

TIGER CAPACITY BUILDING FACILITY: GROWING FROM PROJECTS TO PROFESSIONAL COMMUNITY

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ABSTRACT:

Water security has become one of the most important challenges in the sustainable development of Africa, but only limited reliable information is available on the use and availability of water to support adequate planning and management of water resources. Data acquired from space can contribute to meet the urgent information need. But to satisfy the demand, a good synchronization based on a shared knowledge is required between water managers, who can indicate their specific information needs; developers of the satellite-based data, who can indicate what information can be provided; and the knowledge institutes, which transfer their knowledge on collection and dissemination of the information to users. In other words, a continent-wide capacity is needed to utilize Earth Observation (EO) technology.

In the context of the Committee of Earth Observation Satellites (CEOS), ESA launched the TIGER Initiative in 2002 as a concrete action to match the resolutions of the World Summit on Sustainable Development held in Johannesburg. The initiative aims at assisting African countries to overcome problems faced in the collection, analysis and dissemination of water related geo-information by exploiting the advantages of EO technology. The first phase was completed in 2008, which contained a capacity building facility (TCBF) that supported about 100 individuals from more than 20 institutions all around the continent with training at various levels and methods:

1. Basic education, provided via distance learning.
2. Tailored short courses, selected according to the research interest and technical background of the participants.
3. Research topic oriented supervision, provided by specialists of the research fields of the participants.
4. Advanced short courses focusing on selected earth observation techniques.

ITC implemented the TCBF. Today we are in the second phase of the TIGER Initiative (TIGER II), which aims to build upon the success of the first one. TCBF II is implemented now by a consortium of four partners (ITC, TU Delft, VITO and ISEGI-UNL), with the aim of supporting 20 research projects and establishing 3 Regional Offices in the time span of 2009-2012. They support African efforts to develop sustainable observation systems by using EO technology to learn more about the water cycle and to improve water-monitoring resources that will help to establish sound scientific bases for developing effective adaptation or mitigation measures against the impacts of climate change. The TCBF focuses on the research component of TIGER II that supports African scientists furthering their scientific skills and the technical capacity to address the issue of the water resources in Africa.

The second phase is more complex than its forerunner, although the applied capacity building tools are similar to the first phase. For example, the first training course on earth observation basics was held in Cairo in April 2010. Twenty three participants were supported by the TIGER programme, and another eleven joined using their own resources.

There is a larger variety of participating institutions, from universities to regional water authorities. It is a very important aspect that several projects address trans-boundary issues with multinational staff. The participating institutions and regional offices get free access to ESA satellite data. A large number of training activities are being implemented with the aim of broadening the EO literacy among the information users, i.e. the water practitioners, and providing higher academic qualifications to the key players in EO research and education, to enable them to teach new generations of EO specialists and users in Africa. Besides capacity building, these activities contribute to building a community that unites the users of earth observation technology for water applications around the continent.

1. INTRODUCTION

1.1 Information gap in water management

It sounds like a commonplace statement, but it is sadly true: water is becoming one of the key environmental issues in the

upcoming decades. Especially in Africa, the continent that shows the most extremes in its occurrence, distribution and availability; from the ice cap of the Kilimanjaro to the Hammam Chellala hot springs in Algeria as well as from the Namibian Desert to the humid tropics of Congo. Water security has become one of the most important challenges in the

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sustainable development of the continent, but only limited reliable information is available on the use and availability of water to support adequate planning and management of this resource. In Africa, the in situ measurement network has never been developed to an optimal level, but in the last decades, it even declines, e.g. during the nineties it fell by 90% (Brown 2002), a dramatic loss.

Data acquired from space can contribute to meeting the urgent information need. A good synchronization based on a shared knowledge is required to satisfy the demand between the water managers, who can indicate their specific information needs; the developers of satellite-based data, who can indicate what information can be provided; and the institutes, which transfer the knowledge on generation and dissemination of the relevant information to the users. In other words, a continent-wide capacity is needed to utilize Earth Observation (EO) technology that can contribute to closing the information gap in water management.

1.2 TIGER Initiative to address the information gap

In support of the water sector in Africa and in the context of the Committee of Earth Observation Satellites (CEOS 2005), ESA launched the TIGER Initiative (ESA 2008) in 2002 as a concrete action to match the resolutions of the World Summit on Sustainable Development held in Johannesburg (United Nations 2002). The initiative aims at assisting African countries to overcome problems faced in the collection, analysis and dissemination of water related geo-information by exploiting the advantages of EO technology.

2. RESULTS OF TIGER I

In 2010, we are in the second phase of this initiative. The first phase was completed in 2008, which contained, among others, the TIGER Capacity Building Facility (TCBF) run by the International Institute for Geo-Information Science and Earth Observation (ITC)¹. The main goals of the facility were to provide training and supervision based capacity building and ESA data to the projects in support of their research work.

2.1 TIGER Capacity Building Facility (TCBF) results in Phase I

The programme supported about 100 individuals from more than 20 institutions all around the continent with training at various levels and methods (ITC and ESA 2006). One individual could participate in more than one course:

1. Basic EO education, provided via distance learning (33 trainees on 2 courses).
2. Tailored capacity building programme based on short courses in ITC as well as in the form of distance education (DE), selected according to the research interest and technical background of the participants (23 trainees on 33 courses in face-to-face and 14 trainees on DE courses).
3. Research topic oriented supervision in ITC, provided by specialists of the research fields of the participants (21 researchers).

¹ ITC has joined the University of Twente as a faculty in January 2010, so it is called now Faculty of Geo-Information Science and Earth Observation.

4. Advanced short courses focusing on selected earth observation techniques, held in Africa (51 participants).

Activities 1 and 2 involved the participants in courses given on the “open market”, i.e. the TIGER trainees were mixed with other, “regular” participants. Activities 3 and 4 were dedicated to the TIGER programme. Trainees from 22 countries were the beneficiaries of the capacity building activities, representing 13 projects. Most of the projects were involving more than one institution.

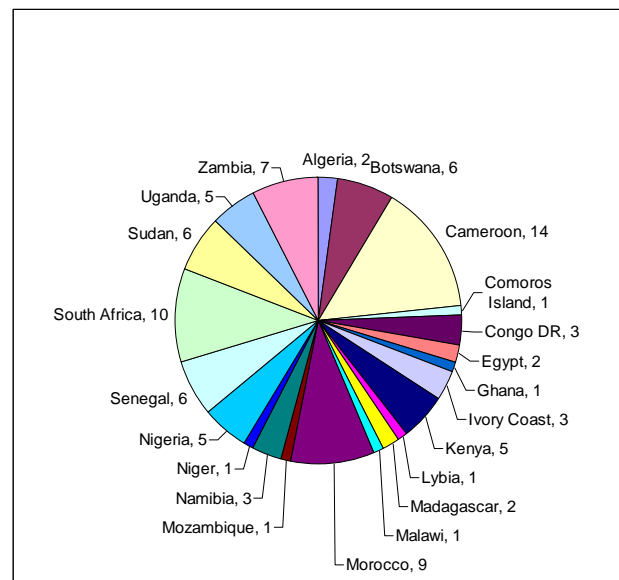


Figure 1 Distribution of the number of trainees by countries in TIGER CBF I.

2.2 Lessons learnt

In all activities, feedback was asked from the participants and the lecturers by the organizers to prepare evaluation reports. The most important findings are summarized in the following.

2.2.1 About basic EO training via distance education

- a) There is a large need among water professionals for basic EO training.
- b) The largest drop-out rate was experienced in distance education: more than thirty percent of the enrolled participants quitted the course before completion. This rate was still better among the TIGER trainees than the others, showing a strong commitment in the TIGER community.

2.2.2 About the tailored capacity building programme

- a) In the higher level DE courses the drop out rate was less than 10 %.
- b) The background technical/scientific knowledge of the trainees in such a programme is very diverse, so the tailored (flexible) planning of the capacity building programme is of utmost importance.
- c) A TIGER team spirit was developed during the stay of the trainees at ITC.

2.2.3 About the supervision of the TIGER projects

- a) The supervision time is rarely enough.
- b) The preparation from the project's side for the face-to-face supervision is extremely important. In some

cases data acquisition and pre-processing used up a large part of the supervision time.

- c) The supervision must not stop when the face-to-face part ends; it has to be extended to the exploitation of the results (e.g. publishing).

2.2.4 About advanced short courses held in Africa

- a) These short courses are mostly eye-openers for the participants.
- b) Giving such courses on the premises of leading African institutions:
 - contributes to the courses with local examples and expertise;
 - contributes to the institutions with the most advanced material and knowledge.
- c) The academic community of Africa needs short courses to get information about the advanced scientific developments.
- d) The EO product user community of Africa takes advantage of such courses for the better identification of the user needs.

2.2.5 Lessons learnt for Phase II

- a) The most advanced EO techniques can help in the less developed countries with the highest efficiency, but these are the countries where the need is the highest for capacity building.
- b) Short courses are not enough, more formal education is also needed in the academic community of Africa (e.g. degree courses at MSc and PhD level).
- c) On-the-job training is the most welcome by many of the participants. This is in a virtual contrast with another observation: trainees can concentrate on the project research better when they are separated from their daily environment.
- d) Further involvement of water practitioners in the programme is needed. They are not informed enough about the possibilities offered by earth observation technology.
- e) Proper embedding of TCBF is needed in the local institutions in terms of facilities and mandate.

2.3 Scientific output of Phase I

The best measure of the success of TIGER Phase I is the scientific quality of the project results. Thus, the Capacity Building Facility supported publishing the results, for example, by helping the researchers in presenting them at conferences. A great success was achieved by Ahmed er-Raji from Centre Royal de Teledetection Spatiale Morocco, who presented the results of the TIGER research project Integration of Earth Observation Data within a Probabilistic Approach for Groundwater Prospecting in the Arid Zone of Anti-Atlas, Ighrem-Morocco: his presentation was voted best from other 67 high quality oral presentations at the AARSE 2008 conference and attracted the prestigious AARSE award.

A good overview of the most important achievements is given in a book (UNESCO 2010), which contains articles from many of the projects supported by the TIGER CBF I.

3. TIGER CAPACITY BUILDING FACILITY II

Today we are in the second phase of the TIGER Initiative (TIGER II), which aims to build upon the success of the first one, consisting of two components: one focusing on water

management and the other on research. The Capacity Building Facility (TCBF II) is implemented now by a consortium of four partners: 1.) ITC and 2.) Technical University Delft (TUD) in the Netherlands; 3.) Flemish Institute for Technological Research, VITO in Belgium and 4.) Institute for Statistics and Geo-Information, Universidade Nova de Lisboa, ISEGI-UNL in Portugal, to support the research component of the initiative that supports African scientists in furthering their scientific skills and technical capacity to address the issue of water resources in Africa.

3.1 Major activities of the TIGER Capacity Building Facility II

Twenty research projects get support in the Capacity Building Facility and 3 Regional Offices (AGRHYMET Regional Centre in Niger, Regional Centre for Mapping of Resources for Development, RCMRD in Kenya and Water Research Commission, WRC in South Africa) are established in the time span of 2009-2012. So, as in Phase I, the TCBF supports African efforts to develop sustainable observation systems by using EO technology. Learning more about the water cycle and improving water resources monitoring will help to establish sound scientific bases for developing effective adaptation or mitigation measures against the impacts of climate change.

The daily activities of the consortium focus on the direct support of the TIGER projects and the TIGER Regional Offices:

- ESA's Data Dissemination System is provided for all those who have limited access to ESA data disseminated through the Internet, or need (quasi-)real-time data.
- All the supported partners are entitled to get ESA and third party data.
- The CBF holds training sessions in different parts of Africa.
- The TIGER research projects take part in tailored capacity building activities, similar to Phase I. A very important element of this activity is the scientific supervision: each project has a supervisor, who monitors and supports the research throughout the life span of the CBF. Furthermore, the same training types (sort courses, distance education, on-site training, etc.) are available for the projects as were in Phase I.
- A new element in Phase II is the tailored capacity building for the TIGER Regional Offices. The focus here is on the establishment of a Regional Water Information System to provide relevant data for water resource managers at a routinely basis.

An important part of the activities are communication and promotion. This includes:

- Development and maintenance of a web site.
- Editing and distributing a newsletter.
- Supporting the teams with the best results to attend scientific conferences.
- Coordinating a special TIGER issue of an international scientific journal.

Unfortunately science and capacity building cannot exist without money, so resource mobilization is a continuous task for both the consortium and the Regional Offices:

- TCBF coordinates joint proposals on R&D calls.
- In spite of the enormous demand, degree courses cannot be directly financed by TCBF, but all members

are encouraged to apply for fellowships for degree courses (MSc, PhD).

3.2 Research fields

The research projects cover various fields within the water sector. Some examples are:

- Local water/environment management issues (e.g. projects in Egypt and Madagascar).
- National water resources (Zambia and Congo).
- Trans-boundary flood monitoring and mitigation (Namibia).
- Water resources and management issues in international water basins (like the Lake Chad Basin and the Volta Basin).

4. A CONCLUDING REMARK

As it is outlined above, the TIGER Capacity Building Facility focuses on projects and regional offices, but aims at being useful for the whole Water Community of Africa. Therefore, TCBF is a partner for all stakeholders of the African Water Sector by being an engine for capacity building and developing joint proposals for projects and activities in the utilization of Earth observation. The projects and regional offices are focal points of development and dissemination of EO technology. This is how we can build an African cross-border professional community.

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