

TIGER

Earth Observation for Integrated Water Resources Management

Space – Water – Africa

Plan of Implementation

(DRAFT for Discussion)

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1 Introduction

Space-based techniques have received considerable recognition at the Johannesburg World Summit on Sustainable Development (WSSD), which resulted in a number of concrete recommendations on how space can be used for sustainable development. To turn words into action, the European Space Agency (ESA) has launched, in the frame of the CEOS WSSD Follow-up Programme adopted in November 2002, a new initiative that focuses on Earth Observation for Integrated Water Resources Management in Africa, called the TIGER Initiative.

In this context, a close cooperation has been established with UNESCO. The TIGER Initiative will also contribute to the achievements of the objectives of the UNESCO IHP-VI “Water Interactions Systems at Risks Social Challenges,” 2002 to 2007 programme, which aims at supporting the African countries to better manage their water resources.

TIGER comprises two major elements: (i) a set of individual demonstrator projects with a limited geographic coverage and scope, which are “building blocks” of (ii) the political process, which aims at developing long-term, large-scale, sustainable information services for better decision making through the involvement of financing institutions and other partners who have a long-term strategic mandate related to development issues.

2 TIGER Objectives

The overall aim of TIGER is to facilitate the integration of space information and technology in hydrological and hydro-geological practices through:

- coordination of relevant projects and activities in water resources management where space data can be a useful improvement to current practices
- the provision of Earth observation data, capacity building and technical support in the development of Earth observation projects

This will be facilitated by providing and facilitating access to space data for water resources management. The TIGER Initiative has two lines of activities, as illustrated in Figure 1—one of a political nature and one of a technical nature, namely:

- *Providing political visibility through coordination*

The TIGER Initiative will serve as a political platform for the implementation of the WSSD Plan of Implementation in order to respond to the key NEPAD objectives, i.e., to reduce poverty and ensure food security. TIGER should contribute to the political willingness to develop mechanisms for sustainable services in Africa and initiate institutional contacts with organisations, which have a mandate for sustainable development.

- *Demonstrator Projects*

Within the TIGER Initiative, a number of individual demonstrator projects are (and will be) launched to develop prototype pre-operational services for water resources management. In

addition, TIGER will provide support to technology transfer and capacity building to accompany the demonstrator projects.



Figure 1 – TIGER’s twofold objectives

3 TIGER Implementation and Projects Selection

The TIGER Initiative will be implemented through a number of individual projects selected, funded and managed by the TIGER Partners. These Partners are initially ESA and UNESCO, which will hopefully be joined by additional organisations. At this stage, some organisations have already expressed concrete interest in joining TIGER, namely, CSIR/SAC in South Africa, ITC in the Netherlands, CSA in Canada, and JAXA in Japan and CRTS in Morocco. Other organisations are expected to join in the near future. Participation in TIGER is principally open to new contributors, provided that they add value to the Initiative.

Projects having the “ TIGER label “ will benefit from a number of advantages including:

- privileged access to Earth observation data
- support to capacity building and transfer of know-how
- support to training and education activities
- provision of scientific expertise (algorithm/model development)
- benefits through coordination of similar activities across Africa
- support to approach donor organisations and raise funding for follow-up activities

There are two categories of TIGER projects:

a. Projects initiated and funded by ESA with the scientific support of UNESCO

Each ESA project will be executed via an implementing consortium supervised by an ESA technical officer assisted by a user group. The selection of the implementing consortium will follow standard ESA procedures (Invitation To Tender to European industry) together with a close involvement of African users and organisations.

b. Projects initiated by candidate partners interested in using the TIGER name

The selection of these projects will result from a Call for Proposals released by the TIGER Partners to the African authorities responsible for and/or involved in water resource management. Proposals are evaluated according to their scientific and technical quality, level of maturity, user involvement, availability of in-situ data, and support from local and national authorities. Such projects would remain the property of the initiators and be implemented according to their specific rules and practices.

The schedule currently envisaged assumes the release of the ESA Aquifer ITT and of the Partners' Call for Proposals in February/March 2004 and proposals received by end of April. The results of the selection will be announced in mid-2004 for a start of the selected projects in the second half of 2004. Additional calls for proposals may be issued at a later stage, as appropriate.

4 Data Access and Utilisation

An essential point must be clarified at the start of the TIGER Initiative, namely, the conditions for access and utilisation of Earth observation data required for the implementation of the individual TIGER demonstrator projects. These conditions will vary depending upon the nature of the data (in situ, space), the origin of the data (local or regional, ESA space data, non-ESA space data) and the associated data policies defined by distributors or data owners.

So, for each demonstrator project, the technical officer, in close cooperation with local African partners, will establish an initial Earth observation data procurement plan. This procurement plan will be updated regularly together with the associated financial requirements.

It is assumed that local in-situ data will be made available free-of-charge or at marginal costs by African authorities. If required and justified, since the collection of ground data could be costly, some financial provision (level to be defined) may be foreseen to cover the expenses incurred by these tasks.

For ESA-funded projects and TIGER-labelled projects requiring ESA Earth observation data, these data will be provided, according to the ESA Data Policy, free-of-charge or at cost of reproduction during Phase 1. For the operational Phase 2, the conditions and prices for ESA Earth observation data will have to be negotiated with the distributors appointed by ESA for the operational or commercial utilisation of these data. A specific budget will have to be allocated for this procurement.

For non-ESA space data requirements, specific conditions will have to be negotiated with the appropriate space agency or data distributor and these conditions may vary according to the data policies in place. Some agencies, i.e., JAXA and CSA, already indicated that TIGER projects would receive Earth observation data at no cost, or under privileged conditions.

5 Work Plan

5.1 Activities during 2003

During 2003, TIGER made significant progress. A working meeting held in May 2003 in Paris identified a number of areas (see Reference note 1) where urgent action is needed for Africa. The main stakeholders, comprising users, providers and sustainers, have agreed on the identification

of the main topics to be addressed, namely wetland monitoring, ground-water resource management as well as food security. Other topics may be added over time. They agreed on a two-phase approach, within which Phase 1 (until end 2005) serves to demonstrate the usefulness of Earth observation for integrated water resource management to African decision-makers and users, while Phase 2 engages major donor and development agencies to turn the successful demonstrator projects into major development programmes. The use of space technology, it was identified, can take a quantum leap in developing countries, if applied appropriately. Capacity building was identified as a key issue and should require special attention.

To move the process forward in a pragmatic manner, ESA has already initiated demonstrator projects and plans to allocate more resources for additional ones, where appropriate. These projects cover the priority topics identified at the Paris meeting and confirmed at the Rabat meeting in October 2003. The total amount allocated or committed by ESA during 2003 is in the order of 4 million euros for the above-mentioned projects. In addition, expenses related to the running of the TIGER Secretariat and the organisation of TIGER meetings (Paris, Rabat) have been covered.

UNESCO is contributing to the TIGER Initiative by providing scientific leadership on water related issues, facilitating the exchange of information and the cooperation with hydrologists and water institutions. UNESCO will particularly focus on the development of training and education material.

5.2 Phase 1 (2003 to 2005) Activities

Phase 1 will focus on the selection and implementation of a number of individual pre-operational projects providing information services based on Earth observation technology, which support national and local authorities responsible for water resource management. These demonstrator projects will address a limited geographical coverage (sub-regions and/or countries) during Phase 1. However, they should constitute the basis for the definition and preparation of a more comprehensive Phase 2. Phase 1 will also identify possible mechanisms, including resources, to ensure the long-term continuity of these pre-operational services.

(i) Political/coordination activities

The Executive Secretariat, under guidance of the TIGER Board, will cover a number of policy and institutional aspects including:

- Establishment of contacts with donors (World Bank, African Development Bank, EU Development Aid, etc.) and support in negotiations with donors/funding organisations to ensure long-term sustainability of services
- Regular dialogues/meetings with national African authorities and African regional organisations (NEPAD, AMCOW, regional secretariats, etc) to ensure political support for TIGER and to institutionalise projects when successfully demonstrated
- Organisation of events such as workshop, symposia, etc in order to provide a platform for better coordination and dissemination of relevant information.

(ii) Demonstrator projects

For each TIGER service the following tasks will be performed by the implementing consortium with the support of the TIGER user group whenever appropriate:

- definition and consolidation of user requirements through regular consultations with the user group
- detailed definition of technical specifications, processing chains, processing algorithms, requirements for Earth observation and in situ data, required models.
- engineering design, prototype generation and validation (for each product and service)
- implementation of demonstrated services including communication, data transfer aspects, etc.
- quality assessment (performance monitoring, validation, acceptance) for each product or service

A number of “horizontal” activities will be performed at two different levels, namely:

- at the level of the overall TIGER initiative with the support of the Secretariat
- at the demonstrator project level with the support of the implementing consortium.

These activities will cover important aspects such as:

- promotion (Web site, CD-ROM, conferences/workshops)
- training (preparation of a training plan, user handbook)
- management (preparation of a management plan, monthly progress reports, final report, project meetings, reviews, etc.)
- technical documentation on product performances, quality, accuracy.
- setting up of a data base with reports, information on services/products, on local and national authorities involved in the projects.

(iii) Deliverables

Deliverables will consist of two main parts:

- Reliable and viable mechanism(s) aimed at developing mechanisms for long term sustainability of the demonstrated TIGER services and products at the end of Phase 1;
- Prototype pre-operational services and products validated by the TIGER User groups and ready to move forward to a truly operational stage.

5.3 Phase 2 (2006 onwards) Activities

Phase 2 should expand proven services from Phase 1 to other regions and countries in Africa and further promote the results of Phase 1 within the user community as well as to decision-makers, demonstrating the potential for the integration of Earth Observation derived products and services within traditional procedures. This implies the transfer of appropriate technology and know-how through the provision of training and capacity building. A permanent dialogue with

user organisations is essential and will be maintained to improve the quality of existing services and identify new ones.

The precise content of Phase 2 will be defined at a decision point in the course of 2005 on the basis of Phase 1 results, the position and views of African local and national authorities, of potential donors, etc. A key criterion is the prospect for sustainability of selected services.

6 TIGER Management Approach and Resources

The high-level management structure proposed for TIGER is illustrated in Figure 2. It includes the following major components:

- A TIGER Board
- An Executive Secretariat
- Individual Demonstrator Projects

For each selected individual project, the following structure is recommended:

- A Technical Officer to supervise the implementation of the project
- A User Group to assist the Technical Officer
- A Technical set-up (consortium or others) in charge of the implementation of the project

TIGER Structure

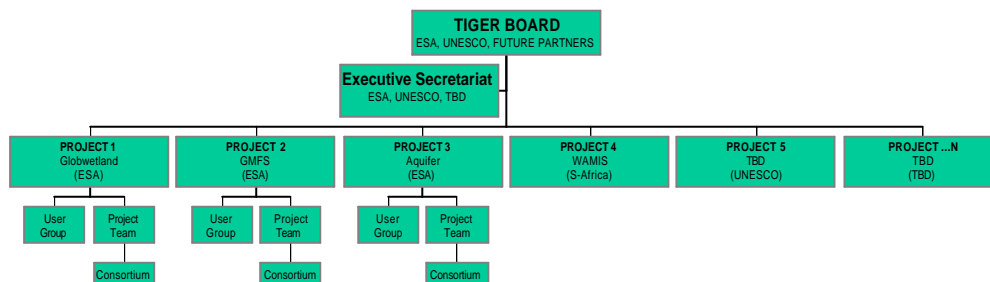


Figure 2- Tiger structure

A brief description of the role and responsibilities of these various building blocks is given in the following sections.

6.1 TIGER Board

A Board, of limited size (10 to 15 people maximum), will be set up in early 2004. The membership includes representatives from the three main stakeholders, namely Providers, Users and Sustainers. Acknowledged scientists/experts in the field of water resources will also participate to assure a high quality of TIGER products and services. This Board will meet

regularly (typically twice a year) to review progress, provide advice to the Executive Secretariat and promote TIGER activities and results in their respective communities. The Board will also assist the project-funding organisations in identifying mechanisms to approach donor organisations in order to ensure long-term sustainability of services.

6.2 Executive Secretariat

The TIGER Initiative will be implemented and monitored under the joint management and leadership of the TIGER Partners covering all scientific, technical, managerial, financial and political aspects. At the first TIGER Working Meeting in Paris, participants recommended that ESA/UNESCO consider setting up a small Secretariat as the main body to carry out administrative and managerial tasks required for TIGER. A TIGER Executive Secretariat, led by a TIGER Coordinator, will be set up in early 2004 and will be responsible for the following main tasks:

- main interface between TIGER partners (TIGER Board) and TIGER actors (project implementers)
- coordination and increase of synergy between TIGER projects
- preparation and presentation of regular reporting on technical, programmatic, financial and administrative aspects of the individual projects (on the basis of inputs from Technical Officers) to TIGER Partners and TIGER Board
- preparation of all preparatory activities (documentation, contacts, meetings...) required for the establishment of political liaisons with key African partners, donor agencies and development organisations in order to identify mechanisms for long term sustainability of TIGER services
- organisation of regular regional and sub-regional events (conferences, workshops)

A *decentralised structure* for the Secretariat is preferred and a permanent TIGER Coordinator, with an appropriate small administrative support, will be appointed to act as the focal point of contact for the external world and ensure daily operations of the Secretariat. A strong involvement of African representatives and TIGER stakeholders in the Executive Secretariat will be ensured.

6.3 User Group(s)

One of the important characteristics of all TIGER projects is that they are user-oriented projects. A user group, composed of local, national or regional experts in water resources management, will be set up at the start of each demonstrator project and will assist the technical officer throughout the definition and implementation of the project.

The national water authorities will be responsible for coordinating the efforts of the local authorities and hence will represent the interface between the funding organisation (or representative), the implementing consortium/technical officer and the local authorities.

The user group will be responsible, in particular, for the:

- definition and consolidation of user requirements (before end of Phase 1)

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- collection of in situ data and appropriate ground truth data according to guidelines provided by the Technical Officer (before end of phase 1)
- support to the implementing consortium and Technical Officer in the interpretation and validation of the final geo-information products (before end of phase 2)
- final acceptance and commissioning of the information service from a user perspective (before end of Phase 2)
- production of a final assessment report including benefits resulting from the service from the point of view of an operational user

6.4 Financial resources

Most of the funding required for TIGER Phase 1 activities will come from ESA, UNESCO and TIGER Partners according to their specific funding mechanisms and rules. Donor agencies (World Bank, Regional Development Banks, European Development Aid, etc.) will be progressively involved in TIGER with the aim of proposing some of the TIGER projects for further consideration, particularly those that are technically successful and meet the priorities of the donors as well as those of the African countries. It is obvious that the African user organisations and governments will be the main actors in developing any long-term funding proposals.

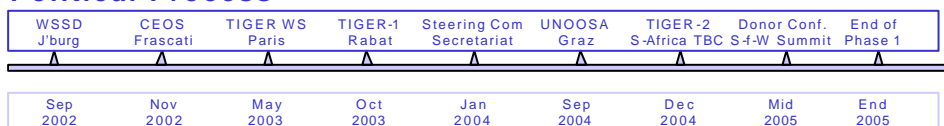
Funding for Phase 1 will cover the costs (manpower, travels, procurement) for implementing organisations or consortia, African partners, the TIGER bodies (Board, Executive Secretariat), etc. The funding allocated to Phase 1 is considered to be seed money to prepare the fully operational Phase 2, for which mechanisms and donors will have to be identified to ensure long-term sustainability. Involvement of the private sector will also be explored in Phase 2.

7 Schedule and milestones

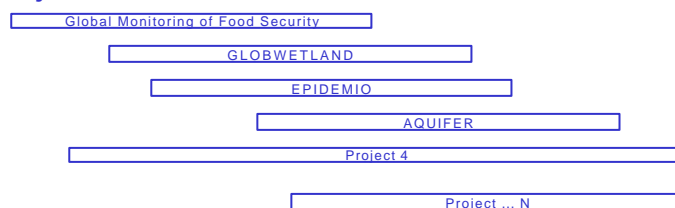
A tentative schedule for the implementation of TIGER Phase 1 is provided in Figure 3.

TIGER Time Schedule

Political Process



Demonstrator Projects



This schedule identifies major milestones for the:

- political process, including the setting up of the TIGER Board and Secretariat in early 2004, an UNOOSA Event in Graz in September 2004, the second TIGER Workshop in South Africa in October 2004, a Donors Conference and a “Space for Water” Summit in 2005
- TIGER demonstrator projects already in progress, or identified: GMFS (Global Monitoring for Food Security), GLOBWETLAND, AQUIFER (ground water system assessment) and EPIDEMIO (use of EO for epidemiological studies). Other projects, the TIGER-labelled projects from Partners will be added as TIGER progresses.

It is expected that a decision on Phase 2 (scope, content, approach for the implementation, funding sources) will be made during the second half of 2005.

8 International Aspects and Partnership

The TIGER Initiative will benefit from the activities coordinated by UNESCO in the African continent. UNESCO’s International Hydrological Programme, through the Intergovernmental Council that meets every two years, will seek continuous consultation with the national and regional institutions in the African countries. UNESCO will focus its action on the improvement of capacity building and education. Moreover, TIGER will benefit from the ISARM/UNESCO (International Shared (Trans-boundary) Aquifer Resources Management) project activities and proposals.

Cooperation and involvement of international organisations such as World Bank, EU Development Aid DG, African regional organisations (e.g., CILSS, OSS, ACMAD, OACT, SADC, IGAD, ECOWAS, UMA) will be explored and implemented if beneficial to TIGER. Partnership with international political initiatives (NEPAD, AMCOW), large international programmes (IHP, WWAP), donor organisations, and African organisations and institutions (as above, plus UN/ECA) will also be explored by ESA and UNESCO together, with the support of African partners.

9 References

1. Minutes from the First TIGER Working Meeting held in Paris 19-20 May 2003
2. TIGER Rabat Plan of Action (dated 31 Oct 2003)
3. Additional relevant documents and Web sites
 - Johannesburg World Summit / Plan of implementation
 - Frascati WSSD Follow-up Programme
 - ESA TESEO study reports
 - ESA Data Policy for ERS and ENVISAT
 - ESA-UNESCO Space Hydrology International Partnership (SHIP)
 - Web sites of ESA, TESEO, DUP, UN Conventions, UNESCO, UN Division for Sustainable Development/Partnerships:
 - ESA Homepage/Earth Observation (<http://www.esa.int/export/esaSA/earth.html>)
 - UNESCO International Hydrological Programme, Phase VI (http://www.unesco.org/water/ihp/ihp_six.shtml)

- World Water Assessment Programme
(<http://www.unesco.org/water/wwap/index.shtml>)
- Geological Applications of Remote Sensing
(<http://www.unesco.org/science/earthsciences/gars/index.htm>)
- Space Education Project
(<http://www.unesco.org/science/earthsciences/sep.htm>)
- UN Division for Sustainable Development (<http://www.un.org/esa/sustdev/>)
- List of partnerships for Sustainable Development
(http://www.un.org/esa/sustdev/partnerships/list_partnerships.htm)
- Convention to Combat Desertification
(<http://www.unccd.int/convention/menu.php>)
- Convention on Biological Diversity
(<http://www.biodiv.org/convention/articles.asp>)
- United Nations Framework Convention on Climate Change (<http://unfccc.int/>)