

Promoting ISPRS Aspirations in Geospatial technology application in Developing Countries and EReT Cameroon Approach to the International MSc Geoinformatics programs.

Njohjam Peter Naburo, Njohjam Lucas Munju
Environmental Resource Trust (EReT) Cameroon, P.O.Box 475 Buea, South-West Province, Republic of Cameroon
njohjam@vahoo.fr, eretcam@vahoo.fr

Working group VI/1

KEY WORDS: MSc, International assistance, Geoinformatics, Resource Management, Education.

ABSTRACT

Environmental Resource Trust (EReT) Cameroon is a Non Governmental Organization working on the development and promotion of geospatial technology application with headquarters in Buea, South-West Province in the Republic of Cameroon, West Africa.

As an NGO working in a new scientific field with less local experts in this domain, we are building capacity for future experts who will serve in various organizations handling spatial data in Cameroon. It is for this reason that Environmental Resource Trust (EReT) Cameroon is introducing Geoinformatics to undergraduates and graduates students as preparation for the MSc in Geoinformatics offered by foreign universities to be mentioned in this paper. These institutions have fellowship opportunities that they offer to support candidates from developing countries and they have diplomatic representation in Cameroon to facilitate visa acquisition. To achieve this goal in promoting geospatial technology application in Cameroon, many actors have to come into play such as international institutions, national government departments and our local university authorities. Such a program requires a memorandum of understanding in International cooperation and technology transfer to be reached by the host institutes abroad, local universities and the NGO for the establishment of terms of reference for collaboration. Geospatial data management for strategic decision making, introduced by the NGO to national organizations such as Ministerial departments, local councils, health services will be presented.

It is not an easy undertaking to develop a program to be implemented in a university curricular except there is concrete proof of qualified and well trained staff that will ensure the handling of the various courses and the sustainability of the program. This means a new program has to show proof of its success in a previous university before it is introduced to another. This will require the need of visiting lecturers in Geoinformatics, signing of collaboration memoranda with institutions in the developed countries in view of exchange academic visits. Some collaboration agreements already initiated by the NGO will be presented in this paper.

Finally, collaborative work executed using geospatial technology for sustainable development will be presented and the paper will be finalized with a request of partnership in the promotion of geoinformatics education in Cameroon and Africa.

1.INTERNATIONAL ASSISTANCE

This initiative in Cameroon is being encouraged by donors such as Pr.Klaas Jan Beek former XIXth ISPRS congress director (Amsterdam 2000) with the donation of twenty two used computer hardware and peripherals from the International Institute for Geoinformation Sciences and Earth Observation (ITC) Enschede the Netherlands. Mr. Jack Dangermond, President of Environmental System Research Institute (ESRI), Redlands California donated ESRI software, higher education data package (ArcGIS 8, ArcPad, ArcSDE etc) which are used for GIS training in preparation for the MSc in geoinformatics courses abroad. We also use this opportunity to thank Mr.Frank Holmuller ESRI

regional Manager Europe, Middle East and Africa (EMEA) who was assigned to handle our problem by ESRI president and he did it successfully, Since the year 2002 we are a Registered Research Laboratory (RRL) with the Intergraph Mapping and GIS Solutions. The NGO received a donation of ArcGIS 8, Digital chart of the World ArcWorld and necessary documentation on GIS from Environmental System Research Institute (ESRI) California USA. Gift from ESRI President Jack Dangermond who was met after his opening speech at the Amsterdam RAI during the XIXth ISPRS congress. The development of GIS components attached to

local services and higher educational institute will be a point of focus in Cameroon.

2.GEOINFORMATICS STUDIES IN CAMEROON

Land measurements have always been carried through Surveyors' work in the field. The theodolite, compass and the chain were the essential instruments used to acquire land measurements. Today in the third millennium information technology has brought in new methods of data acquisition based on remote sensing, global positioning system (GPS) and geographical information systems (GIS).

In Cameroon about only 1% of the country Surveyors have undergone university education. Most of our Survey engineers have only gained this grade through in-service promotion and further training in international institutions abroad after completing a diploma course. In the same time thousands of graduates are leaving the universities with BSc degrees in mathematics, geography, physics, chemistry, agriculture and other disciplines. Very few of them have knowledge about geoinformatics and its application in geodata management.

It is for this reason that Environmental Resource Trust (EReT) Cameroon developed the awareness program in Geoinformatics as a prelude to create new jobs opportunities and for the entrance into the International MSc Geoinformatics program in foreign universities abroad.

In this program they are shown the various fields in which geoinformatics is applied. It was realized that since this is a new field in developing countries, only few organizations are using this technology apart from international organizations working on bilateral agreement in the country. These include organizations such as the GTZ, WWF and DFID in their natural resource management program, the United Nation Development program (UNDP) in the mapping of aid assistance sites.

It has been very challenging to present a new subject to an audience which is almost ignorant about it.

Posters were pasted calling for university graduates to register for the geoinformatics initiation program. Twenty five graduates were registered for the program amongst who three female graduates.

Since all the students were versed with Cameroon, it was easy to take local geographic locations to explain the use of GIS because all the data available in our office is from foreign countries.. Although we are still facing a hardware problem for the installation of this program, the students are shown demo CDs dealing with photogrammetry, remote sensing and GIS.

Through these demonstrations, students are encouraged to undergo remote sensing with specialization in their field of study at under graduate level.

Before any development or project is carried out, there is a need for data acquisition to be transformed into usable information.

How ever, Environmental Resource Trust (EReT) Cameroon with its library of books and CD-ROMs on geoinformatics is always at the assistance of the students to guide them through the GIS documentation as well as the software.

Upon graduation from the university, many Cameroonians have not yet found the possibility of changing their lives with a postgraduate course in Geoinformatics. The role of EReT Cameroon is to encourage university graduates to follow a Master degree in Geoinformatics at any of the universities listed in the directory. Most of the students in the NGO are attracted by the programs since they found that with any scientific degree, one is eligible to follow the MSc program.

To introduce it to the students, each of them was requested to summarize his/her thesis so that we can jointly see how geoinformatics can be applied in it for timely decision taking.

The following BSc topics were studied:

- The effect of water pollution to the environment in the Kumba municipality.
- Study of the Geology of Manyemen village.
- The effect of Spontaneous hawkers markets within the Bamenda urban area.
- Geomorphology of the Sabga hills in the North West Province of Cameroon.

Each topic was analyzed and the location town considered as the study area. The various thematic layers were identified and classified according to usage. From the first topic, water is an indication for linear or polygon feature, the municipality constitute a polygon feature, point features for buidings types, roads and utility lines are linear features.

Many types of pollution originate from sources such as organic, industrial, chemical, mining etc, which are located at certain points along the river flowing in the municipality. This implies that the toxicity of the river water is not the same at all the points. Using GIS, the prediction of an epidemic can be shown where the amount of pollution is seen to be very high. This begins exactly where the river has covered a long distance through all the various

types of waste. The development of a spatial query based on the buffer operation in ArcView GIS will determine the areas of high epidemic spread. The results of the research can now be used to plan for the intervention strategy. This will enable the public health department to dispatch an emergency intervention team at the shown highly polluted localities.

The introduction of Geoinformatics to university graduates by EReT Cameroon has developed a new direction of orientation in the sense that these graduates now visit web sites dealing with GIS, photogrammetry, remote sensing, mapping etc. They are more concerned with a variety of workshops, seminars, symposium and conferences worldwide dealing with Geoinformatics. The bio-diversity conservation project of the botanical garden in Limbe Cameroon requested the position of a BSc degree holder in Geography with some knowledge in GIS. Many graduates attended the interview but non was selected because they hadn't any GIS experience.

This creates concern for them to follow postgraduate courses in Geoinformatics such as those offered by the Stuttgart University and the International Institute for Geoinformation Sciences and Earth Observation (ITC) The Netherlands. These institutions have tailored their courses to the need of developing countries.

3. GEOINFORMATICS APPLICATION TO THE CHAD – CAMEROON PIPELINE PROJECT.

This is a 1070 km long pipeline project for the evacuation of crude oil from the Republic of Chad to the Atlantic coastal town of Kribi in the Republic of Cameroon. This project was used as a case study for the students in the NGO. The application of remote sensing was used at the initial stage for mapping the proposed pipeline track. Aerial photography was carried out by Maps Geosystems of the United Arabs Emirates under a contract from the Exxon oil mining company.

All geographic entities such as settlements, rivers, plantations, forests, road network and savannah was mapped as thematic layers by interpretation of the aerial photographs based on their spectral signatures and ground truthing with the GPS. The altimetric data was used to generate a DTM to enable the visualization of excavation cost of the pipeline trenches and minimizing the destruction of natural habitat. A multidisciplinary team was dispatched to the project areas for socio-economic surveys, wildlife, botany, agriculture, ecologists, geographers, and cartographers.

From existing data some fragile ecological sites were avoided in order to maintain their natural biodiversity and the buffer operation was used to estimate the total area of land occupied by the project.

4.GEOINFORMATICS INITIALISATION PROGRAM AT EReT CAMEROON

4.1Computer Basics

-Introduction to basic computer programs (Windows, MS Words, MS Excel, MS Publisher, MS Access).

-Drive A demonstrations.

-Drive C demonstrations.

-How to use CDs.

-System connections.

-Assessment

4.2Introducing Geoinformatics,

-What is Geoinformatics

- Related terminology: Remote Sensing – Global Positioning System (GPS), Land Information System (LIS) –Landuse

Planning (LUP) Environmental Impact Assessment (EIA) and photogrammetry.

- Case Study
- Assessment

4.3 Remote sensing

- What is Remote Sensing
- Sample Remote Sensing Processes
- Electromagnetic Spectrum (wave length ,frequency etc)
- Satellite imagery (Types of images, SPOT , Landsat , SAR , RADAR , IKONOS)
- Remote Sensing applications to environmental conservation
- Case study within Cameroon locality
- Assessment

4.4 Geographic Information System (GIS)

Introductory Lessons to GIS.

What is GIS .

Questions GIS can answer.

Components of GIS.

Data linkage.

Data Automation (Digitizing, Scanning,).

Different GIS Softwares.

Field trips to GIS organizations (CAMGIS, Limbe botanic garden, The Tropenbos Project Kribi)

Sample application of GIS in Cameroon

Case study (In relation to student's BSc research work)

4.5 Using a GIS

Careers with GIS applications.

Geoinformatics M.Sc. degree programs in European Universities.

Job positioning in Cameroon and abroad with GIS (Ministry, Municipalities, NGOs etc)

The governments of Germany and the Netherlands are supporting these MSc programs by granting scholarship such as the DAAD for studies in Germany, university of Stuttgart and the Netherlands Fellowship Program (NFP) granted by the Dutch government.

For the promotion of Geoinformation sciences in developing countries, we will request these institutions to be flexible in the selection procedures by allowing some direct universities graduates from developing countries to be admitted in the MSc program without the required professional experience. Reason being that no institution in many developing countries offers Geoinformatics courses to enable them gain the experience. Another setback is the English language test which is sometimes required from students who have followed their studies in English from the primary to university level. A country like Cameroon is considered French speaking whereas one part is English speaking and the other one French speaking. That is why the country is in the Common Wealth and Francophonie. The cost of the English proficiency test is high and hinders the participation of many Cameroonian students from international courses.

5 GEOINFORMATICS IN THE NATIONAL ADVANCED SCHOOL OF PUBLIC WORKS

The Survey department of the National Advanced School of Public Works is using mechanical theodolites for land measurements. No electronic instruments exist in the school and there is a need to introduce electronic instruments such as the distance meter, the GPS receiver. Cartography and photogrammetry are still taught in theory.

As a first step in Geoinformation development in the National Advanced school of Public Works Annex Buea in the Republic of Cameroon, we contacted the Director of the School and proposed the introduction of GIS in the school program. He has never heard of a geographic information system so the NGO has to explain what the GIS does and the advantages it offers in spatial data management for sustainable development. With its four departments namely: town planning, land surveying and cadastre, civil engineering, and rural engineering, there was a need to know which school department should benefit from the program . It was concluded that the town planning, cadastre and rural engineering departments should have a GIS course in their curriculum. These departments operate directly with data located on the earth surface and which positions can be defined in x,y,z coordinates. Presently some instructors are teaching GIS while expecting a better training in future. The Provincial Service of Surveys is applying a computerized system for the production of cadastral plans using the AutoCAD software. This is a personal initiative of the Provincial Chief of Service surveys Mr. Mbella Simon Mwambo who is actually developing a digital cadastral database for South-West Province. This initiative is highly recommended, as there are plans to tie all the cadastral plans to the UTM coordinates systems. This enable cadastral plans to be sent through the internet for a global use.and to avoid an overlap of land parcels in the cadastral database

6.RECOMMENDATION TO ISPRS COMMISSION VI PRESIDENT

The International Society of Photogrammetry and Remote Sensing (ISPRS) commission VI should seek further means of securing fellowship opportunities for participants from developing countries to follow MSc courses in Geoinformatics in order to enable the teaching of this discipline by nationals of the countries concerned in higher institutions of learning

As a continuous effort to promote geospatial education, regular fellowship programs should be reached with institutions in developed countries and funding organizations to support selected candidates from developing countries as defined in international co-operation.

We are proposing that the ISPRS commission VI President Dr. Maria Sausen Tania elaborates with the ISPRS Council a strategy to secure sponsorship from donor organizations so that scholarships could be directly offered to NGOs in developing countries dealing with Geoinformatics who will now nominate candidates for the required program. This process will facilitate the promotion of Geoinformatics since a potential candidate can be chosen among the Resource Counterparts in the NGO, staff of the collaborating academic institutions directly involved in the program. The NGO will now work in collaboration with the beneficiary institution to maintain the sustainability of the program.

Some prominent geoinformation equipments manufacturers such as Leica Geosystems are changing away their mechanical / electronics survey equipment to Global Positioning Systems (GPS), we would request that the ISPRS Commission VI President negotiates with Mr. Hans Hess Leica Geosystem President and CEO to help NGO

in developing countries with some of these used electronic spatial data acquisition equipments for educational purposes. Some total stations are partially computerized and some are robotic such as the bifocal total station displayed by Leica Geosystem during the exhibition at the XIXth ISPRS congress in Amsterdam are some of the innovations in spatial data acquisition. We have been

introducing such instruments to students using the illustrations in the GIM international magazine. It will be our high esteem to receive such hardware for surveying and earth observation from these big companies as a tool for training and research in developing countries.

References

Chapman & Hall, 94 Mapping the Diversity of Nature
FAO Development Series 1, 93 Guide lines for Land-use Planning
Lawrence Lethan 98 Using Global Positioning Systems in the out doors
CORDIS RTD-PROJECTS / © European Communities.
Njohjam 2002 ,EReT annual report