the maps we produce. All these shortcomings call for a well-formulated mapping policy.

Through this medium, I am calling on the Federal Government to invite all stakeholders to formulate a comprehensive national mapping policy that will spell out the ways maps should be produced, disbursed and revised in the country. The policy will spell out the following:

1. The types and scales of maps that different tiers of government should produce.
2. The types of maps that should be produced by different government departments and ministries – education, health, agriculture, water resources, communication, works and housing, etc.
3. The organisation of mapping in Nigeria and the best structure that will ensure that right maps are produced at the right time.

4. The financing of mapping at local, state and federal government levels and the level of funding desirable.
5. The education of all categories of professionals in the mapping sciences.
6. The mode of reporting of mapping activities and data that can be mapped.
7. The standardisation of mapping practices.
8. Co-ordination of efforts in the area of digital cartographic database development, quality control and distribution.
9. Participation of foreign nationals and governments in the production of strategic maps of the country.
10. Revision cycle for different categories of maps.

8. CONCLUSION

Mr. Vice Chancellor Sir, in the last few minutes, I have been discussing the map as a pathfinder, which reminds me of my first atlas called *Pathfinder Atlas of West Africa*. Many people, who used the atlas in the past, may just be conscious of the meaning of the title of the book today. The atlas helps us find our way to West African countries. For maps to show us the way effectively, they must be produced at appropriate scales; they must cover required geographical areas, and must provide appropriate information in required details. All these require that the government should look at the above recommendations carefully. The number of recommendations made shows that many aspects of mapping in Nigeria require some attention. It is hoped that as much attention will be given to the mapping of the country as we have given to some other activities such as election and sports. Mapping may not be as conspicuous as roads and buildings and they may not generate enough revenue to meet all expenses on it, but mapping should be regarded as a social service which can save government a lot of money in the long run as costs of projects need not include mapping if appropriate maps are available.

Mr. Vice Chancellor Sir, let us all enter the world of maps. We can never miss our ways. Thank you all for listening to my lecture.

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