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TWENTY YEARS OF RECTAS TRAINING AND OTHER SERVICES
IN AEROSPACE SURVEYS TO AFRICA

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A B S T R A C T

The Regional Centre for Training in Aerospace Surveys (RECTAS), Ile-Ife, Nigeria was established on the 21st October 1972 under the auspices of the United Nations Economic Commission for Africa (UNECA) as an intergovernmental institution. The objective was to provide long term training in both English and French languages in Photogrammetry, Photo-interpretation, Remote Sensing, Cartography and some other aspects of Geoinformation production for indigenous Africa manpower developments by Africans in an African environment, for the economic recovery of Africa and regional co-operation and integration among others, through appropriate technology transfer and technical assistances in these areas from developed countries in line with some of the objectives of the Lagos Plan of Action and the Final Act of Lagos.

This paper gives a brief historical background of the Centre, the objectives of the Centre, its achievements and impact on the African continent. The training programmes available at different levels and duration for various courses are described as well as other services rendered by the Centre to Africa. The sources of funding, plans and programmes, including the present expansion programmes ongoing and the future plans and programmes of the Centre are discussed. The various technical assistances from various countries and international Agencies already received and those still being received are also acknowledged and their impacts are discussed.

The major problems being encountered by the Centre in offering these training and services are discussed and strategies for solving these problems for the viable survival of the Centre are suggested to achieve self-sustainable existence. The complementary roles of RECTAS with other sister-institutions in Africa are discussed.

The activities marking the 20th anniversary celebration of RECTAS along with the International Space Year (ISY) in 1992 are briefly described.

The future plans and objectives of the Centre are highlighted. Appeals are made for more technical assistances from more countries and relevant international agencies and renewal of existing ones.

Based on the above, conclusions and recommendations are made on the status and future role of RECTAS in Africa in training and services in Cartography and Geoinformation production to Africa in order to achieve success in the O.A.U. and E.C.A. economic recovery programmes efforts for the continent.

HISTORICAL BACKGROUND

The need for establishing a Regional "Cartographic" Centre was first mooted at the First United Nations Regional Cartographic Conference in 1963 in Nairobi, Kenya. The eighth Session of the Economic Commission for Africa (ECA) Conference of Ministers held in Addis Ababa, Ethiopia in 1964 passed Resolution 164 (VIII) calling for the creation of a Regional Centre for Training in Photogrammetry, Photo-interpretation and Airborne Geophysical Surveys. In response to this call in 1971 four founding members states (Benin, Ghana, Nigeria and Senegal) signed the Principal Agreement establishing the Regional Centre for Training in Aerial Surveys (RECTAS) to be located on the Campus of the Obafemi Awolowo University (then the University of Ife), Nigeria. The formal opening of the Centre was performed by the Executive Secretary of the United Nations Economic Commission for Africa (UNECA), Dr. R.K.A. Gardiner on the 21st October, 1972. In 1980 both Mali and Burkina joined the Centre as participating signatory member States while Cameroun and Niger joined in 1983 and 1984 respectively. In 1987 the Centre changed its name to the *Regional Centre for Training in Aerospace Surveys (RECTAS)* to cover the entire scope of its new training, research and consultancy activities, including Remote Sensing for Geoinformation production. The Centre which is bilingual (English and French) has been established in Africa to conduct training and research in an African environment by Africans in various fields of Aerospace Surveys. The Centre is a United Nations Economic Commission for Africa (UNECA) sponsored Institution with a diplomatic status of an International Inter-governmental Organisation fully accredited to the Federal Republic of Nigeria.

ADMINISTRATIVE STRUCTURE

The highest authority in the Centre is the *Governing Council* which comprises representatives from participating member states. The Council is presided over by the Executive Secretary of E.C.A. as Chairman. The Director of the Centre is the Secretary of the Governing Council. A *Technical Advisory Committee* advises the Council on technical matters relating to the preparation and implementation of the work programme of the Centre. An *Academic Board* is responsible for academic matters. The Centre which is located on the Campus of Obafemi Awolowo University in Ile-Ife, Nigeria, consists of the Directorate, and two Divisions (The Academic and Research Division incorporates three units viz:- Photogrammetry and Photography, Remote Sensing and Cartography. The Administrative/Finance and Common Services Division also has three units viz:- Administration/Finance, Instrument Maintenance and Documentation/Information and Publications units).

THE NEED FOR THE CENTRE

In many African countries the Surveying and Mapping Services, despite significant development achieved in recent years, in line with advanced global technological development, are not yet adequate to meet the rapidly increasing demands for Mapping and Surveying work of various government departments and organisations concerned with appropriate accelerated and orderly national development planning, implementation and execution. The importance of the demand on surveying and mapping including remote sensing technology for the effective Environmental monitoring and control cannot be over-emphasized. Where these technologies are not available or not appropriately utilized they cause serious degradation of the environment and cause similar huge economic losses and untold damage and hardship to the properties and lives of the Nation. Extensive and intensive uses of modern Aerospace Survey technologies are the only ways to cope with these increasing demands on the Surveys potentials of these countries. The urgent need to produce the necessary indigenous manpower in Surveying, Photogrammetry, Remote Sensing and Cartography for the exploration, exploitation and management of Africa's natural resources and improvement of agricultural food production to reduce the debilitating huge investment on food importation and improve the present very poor African economy through long-term and short-term training courses have long been identified as a *sine qua non* for Africa's orderly development. The acute shortage of personnel with adequate training in these techniques and the current huge cost of overseas training in these techniques constitute serious handicaps. This urgent need necessitated the establishment of the

Regional Centre for Training in Aerospace Surveys with the sub-regional and regional collaboration and co-operation objective of a number of African countries to reduce the burden of the manpower and resources requirements on each country.

Since computer literacy has started spreading for the effective, appropriate transfer and application of modern technologies in various application areas to improve their lots in the developing countries, an Institution which is capable to keep abreast with the new technologies is necessary. RECTAS is a good example of such an Institution and it has succeeded in doing so.

OBJECTIVES OF THE CENTRE

The objectives of establishing the Centre include, among others:

- (i) To provide long term theoretical and practical training in the field of Aerospace Surveys including, in particular, Photogrammetry, Photo-interpretation, Remote Sensing, Cartography and Airborne Geophysical Surveys, with a view to meeting the manpower requirements of African countries in these areas.
- (ii) To conduct seminars, workshops and short term courses with a view to providing an opportunity for exchange of information and knowledge/experience in the field of Aerospace Surveys and the Environment.
- (iii) To carry out and promote studies and research in the field of Aerospace Surveys and its application to man's environment in its totality to make the world a better place to live in.
- (iv) To provide consultancy and advisory services upon request on Aerospace Surveys problems including its applications to solving effective environmental monitoring and control, natural resources inventory and management problems to all the African Governments (including their various agencies) of member states of the Economic Commission for Africa and to other Surveying organisations in the region for both Anglophone and Francophone countries.

ACHIEVEMENTS/IMPACT

The major activity of RECTAS which has made significant contributions to the solution of the problems identified in the Africa's Priority Programmes APPER and UNPAAERD and other emergency measures being taken towards the accelerated implementation of the Lagos Plan of action 1980-2000 is in the area of indigenous training and manpower development in the Region. Since its inception, to date the Centre has offered admission to about **744** African Nationals. Out of these, about **689** passed and are consequently holders of either RECTAS Operator's,

Technician's, Technologist's or Postgraduate diplomas in Photogrammetry and Remote Sensing cum Photo-interpretation from the following 25 African Countries: Benin, Burkina, Cameroon, Ghana, Mali, Niger, Nigeria and Senegal that are participating member states as well as from the following other African countries: Algeria, Central African Republic, Côte D'Ivoire, Burundi, Ethiopia, Kenya, Libya, Malawi, Rwanda, Sierra Leone, Somalia, Sudan, Uganda, Zaire, Zambia, Zimbabwe and Lesotho. The area served so far by RECTAS training programme is illustrated as screened areas in Fig. 1 (as will be shown during the presentation for lack of space here) while Fig. 2 and Fig. 3 depict RECTAS yearly total student population for different courses and yearly figure of RECTAS trained students respectively, as will be shown during the presentation only for reason of space problems. However, Figure 2 shows that Yearly total RECTAS student population for all the different courses ranged between 11 in 1972/73 to 120 in 1992/93 session. Figure 3 shows that yearly figure of RECTAS trained and graduated students for all the different courses ranged between 11 in 1972/73 to 130 in 1992/93 session. Through short term training courses, workshops, seminars and conferences the Centre has also trained many African nationals in Photogrammetry, Remote Sensing, Photo-interpretation for census exercises and other activities. Between 1990 and 1992, RECTAS organised some Census Cartography short courses for staff of the *National Population Commission* of Nigeria for the conduct of the November 1991 National Population Census, the result of which is already out since March 1992. In November 1991, RECTAS organised, in collaboration with E.C.A. and with the Technical Support of the *Groupement pour le Développement de la Télédétection Aérospatiale (GDTA)*, Toulouse, France, a very successful Census Cartography Workshop for 19 Nationals of seven African countries, including: Gambia, Ghana, Liberia, Mozambique, Namibia, Nigeria, and Sierra Leone. These also include workshops in Survey and Mapping Computation Techniques organized in Ghana and Nigeria and Computer Science of Image Processing techniques, etc.

Between 1991 and 1992, RECTAS and ECA jointly organised distribution of questionnaires for RECTAS alumni in many countries to find out how they are being utilized and possible areas of improvement of the courses at RECTAS for the benefit of Africa's economic recovery efforts.

Between 30th November - 5th December, 1992, RECTAS, in collaboration with, and with technical support from GDTA, with experts from France and with the *Centre National d'Etudes Spatiales (CNES)* and the *Ministère des Affaires Etrangères (MAE)*, both of France as the strong financial sponsors, organised a Bilingual International Seminar (English and French) for some 27 RECTAS and GDTA Alumni and Policy/decision-makers carefully selected from different African countries. The title of the Seminar was: *New Developments in Cartographic Applications of Remote Sensing*. This was very well attended and publicized, and adjudged very successful.

This was immediately followed by the *20th Anniversary of RECTAS* and the *International Space Year (ISY)* celebrations, during 7-8 December 1992 at RECTAS, Ile-Ife, Nigeria as per E.C.A. mandate.

Thanks to the French Embassy in Lagos, Nigeria, who were very instrumental to the success of both activities with their co-ordination and other assistance.

Apart from training and conferences/seminars, the Centre has also executed map compilations, topographic, township and land use mapping projects for some African Countries and/or organisations including Nigeria, Senegal and Mali for various purposes and at different scales under its Consultancy Services Unit. Member states are hereby invited to always let RECTAS know about their proposed/on-going development projects so that useful contributions on consultancy basis can be made by RECTAS at reduced costs.

THE PROGRAMMES

In its 20 years since its establishment by ECA, RECTAS as one of the leading ECA centres in Aerospace Training has earned international reputation as a Centre for excellence, particularly by the European community.

The Centre has the following major programmes, namely:

(a) **Training Courses** :

Long term Training courses are offered at different levels (Technician, Technologist and Post-Graduate) in Photogrammetry, Remote Sensing and in 1993/94 session Cartography, of different durations and related activities, and the dates of commencement are indicated in Table 1. The entry qualifications for the various courses are shown in Table 2. All courses are given both in French for the Francophones and in English for the Anglophones. A descriptive information booklet (Training courses) including fees payable is published annually and is available on request for more information.

(b) **Consultancy and Research** :

RECTAS Consultancy and Research services are directed to assist in short-term solution of the development problems of all the ECA member states by offering the benefit of RECTAS expertise, and facilities in all these areas, including Remote Sensing and Digital Image Processing to African Governments as well as other organisations and agencies.

The areas of consultancy and research services available at RECTAS include the following:

- (i) Organising workshops and Seminars in Survey and Mapping Computation, Refresher courses in Photogrammetry, Remote Sensing, Digital Image Processing and Computer Applications, and soon Geographical Information System (G.I.S.) applications.
- (ii) Cartographic Draughtmanship and Photo-grammetric Operator's training courses by special arrangements as well as workshop on instrument maintenance, also by special arrangement.
- (iii) Execution of Engineering, Cadastral, Large Scale, Topographic Mapping, Remote Sensing and also thematic mapping projects related to geology, soil science, drought, desertification, deforestation controls, and planning for agriculture. Carrying out Environmental Impact Assessment (E.I.A.), environmental hazard monitoring, control and prevention of pollution and urban and rural planning.
- (iv) Assistance in minor repairs and maintenance, installation of surveying, photogrammetry, and Remote Sensing equipment and software.
- (v) Advisory services in the specialized fields of mapping and Remote Sensing facilities in the establishment of such units where none exist in different African countries.

RECTAS CONSULTANCY FACILITIES/CAPABILITIES

The Centre has over the years acquired a wide range of equipment required for the implementation of its programmes. A summary of these facilities in Photogrammetry and Remote Sensing are listed in Table III. There is a notable expansion of the centre's equipment base from the traditional ones to those required for aerospace surveys. In the latter case a wide range of automated instruments for digital image processing is becoming available for fast mapping operations at RECTAS.

(a) Facilities

Existing Facilities

- (i) In the field of Photogrammetry, RECTAS possesses varieties of up-to-date photogrammetric equipments for training and mapping operations.
- (ii) In the field of Remote Sensing RECTAS possesses a sizeable number of image processing systems and a number of different satellite imageries, digital and reprographic documents. Two different softwares (DIDACTIM and MULTISCOPE) installed on the Digital Image Processing (DIP) units

enable a wide range of users (e.g. agronomists, geologists, urbanists, environmentalists, planners, engineers, minerals and oil explorers, military applications, agriculturists, Photogrammetrists, surveyors, etc...) to process satellite images of study areas with a ground resolution down to 10m in the case of SPOT. A look at Table III, as will be shown during presentation, summarises the existing photogrammetry and Remote Sensing facilities. RECTAS will be setting up Geographical Information Systems (GIS) very soon to enhance its capabilities/facilities.

Planned Facilities

Most of the Centre's expected facilities are for expansion. A look at Table IV, which will be shown during presentation, summarizes the proposed and expected equipment, which shows that the Centre is embarking on training and research not only in areas where new or modern mapping operations are time saving and efficient in many ways but also adapted to the mapping needs of the ECA member states of Africa.

(b) Capabilities:

(i) **In photogrammetry** RECTAS CONSULT is capable of:

- Providing Photogrammetric instruments (under supervision) for the use of researchers and practising surveyors for mapping projects;
- Planning and costing photogrammetric project;
- Executing aerial triangulation observations and adjustments;
- Carrying out different map compilation at desired scales and contour intervals;
- Executing mapping projects (production of single or multi-colour topographic maps at any desirable scale);
- Constructing controlled and uncontrolled mosaics;
- Carrying out basic maintenance and servicing of photogrammetric instruments in collaboration with ITC, The Netherlands.

(ii) **In Remote Sensing**, our Digital Image Processing System and soon the GIS outfit can handle images of: SPOT, LANDSAT TM, NOAA AVHR

We have the personnel with the know-how in digital and analogue data processing for information on: agricultural land use, pests control and agricultural yield improvement in food production; vegetation and rangeland management; forestry and wildlife management; geological and hydro-geological and soil surveys; oil and mineral prospecting and management; urban and rural land use planning; desertification and drought monitoring and control; water resource management; environmental impact assessment for social services and infrastructural provision;

environmental monitoring, control and protection; military applications for different purposes; educational purposes; population census exercise, etc.

PROBLEMS

The problem of RECTAS is that most of its analogue and other instruments are becoming obsolete and need replacement/modernisation as the whole world is going analytical/digital. The size of the buildings is small, and they need expansion to meet demand. There is need for modernisation of training programmes for both staff development and students' training and for provision of funds to achieve these objectives.

Lack of funds from contribution of participating member states due to their poor economic conditions and/or stringent national Foreign Exchange Regulations, making contributions impossible or irregular/inconsistent.

Dearth of adequate number of indigenous experts in Aerospace Surveys Techniques in African countries, poor salary conditions due to non-availability of Funds to guarantee ability to back up payment of enhanced salaries from member states contributions only.

Finally, the expected sources of funding for RECTAS budget is 50% from member states contribution, at least 10.5% from internally generated revenue by RECTAS and thirdly, 39.5% from donor countries and International Multilateral and Bilateral Agencies.

Unfortunately, these targets have generally not been met yet to achieve planned programmes and objectives.

TECHNICAL ASSISTANCE

The impact of the Technical Assistance received from donor multilateral and bilateral organisations, countries and agencies on the role of RECTAS in Africa cannot be over-emphasized. The Centre has received over the years technical and administrative support from the Economic Commission for Africa (ECA) its sponsor, and the International Centre for Training in Aerospace Surveys (ITC), Netherlands helped to establish RECTAS in 1972 with the Dutch Government support, providing equipment and technical/lecturing staff for about nine years.

In 1985, RECTAS made contact and appeal to several donor countries and international organisations for Technical Assistance funding to modernise RECTAS activities and consequently some technical assistances are now being enjoyed. Examples of recent technical assistance may be illustrated by:

(I) The preparatory assistance grant by UNDP in 1988 under the 4th programme cycle for purchase of equipment, curriculum development, with grant allocation of \$300,000 including fellowship awards for some RECTAS students, payment of allowances of some experts invited for specific duties at RECTAS and organisation of seminars/workshops.

(II) the MAE/GDTA/RECTAS project: Under this protocol agreement the Groupement pour le Développement de la Télédétection Aérospatiale (GDTA) financed by the French Ministry of Foreign Affairs (MAE) through its Embassy in Lagos, Nigeria, is to assist RECTAS to set up a modern Remote Sensing Unit and enhance micro-computers usage, knowledge for various application areas including other modern scientific instruments and software, satellite imagery and teaching documents and materials.

In 1988 and 1989, a grant of FF941,080 and FF 2 million respectively were allocated for such purpose. The grant has been on the increase since then, and has, together with experts sent on missions, helped in no small measure to reactivate, resuscitate and revitalize Remote Sensing activities at RECTAS.

The French Government has since then sent three experts to help in developing the Remote Sensing Unit for teaching and rendering consultancy services to various application areas and others on short missions, in addition to offering annual scholarship for RECTAS staff development training at GDTA, Toulouse, France (15 up till now). Fellowships are also offered for a number of African RECTAS students annually. Several equipments were received in 1989, 1990, 1991 and 1992, and others planned for 1993. This is in addition to participation in the EC/GDTA/ITC/RECTAS project. This agreement has been extended for another two years (1993/1994) as Phase II, after the success of the Phase I.

(III) The DGIS/ITC/RECTAS Fellowship Technical Assistance Project, financed by the Dutch Government, is the Phase II of the Dutch Government assistance, after the inception assistance. This project was approved in 1989 with funding to the tune of DFL 1 million to provide scholarship for students at RECTAS and RECTAS staff development training in ITC, Netherlands and also to improve the library facilities at RECTAS. This is also in addition to participation in EC/GDTA/ITC/RECTAS Project, and ITC staff serving as consultants to the EC on the project. The project duration is 5 years (1989-94) in the first instance.

(IV) EC/GDTA/ITC/RECTAS Project financed mainly by the European Community (EC) under the European Development Fund (EDF) and vigorously supported by France and the Netherlands. The EC has approved a grant of ECU 3 million for its implementation for a duration of 5 years in the first instance. This is the master project currently at RECTAS programmed to achieve the objective of

revision and modernisation of all existing training programmes and setting new training courses in Cartography with modern equipment. It also includes RECTAS staff training at ITC and GDTA and offering fellowship to some students of RECTAS annually.

A number of modern Photogrammetry, Remote Sensing and Cartographic equipment have been delivered to RECTAS in 1992 under these projects as the contracts for the supply have already been awarded by international tender. More are still being expected for delivery in 1993.

(V) The Switzerland Government has offered financial assistance for fellowship to some RECTAS students and paid salaries of some RECTAS staff for the past 14 years. This also includes the APY instrument donated by the Government. The Switzerland Government also pledged in 1989 the sum of \$200,000 for some items not provided for in the other projects including our calcum plotters, computers, update software for the APY, photocopiers, binding materials, consumables, etc. This project is still on-going today, to tidy up last part of some purchases.

(VI) The British Council also sponsors a number of African students from different African countries such as Malawi, Zambia, Swaziland and Zimbabwe to RECTAS on fellowships.

The RECTAS Second Five-Year Development Plan Programme was launched in Senegal in 1989 and 40% of the budget is expected to be provided by international communities through technical assistance. The approved estimated budget is \$8,534,827.00. The impact of the received/pledged assistance has gone to help in no small measure to assist RECTAS to achieve some of its objectives in the realization of the aspirations of the *Lagos Plan of Action* as well as those of the ideals of *African Economic Recovery Programme* concerning the role "Cartography" is supposed to play. This includes solving the problems of deteriorating climatic conditions, drought control, improve agriculture and food production to reduce famine and improve African standards of living, prevent environmental degradation by carrying out Environmental Impact Assessments, improve accuracy of population estimates, improve appropriate technology transfer, good maintenance culture for sophisticated equipment, improve socio-economic development by provision of modern equipment.

The Technical Assistance has helped in assisting poor developing countries who would otherwise not have been able to fund provision of equipment, materials and high level manpower required to provide training to Africans for appropriate technology transfer in these areas of Photogrammetry, Remote Sensing and Cartography for Geoinformation production even on a regional

collaboration/cooperation basis to do so to some extent. It has also promoted regional cooperation.

ACKNOWLEDGEMENT

We would like to seize this opportunity to thank all the donor countries and international agencies listed above that have provided assistance to RECTAS in various ways as well as those who have promised and other intending ones in the near future.

Particular thanks go to the the French Government for its dynamic/consistent assistance to RECTAS in many ways under two projects to make the world a better place to live in. Thanks also go in particular to the Dutch Government, in particular for having been consultants/co-ordinators to the EC Master Project and for representing the EC on the Financial Drive/Sensitization mission to all member states in March 1992 as strategy to ensure payment of contributions regularly and schedule payment of arrears in order to meet one of the conditionalities of the EC/GDTA/ITC/RECTAS project.

Particular thanks also go to the ECA for its steady administrative and technical support to RECTAS as its sponsor and whose Executive Secretary is the Chairman of RECTAS Governing Council.

~~Last~~ but not the least, particular thanks go to the Federal Government of Nigeria, ~~the~~ ~~Most~~ country, for honouring and paying up to date all its financial contributions to RECTAS, including the pledged contribution towards the physical expansion programme at the Conference of African Ministers responsible for Cartography and Remote Sensing in Senegal, 1989, during the launching of the RECTAS Second Five-Year Development Programme. Other organisations, countries and individuals who have helped RECTAS to survive in its 20 years of existence, too numerous to mention here, are also thanked.

APPEAL

I strongly urge and appeal to the other international organisations and agencies and other donor countries that have not yet been supporting RECTAS or have stopped, or are about to stop their assistance, to appreciate the need and offer, or continue to offer technical assistance to RECTAS. These include, among others: UNDP, UNESCO, UNITAR, UNEP, USAID, ADB, FAO, UNIDO, WHO, World Bank, Arab Development Bank, ILO, etc. and donor countries such as Japan, Finland, Germany, Canada, USA, the European Community (EC), etc.

RECTAS has been recognised by the EC as "Centre for Excellence" in Africa in this area of training in Photogrammetry, Remote Sensing and Cartography up to Post-Graduate level indispensable for Africa's Economic Recovery Programme.

Furthermore, I urge African States which are not yet participating member states of RECTAS to join by simply signing the Principal Agreement Document establishing RECTAS by mandate to serve **the entire African countries**, and re-emphasized at the Conference of African Ministers responsible for Cartography and Remote Sensing on the occasion of the Launching of the Second Five-Year Development Plan of the Regional Centre for Training in Aerospace Surveys (RECTAS) in Dakar, Senegal, on 24th February, 1989. Efforts are already being made to assure those who promised to join that necessary action would actually be formalized to become members.

All member states of ECA are entitled to be members, the procedure is simple as indicated in the conclusion of this paper, and the benefits are innumerable (including possibility of food sufficiency, improved economy, improved natural resources exploitation and management, improved standard of living, good environment, national peace and stability, and sustainable development, etc.) for being a participating member state of RECTAS.

BENEFITS TO PARTICIPATING MEMBER STATES AND INVITATION TO NON MEMBER STATES TO JOIN THE CENTRE

Member States of United Nations Economic Commission for Africa (UNECA) who are not yet participating member states of RECTAS are hereby invited to take advantage of our training programmes and technical services and to join the Centre as participating member States as of right according to the statutory instrument establishing the Centre.

The following are some of the benefits to participating signatory member states of RECTAS:

- (i) Manpower development opportunities in Photo-grammetry, Remote Sensing, Cartography and Aerial Photography through long-term and short-term training for nationals of member states at RECTAS at Technician, Technologist and Post-Graduate levels for the various courses in both English and French.
- (ii) Fellowships are readily available for students from member states to undertake various courses at the Centre at all levels.
- (iii) Low charges to member states making use of our consultancy and technical services for mapping.

- (iv) Assistance to member states in the application of Photogrammetry and Remote Sensing to combat the problems due to desertification, drought, soil erosion, flooding, boundary disputes (international and national (including inter-state and local government)) and disease vector detection, mapping at different scales for different purposes, seismic and volcanic activities and urban pollution control; Assistance in Environmental monitoring, control and protection. Environmental Impact Assessment studies for different application areas.
- (v) Assistance to member states in the application of Remote Sensing to natural resources development related to agricultural and rural development, population census, geological, oil and mineral exploration, landuse and underground water surveys, assistance in training armed forces personnels in these techniques for national security, peace and stability purposes.
- (vi) Assistance to member states in establishing a photogrammetric and or Remote Sensing Unit where none exists and carrying out the repairs of equipment in collaboration with I.T.C. at reduced rates on consultancy basis.
- (vii) In addition to the above, a percentage of the profit accruing from Consultancy Services project will form part of the centre's internally generated revenue. This will definitely help in improving the performance of the Centre's activities. We are determined to make our contributions to APPER and UN-PAAERD as well as to the accelerated implementation of the Lagos Plan of Action and the Final Act of Lagos as far as manpower training and natural resources development are concerned for economic recovery of African countries.
- (viii) Employment opportunities are available at RECTAS for nationals of participating (African) member states of ECA as international civil servants.
- (ix) Various fellowship opportunities are available for students from participating member States for courses at all level, (including Tuition, Feeding Allowance, Insurance, Book Allowance etc...). Similarly, a dynamic and regular in-service staff development through local and overseas training on fellowship exists for RECTAS staff.

CONCLUSION

The determination of African nations under the Organisation of African Unity (OAU) and the Economic Commission for Africa is to energetically expand its indigenous capability for improved economy, environment, food production and exploration and exploitation and management of its abundant yet unexploited natural resources for self reliance and self sufficiency manifest in a number of objectives. These include sustaining technology development efforts and advancing the frontiers of technology, invest in research and development, and support as well

as stimulate academic growth for the supply of competent indigenous African manpower.

The vehicle for achieving these objectives has been the rigorous development of necessary indigenous capabilities with the highest priority being accorded the development of a highly talented, well dedicated and well educated work-force while upgrading their knowledge, skills and experience to cope with the requirements for Africa's development through educational partnerships of a number of African countries in the face of modern emerging technologies.

The Regional Centre for Training in Aerospace Surveys (RECTAS), Ile-Ife, Nigeria, is one such ideal Centre for the above objectives and to foster regional and sub-regional cooperation, friendship and technological progress in the pursuit of African accelerated Economic Recovery Programme to achieve the objective of the Lagos Plan of Action and Environmental Monitoring and Protection to make Africa a better place to live in.

RECTAS is a leading Regional training institution in Africa and the only one charged with the responsibility **mainly of long term training** in Photogrammetry, Remote Sensing/Photointerpretation and Cartography for all the African Countries of E.C.A. **on a regional level**. All other training Centres are **mainly responsible for short term training courses/workshops and user assistance services** by mandate on **sub-regional level**. However, it is important to say that these roles are complementary, vital and non-duplicating. These areas of specialization are indispensable for the accelerated orderly development, Economic Recovery, increased food production, Self reliance and Self sufficiency programmes of O.A.U. for all African Countries.

It is important to note, that the Centre is currently luckily involved in a very important project well financed by the European Community under the European Development Fund (EDF) and under which it is envisaged that the Centre's equipment and training programmes will be modernized and its staff trained or upgraded to cope with the demand of modern technology in Geoinformation production, having been recognised as a Centre for excellence in Africa in this area for indigenous manpower development by the European Community (EC).

The European Community has, however, laid down a condition for its continued support to the project, by stipulating that member countries of RECTAS should at least pay regularly their own portion of financial contributions otherwise the project may be terminated/discontinued.

An appeal is hereby strongly made to all member states to ensure regular national budgeting for the adequate and consistent payment of all their contributions including arrears to ensure the continuation of the European Community project for the benefit of all African Countries to achieve the O.A.U. objectives.

For the yet non-member states the advantages of joining are numerous and a *sine qua non* for their national economic recovery, regional cooperation and integration. The more the number of participating member states the smaller the amount of contributions per country for the Regular Budget of RECTAS without decrease on the benefits. Membership is for all E.C.A. member countries that sign the Principal Agreement establishing RECTAS. This is available and obtainable easily at the E.C.A. headquarters in Addis Ababa, Ethiopia simply by applying to the Executive Secretary of E.C.A. who is the Chairman of RECTAS Governing Council or by applying to the "Director, Regional Centre for Training in Aerospace Surveys (RECTAS), Obafemi Awolowo University Campus, P.M.B. 5545, ILE-IFE, NIGERIA". Further information about RECTAS can also be obtained directly from the DIRECTOR. The benefits of being a participating member state are numerous and a *sine qua non* for any African country's accelerated/orderly development, economic recovery and environmental monitoring control, and protection efforts, increased food production, drought and desertification control, exploration and exploitation of African natural resources still grossly unexploited.

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Long live Africa.

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TABLE I TRAINING COURSES

Course	Duration	Graduation Document	Commencement
PHOTOGRAMMETRY			
Technician's Course	22 months	Technician's diploma	December each year
Technologist's Course	18 months	Technologist diploma	April each year
Postgraduate Course	12 months	Postgraduate diploma	October each year
REMOTE SENSING			
Technician's Course	9 months	Technician's diploma	January each year
Technologist's Course	12 months	Technologist diploma	October each year
Postgraduate Course	12 months	Postgraduate diploma	October each year

Courses in Cartography were planned to start in 1992 as shown in the table below:

Course	Duration	Graduation Document	Commencement
CARTOGRAPHY			
Draughtman's Course	12 months	Draughtman's Certificate	October 1993
Technician's Course	18 months	Technician's diploma	April 1994
Technologist's Course	18 months	Technologist diploma	April 1995

TABLE II: ENTRY QUALIFICATIONS FOR EACH COURSE

PHOTOGRAMMETRY	
COURSE	ENTRY QUALIFICATIONS
Technician's Course	GCE O/L credit in Maths, Physics, Chemistry, Geography or equivalent or high pass Operator's Certificate of RECTAS. Satisfactory stereoscopic vision plus 2 years experience.
Technologist's Course	GCE A/L, credit in 2 subjects including Maths, general entry qualification to University, Technician Diploma in Photogrammetry or equivalent in Surveying. Satisfactory stereoscopic vision.
Post-Graduate Diploma Course	Good B.Sc. in Maths, Geography (with Maths), Surveying, Civil Engineering or equivalent. Satisfactory stereoscopic vision.

REMOTE SENSING	
COURSE	ENTRY QUALIFICATIONS
Technician's Course	GCE O/L credit in 4 subjects in Physics, Social and Natural Sciences, or Technician Diploma in appropriate discipline in Resource Surveys plus 2 years field experience. Satisfactory stereoscopic and colour vision.
Technologist's Course	Technologist's Diploma in any discipline related to Resource Surveys, plus 2 years post-qualification experience. Satisfactory stereoscopic and colour vision.
Post-Graduate Diploma Course	Bachelor's Degree or its equivalent in Natural or Physical Sciences, plus 2 years post-qualification experience. Satisfactory stereoscopic and colour vision.

(contd.)

CARTOGRAPHY	
COURSE	ENTRY QUALIFICATIONS
Augustsmanship Course	GCE O/L with credit Geography or Technical Drawing and Draughting ability. Satisfactory colour vision.
Technician's Course	GCE O/L credit in Maths or Physics, Geography, Technical Drawing and any other subject, plus drafting experience. Satisfactory colour vision.
Technologist's Course	High pass RECTAS Technician Diploma or equivalent with 2 years post-qualification experience. Satisfactory colour vision

**TABLE III: EXISTING FACILITIES FOR PHOTOGRAMMETRY
AND REMOTE SENSING**

PHOTOGRAMMETRY	REMOTE SENSING
<p>Wild Autograph A9 (1) Wild Autograph A8 (3) Wild Aviograph A8 (2) Wild Aviograph B8S (3) Kern PG2 (3) ITC Stereotrainer (15) Wild Rectifier E4 (1) Wild PUG4 E4 (1) Wild Reduction Printer (1) Electric Desk Calculator (10) Facit Calculator (2) Mirror Stereoscope (16) Coordinatograph (Swiss) (3) Multiplexograph (3) Templace Cutter (1) Pocket Stereoscope (50) Analytical Photogrammeter Yserman (APY) (1) Twin Stereoscope (1) CMPI Comparator and PDP II Computer (1)</p>	<p><i>Image Processing</i> <u>Hardware</u> - BULL Micral unit up-dating - High resolution image screen AYDIN (19") - Graphic Printer EPSON FAX 1050 - Serial mouse MICROSOFT - UPS 600 VA ONDYNE - COMPAQ Unit - Micro computer COMPAQ 386/33 - Mathematic Co-processor INTEL 80387 - High Resolution image screen AYDIN RANGER 21 MP (21") - High resolution image screen NEC MULTISYNC 3D (14") - Image Board NUMBER NINE - Graphic printer EPSON LQ 1050 - Thermic color printer TEKTRONIX 4693 DX - Magneto-optical drive RICOH RS-9200II - Tape drive 6250 bpi CIPHER 9000 Series - UPS 2000 VA ONDYNE - Stabilizer 3000 VA SAMLEX <u>Software:</u> - DIDACTIM 3.3/C.1 - RECTAS initial version up-dating - Project module - Subscription - MULTISCOPE 1.3/WINDOWS 3.0. - TURBO PASCAL 5.1. - TURBO C 2.0 <u>Satellite Imagery:</u> - A good number of SPOT HRV multispect. and panchromatic and some LANDSAT TM images available <u>Other Accessories:</u> - Computer Compatible Tapes, diskettes, magneto-optical disk, consumables for peripherals, etc.</p>

TABLE IV: PLANNED FACILITIES

<p>(i) PHOTOGRAMMETRIC EQUIPMENT</p> <p>Acquisition of a MATRA (T5) analytical plotter and the ITC training packages;</p> <ul style="list-style-type: none">- Upgrading 7 existing analog plotters for digital output- Integrated digital mapping system (including videomap, SPOT software, etc.)- Orthophoto system- 3 Intergraph systems (including PC AT, software, x4 digital and A3 format plotter)- 4 Training Packages for Photogrammetric operators.
<p>(ii) REMOTE SENSING EQUIPMENT</p> <ul style="list-style-type: none">- Colour trionics R.S. enlarger- Digital Image Processing Systems- Optical Transfer Device and Pantograph- Miscellaneous equipment (field work tools, mirror stereoscopes, light tables, etc.)
<p>(iii) MISCELLANEOUS EQUIPMENT</p> <ul style="list-style-type: none">- Project vehicles- Teaching materials for general use- Personal computers, and tools, books, atlases, etc.
<p>(iv) CARTOGRAPHIC EQUIPMENT</p> <ul style="list-style-type: none">- 1 Reprographic-master vertical camera- 1 Point light exposure box- 1 UV - exposure box- 1 Cromalin colour proving system- 1 Rapid Access Film Developing Machine- Drawing office equipment- Small Photographic/Reprographic equipment- Aerial Photography Equipment
<p>(v) BUILDINGS</p> <p>Through the Second Five-Year Capital Development Project, we have completed constructing a new Cartographic bloc, a mini-library and Photo-interpretation room for the Centre while three of the existing blocks have been converted/modified and extended to house new photogrammetry, remote sensing and cartographic equipment supplied under the EC project.</p>