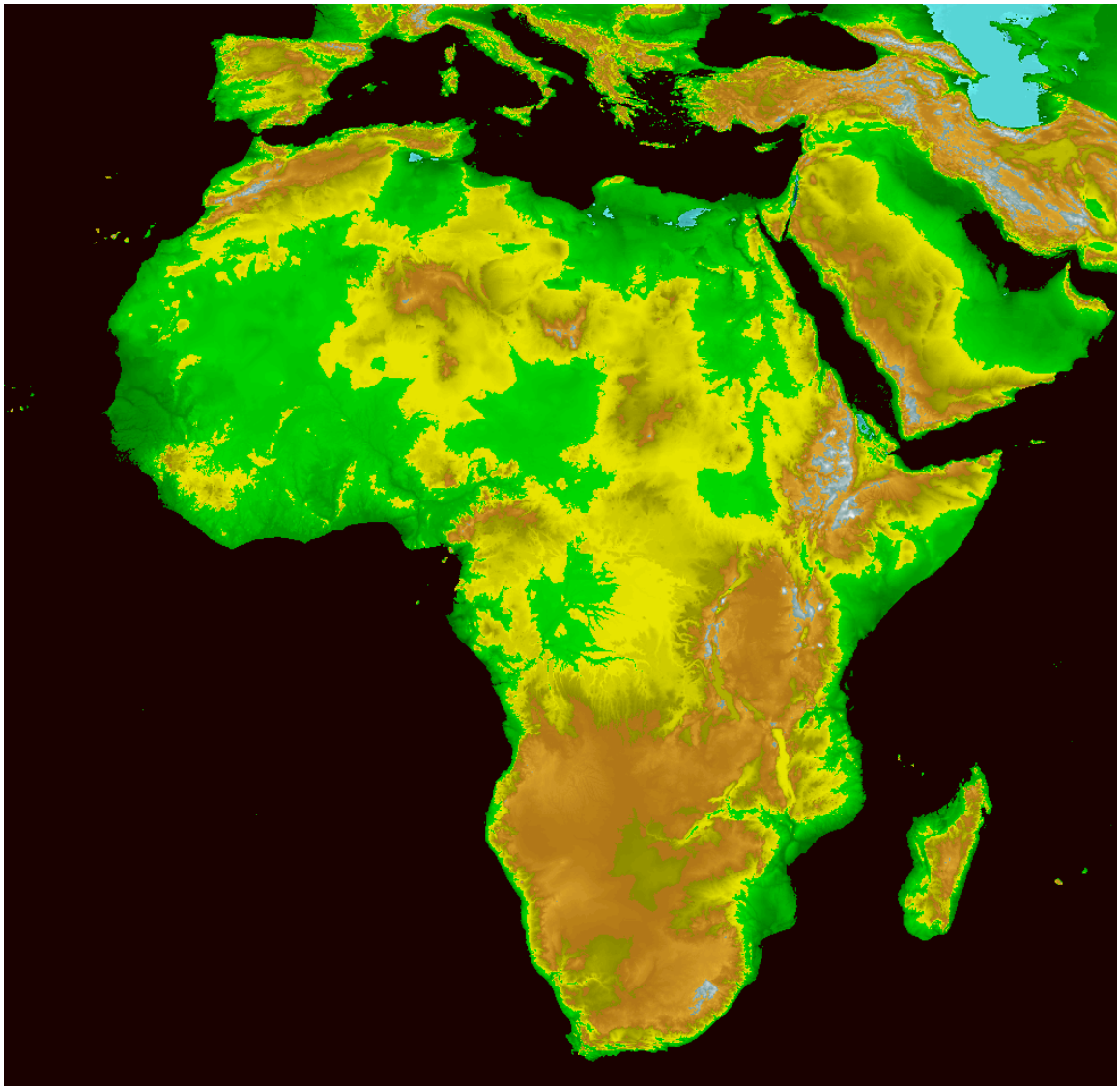




global change SysTem for Analysis, Research and Training



**START in Africa:
1992-2005**

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START in Africa: 1992-2005

Background

2000 AD marked the completion of START's initial Implementation Plan¹ as well as START's first decade of programmatic activities². An early milestone since the creation of the global change SysTem for Analysis, Research and Training (START) was the November 1992 Niamey Conference on Global Change in Africa³. START organized this conference on behalf of IGBP, (I)HDP and the European Commission, and in collaboration with other national, regional and multilateral organizations. This workshop defined a basis for START activities in Africa by:

- Reviewing IGBP and (I)HDP Core Projects and other relevant research and monitoring programs and available information on global change research issues important for Africa;
- Identifying key thematic areas for collaborative research involving both natural and socio-economic sciences; and
- Defining priorities for African participation in implementing research in these areas, including identification of impediments and recommending development of regional research networks through the START.

Subsequent to the Niamey Conference, START initiated several scoping workshops⁴ that identified the Miombo, Kalahari and African Rangelands as priority ecosystems for development of regional research networks in Southern Africa⁵. Similar workshops for Western Africa identified issues of food security and water resources as priority themes for development of regional research networks. Since then, START has systematically and consistently built and nurtured regional capacity in Africa; human resources have been enhanced through START fellowships and grants, and institutional capabilities have been strengthened, through establishment of the Pan-African START Secretariat, a Pan-Africa START regional Committee and individual research nodes at various universities and regional institutions, for example, through support for regular Regional Climate Outlook Fora, organized by regional institutions such as ACMAD and establishment of a Research Node for the IGBP's PAGES project, focusing on paleo-climatology and paleo-ecology of the East African lakes at the University of Nairobi. Through a dedicated effort, START has become the primary and widely recognized framework for supporting global environmental change research in Africa.

Several significant inter-governmental initiatives have been launched in Africa over the past decade, including:

¹ START Implementation Plan, 1997-2002, IGBP Report 44.

² START International Secretariat was opened in Washington, DC in July 1992.

³ Africa and Global Change, IGBP Report No. 29, 1994

⁴ For example: African savannas and the Global Atmosphere, IGBP Report No. 31, 1994; Global Changes in Southern, Central and Eastern Africa – A START Workshop Report, Gaborone, Botswana, July 1994

⁵ The Kalahari Transect: Research on Global Change and Sustainable Development in Southern Africa. Edited by R.J. Scholes and D.A.B. Parsons. IGBP Report No. 42 (1997); and

The Miombo Network: Framework for a Terrestrial Transect Study of Land-Use and Land-Cover Change in the Miombo Ecosystems of Central Africa. Edited by P. V. Desanker, P. Frost, C. Justice and R. Scholes. IGBP Report No. 41 (1997), ISSN 0284-8015

- (a) The New Partnership for Africa Development (NEPAD) environment action plan and strategies to address the regions environmental challenges, while at the same time combating poverty and promoting socio-economic development of Africa;
- (b) The Johannesburg plan of action for implementing the World Summit (WSSD) targets on sustainable development; and
- (c) Programmes for action towards addressing the internationally agreed development goals, including those contained in the UN Millennium Declaration (MD).

These initiatives provide an appropriate framework for strategic partnership between Africa and its development partners for implementing activities that protect the environment and enable sustainable development of the region. START's effort in Africa is framed in the context of these initiatives and contributes to these initiatives.

Over the past decade, the START effort in the African region has blossomed into a significant number of collaborating regional research networks comprising individual scientists and institutions and working on a set of common regional challenges pertinent to global environmental change issues of priority to the region. In terms of capacity building, annually around 500 African scientists are engaged in START activities. START provides research grants to mid-career and young scientists (currently 33 projects are ongoing under such grants), doctoral and post-doctoral fellowships (of 23 awards thus far, 4 PhD thesis have been completed), short-term fellowships for young scientists and visiting scientists awards for mid-career scientists (75+ have been awarded), young scientists awards to recognize outstanding scientists who publish in peer-reviewed journals (around 50+ have been awarded), and conducts advanced level institutes for pos-PhD scientists and shorter-term training sessions (around 130 Africans have been engaged thus far).

This dedicated effort of START has contributed to:

- Increased scientific understanding of global change in Africa and regional-global linkages in the earth system;
- Enhanced regional capacity in terms of human resources as reflected by the number of START fellows, visiting scientists and young scientist awardees and the increased number of African researchers engaged in global change research networks and projects;
- A culture of peer-reviewed proposals and publications as reflected by the responses to the START announcements for research grant opportunities and publication of scientific books, special issues of refereed publications;
- An institutional structure comprising PACOM⁶, PASS⁷ and a distributed set of regional research networks and nodes;
- Development of an efficient and cost-effective non-governmental mechanism for funding global change research in Africa based on the peer-review process; and
- Substantial leveraging of resources.

This report summarizes the current state of START activities in Africa and provides a context for future actions. The purpose of this report is not only to provide a record of START activities in Africa, but also to identify and highlight contributions to the Earth System Science Partnership and to anticipate future challenges in charting a course for collaborative action on

⁶ PACOM: Pan-African START Regional Committee

⁷ PASS: Pan-African START Secretariat

global change research in Africa. The report highlights the substantial achievements of START in Africa and elucidates the structure and operation of START effort in Africa to instill a culture of multidisciplinary research, scientific peer review and peer-reviewed publications.

START: The Focal Point for Global Change Research and Capacity Building in Africa

“There is...still a need for an organisation that can contribute to building network in the scientific community in the field of global change, support in developing research proposals and provide both long and short-term fellowships and grants across the (African) region. The Pan-African START programme has proved to be an efficient organisation in this regard, with a well-developed network and necessary credibility in the scientific community. There is a need for continued support of the program, particularly to ensure a stable and predictable funding of fellowships and a working secretariat. It is recommended that support for the START programme continues.”

[Excerpt from the NORAD review of START in Africa, 2002]

Context

The acute need to enhance the indigenous scientific capabilities of African countries to deal with global environmental changes (including climate change) and its impacts is well recognized. “Many of the continent’s most serious problems, including malnutrition, disease, and environmental degradation, cannot be met without the presence of a critical mass of African scientists working on issues of direct concern to the continent itself.”⁸ The most recent Third Assessment Report of the IPCC has also called attention to the fact that Africa is among the regions most vulnerable to climate change.

Equally important is the need to engage the African scientific community in a more effective relationship with the decision-making community in Africa in addressing sustainable development issues. The recent Implementation Plan from the World Summit on Sustainable Development specifically calls for the provision of “financial and technical support to strengthen the capacity of African countries to undertake environmental legislative policy and institutional reform for sustainable development and to undertake environmental impact assessments and, as appropriate, to negotiate and implement multilateral environment agreements.”⁹ This type of policy reform can not take place without the contribution of the region’s scientific community. This need was already recognized at the 1992 Niamey Conference on Global Change in Africa, which noted that “our aim is...to incorporate (the scientific knowledge) into a much broader socio-political context, ... especially to stimulate an efficient transfer of the results of scientific research to the level of political decisions.”¹⁰

⁸ *Science*. 1 June 2001. 292(5522): 1609

⁹ Report of the World Summit on Sustainable Development 2002.

(<http://www.johannesburgsummit.org/html/documents/documents.html>), A/CONF.199/20, Implementation Plan, p.45.

¹⁰ Comments of Dr. Jean-Pierre Contzen, DG, JRC/EC in “Africa and Global Change”, IGBP Report No. 29, 1994

The WSSD also endorsed the New African Partnership for Development as a mechanism to foster sustainable development in the region. While NEPAD is a recent development, the critical environmental sectors identified by NEPAD are essentially the same as ones previously identified in numerous other fora and documents, including the Niamey Conference of 1992. It is not surprising, therefore, that **“START’s activities in Africa specifically target the critical environmental sectors as identified within NEPAD, including food security/agriculture, land use/desertification, water resources, biodiversity, health, and vulnerability. These themes are also consistent with the major programmatic areas of the core and joint projects of START’s Sponsors”**.

START activities in Africa are designed to:

- Engage the African research community in global change research of the Earth System Science Partnership (ESSP) and their projects;
- Promote collaboration within African research community to provide sound, scientific assessments of the impacts of global changes, including climate variability and change, and coping strategies relevant to critical socio-economic sectors and to sustainable development;
- Provide targeted capacity building opportunities for African researchers, largely within the region;
- Enhance regional research capability, both human and institutional; and
- Provide input to policy/decision making communities, at various levels, on critical sectors.

Programmatically, the START effort in the African region emphasizes collaborative regional research on (i) climate change and climate variability, including regional climate scenarios and extreme climate events, and assessments of the impacts of adaptation and vulnerability to climatic variability and change; (ii) global environmental change and water resources, food systems, and coastal zone resources; (iii) land-use/land-cover change, ecosystems/biogeochemical changes, and biodiversity.

The START network in Africa, comprising individual scientists and institutions, is unique in the sense that it promotes research on the national and regional aspects of global environmental change, links such activities to the ESSP’s projects and actively builds the capacity of individuals and institutions in the region to address significant environmental problems on local to regional scales. Specifically, START promotes regional research networks that conduct research on regional aspects of environmental change, assess impacts and vulnerabilities to such changes and provide information to policy-makers. START mobilizes resources to support infrastructure and research programs on environmental change, and provides a variety of capacity building opportunities to African global change scientists. START’s strategy of “research-driven” capacity building engages the younger generation of scientists in regional research projects and networks.

Given its strategic focus on research-driven capacity building, START conducts a comprehensive capacity building program that includes awards for short- and longer-term fellowships, Visiting Scientists and Young Scientist Awards, Advanced Institutes and Young Scientists’ Conferences. Promoting collaboration with the policy/decision-making community, and fostering regional research and institutional networks is an inherent aspect of these

activities. A substantial fraction of START fellows and grantees provide scientific information and guidance to national and regional policy communities and are actively engaged in the development and implementation of National Adaptation Programs of Action (NAPAs).

In the following sections, the organizational structure for START activities in Africa is described, followed by a brief consideration of funding available for support of global change research activities in Africa. Highlights of selected ongoing START-related research projects and START's capacity building activities targeted specifically to Africa are provided in the next section. A list of all current activities and significant publications from the Africa-based research projects are included in the Appendix. A complete description of all START projects in Africa is available on the START website at <http://www.start.org> and also in Annual Reports issued by the Pan-African START Secretariat <http://pass.uonbi.ac.ke> or email: pass@uonbi.ac.ke.

Organization: PASS and PACOM

The Pan-African START Secretariat (PASS) located at the University of Nairobi, Kenya operates on the basis of a Memorandum of Agreement between the Kenya National Academy of Sciences, the University of Nairobi and the International START Secretariat, as approved by the START Scientific Steering Committee. The small but efficient PASS office includes a Director, a Program Scientist, a data-base manager and an administrative assistant. As a service-oriented facilitating organization, PASS provides co-ordination, communications and operational support for the Pan African START Committee (PACOM).

PACOM plans, prioritizes and develops strategies for implementing collaborative research activities on regional aspects of global change; promotes assessments of the impacts of global change and actions that enhance indigenous human and institutional capacity to cope with such impacts and fosters a cohesive African scientific community that can more effectively interact with national and regional decision- and policy-makers. Membership of PACOM typically includes scientists, leaders of regional research networks, representatives of academia and regional or multilateral organizations based in Africa and the policy community.

Representatives of various relevant and interested core projects of the ESSP often participate in PACOM sessions. PACOM facilitates development of research collaboration and proposals. It helps in widely disseminating information on various opportunities available through START, including announcements of opportunities such as calls for proposals and fellowships. Members of PACOM assist in various regional workshops and conferences, and in fostering liaison with policy community in Africa. PACOM members often serve as peer-reviewers for proposals and requests for fellowships. PACOM members actively foster strategic partnerships with other individuals and institutions in order to strengthen the overall effort on global change research in Africa. A list of current and past PACOM members is attached in the Appendix 1.

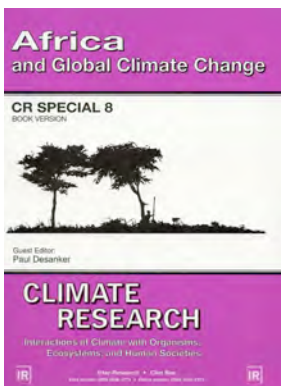
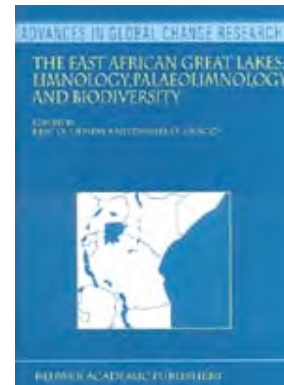
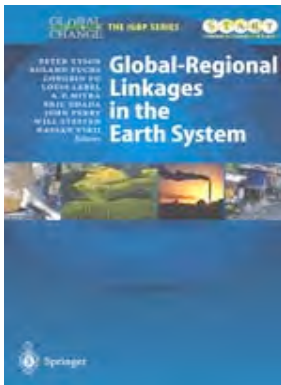
Funding Global Change Research in Africa

At present, START provides the only significant operational framework for securing and distributing funding for global change research in Africa. While there are diverse sources of funding support, most, if not all, such funding has to be secured on the basis of successfully peer-reviewed proposals that the International START Secretariat and PASS submit to various

multi- and bilateral development assistance agencies, research funding agencies of developed countries and various foundations.

Over the past decade, START has secured significant funding resources to support global change research and capacity building in Africa. Nevertheless, securing assured and sustained funding for global change research and building regional human and institutional capacity remains a significant challenge. It requires implementation of a coherent and relevant strategy based on broad regional consensus to nurture research-driven capacity building for global change research in Africa and a significant commitment from key donors/funding agencies. It also requires careful nurturing of relationships with various partner donor agencies and regular meaningful briefings to program officers of such agencies to ensure that the effort is closely related to agencies' mission and that the overhead operational costs are not excessive. Given its non-governmental framework under the auspices of the ESSP and close alignment with regional action plans emanating from NEPAD, MGD and WSSD, START operates an efficient structure, with rather low-overhead cost, that has gained respect and recognition by the donor community as well as the indigenous scientific community. During its review of the activities conducted by START in Africa during 2002, NORAD representatives noted **“the START mechanism for supporting research and capacity building is a functioning, efficient and cost-effective modality that should be sustained”**.

Recent START Publications



Selected Current START Projects in Africa

Only a select set of ongoing activities is highlighted here; a complete listing of current START projects in Africa is included in Appendix 2 and a list of publications from these projects is included in Appendix 3. A complete description of all START activities in Africa is available on the START website (<http://www.start.org>) and also in Annual Reports issued by PASS (<http://pass.uonbi.ac.ke>).

1. Climate change and climate variability

1.1 Assessments of Impacts/Adaptation/Vulnerability to Climatic Variability and Environmental Change (AIACC)

Assessments of Impacts and Adaptations to Climate Change (AIACC) is a global initiative developed in collaboration with the UNEP/WMO Intergovernmental Panel on Climate Change (IPCC) and funded by the Global Environment Facility to advance scientific understanding of climate change vulnerabilities and adaptation options in developing countries. The AIACC project seeks to advance scientific understanding of climate change vulnerabilities and adaptation options in developing countries, build capacity to support National Communications to the UN Framework Convention on Climate Change, and develop networks that link science and policy communities in support of adaptation. AIACC is achieving these objectives by providing funding, technical support, training, mentoring and networking for regional assessments in various parts of Africa (12 projects), Asia, Central and South America and Small Island States of the Caribbean, Indian and Pacific Oceans. AIACC is implemented by the United Nations Environment Programme and executed jointly by START and the Third World Academy of Sciences (TWAS). In addition to funding from the Global Environmental Facility, collateral funding has been provided by the US Environmental Protection Agency, US Agency for International Development, World Bank, Canadian International Development Agency, and participating institutions in developing countries.

A total of 108 African scientists, 34 graduate students and 24 associates are involved in these projects in Africa. Of these, a significant number are now engaged in their national committees under the UNFCCC and are also lead or contributing authors for the ongoing fourth IPCC Assessment. Within Africa, AIACC has fostered the development of regional climate modeling networks and established regional nodes in South and West Africa.

The 12 AIACC sub-projects in Africa will be completed in 2006. Outputs of these projects will include technical reports, papers in peer-reviewed journals and information bulletins for the civil society and government agencies. Publications as of September 2005 include: 18 papers in peer-reviewed journals, 12 technical papers, and 15 reports. In addition, 8 PhD and MS dissertations have been completed. Information from these publications will be included in National Communications from various countries to the UNFCCC and will also contribute to the Fourth Assessment of the IPCC (see Appendix 4). A recent regional workshop for Africa and the Indian Ocean Islands has been summarized in a widely circulated publication titled: Messages from Dakar. START intends to continue the AIACC project in future.

More complete information, including reports and published papers, is available at http://www.start.org/Projects/AIACC_Project/aiacc.html and <http://www.aiaccproject.org>

1.2 Climate Variability and Food Production: CLIMAG – West Africa

The CLIMAG West Africa project is concerned with the application of seasonal climate forecasts to improve cropping strategies and thereby enhance food security through improved regional Early Warning Systems Networks. The project involves collaboration between West African, European and American scientists. For this specific project, START helped catalyze collaboration between 3 regional institutions [African Centre of Meteorological Applications for Development (ACMAD), AGRHYMET Regional Centre, and the African component of the International Center for Research in Semi-Arid tropics], one national organization (METEO-Mali), 1 USA and 3 European institutions.

The project has evaluated the existing climatological forecast methodologies for their utility to the agricultural community; assessed the current agro-ecological zones in Mali and the ability of the farmers in Mali to respond to information on seasonal climate forecast; and assessed the efficacy of existing regional Early Warning Systems for the distribution and use of seasonal climate forecasts.

The project enhanced regional capacity through awards of fellowships for African scientists who have gained skills in the latest methods and application tools through their research in the project and collaboration with the research institutions of the USA and European partners.

Participating Countries include Mali, Niger, Italy, United Kingdom, the Netherlands, and United States. The project is funded by EC/ENRICH, NORAD and USCCSP and coordinated by Prof. Giampiero Maracchi of the Fondazione per la Meteorologia Applicata, Florence, Italy. More information is available at the following website addresses: <http://www.ibimet.cnr.it/Case/climag> and <http://iri.columbia.edu/africa/project/NetworkMali>

1.3 Global Change and Food Systems:

There are currently seven ongoing projects in Africa focused on climate variability and food security issues supported under the Advanced Institute on Climatic Variability and Food Security (see Section 4.4 and Appendix 8). These projects might contribute to the GECAFS¹¹ Joint Project of the ESSP.

2. Global Change and Water Resources

2.1 AfriBASINS / AfriCAT Project

Coastlines worldwide are heavily impacted by pollution, erosion and physical constructs. River dams influence the natural flow of water. Large-scale agriculture cause nutrient and sediment

¹¹ GECAFS: Global Environmental Change and Food Systems

depositions along coast lines and waters. New chemicals from industry run-offs have entered the priority lists of international organizations and require coastal zone impact and monitoring studies. In addition, increased economic activities from tourism, fisheries, urbanization and traffic offers challenges for coastal zone managers and regulators. The management issues and their solutions require an integrated approach drawn from natural and socio-economic sciences. Numerous studies have been conducted directly address challenges, however the AfriBASINS Program provides a more comprehensive integrated assessment. This project utilizes the Driver-Pressure-State-Impacts-Responses (DPSIR) framework, originally developed at OECD, to analyze critical issues in African watersheds and to assess the overall impacts of the movement of materials and particles through watersheds to coastal zones.

The AfriBASINS effort is a collaboration between LOICZ¹², START, and UNESCO/IOC. Four ongoing pilot research projects funded through START have examined the impacts of climate change and documented extreme events, as well as predicted future climate and socio-economic changes. These projects concern the impoundment of water by damming and its abstraction through tube wells - a common practices in Africa. The catchments chosen for this pilot study comprise the Sebou and Moulouya—the two largest rivers in Morocco—both of which have been dammed; the Senegal—a large West African river dammed in its lower course; the Tana and Sabaki in Kenya, the former having been dammed; and the Rufiji in Tanzania, for which damming is planned. While the catchments differ in the state and scale of their damming and in the nature of the impacts and issues in the coastal zones of these river basins, a standardized approach to the research is being used that places a strong emphasis on consultation with catchment and coastal managers, and, where appropriate, coastal stakeholders, and builds on a comprehensive review of the literature and relevant unpublished information as well as more recently acquired data.

The effort has led to several outcomes:

- (i) a summary paper has been prepared (reference: Arthurton, R.S., H.H. Kremer, E. Odada, W. Salomons and J.I. Marshall Crossland (2002) African Basins: LOICZ Global Change Assessment and Synthesis of River Catchment-Coastal Sea Interactions and Human Dimensions. LOICZ Reports & Studies No.25, ii + 344 pages, LOICZ IPO, Texel, The Netherlands;
- (ii) A workshop on Global Change and Ground Water Sustainable Use was held in Gaborone, Botswana, 7- 9 June 2002;
- (iii) A synthesis of AfriCat undertakings and a complete set of manuscripts featuring modern integrative global change research approaches and results in four different African sub-regions have been prepared for publication in a peer reviewed journal;
- (iv) A presentation was made at the December 2003 African Ministerial Conference on Water held in Addis Ababa; and
- (v) A concise strategy for the next phase of AfriCat has been prepared. This includes a proposal under consideration by START for setting up a LOICZ node for Africa at an African institution.

Additional information is available at the following website:

<http://coast.gkss.de/loiczbasins/africat.htm>

¹² LOICZ: Land-Ocean Interactions in the Coastal Zone Core Project of IGBP



CY 2004/2005 Geographical coverage of major START activities in Africa

2.2 Assessment of the Vulnerability of Water Resources to Environmental Change in Africa – a project in collaboration with UNEP-DEWA

This collaborative project between START, UNEP-DEWA, UNEP-GEMS water program, UNEP-Regional Office for Africa and NEPAD is being executed by PASS. The main objective of the project is to assess the state of the surface water resources and current environmental factors that cause vulnerability to environmental change. The project is coordinated by PASS and implemented by selected Africa regional water institutions and scientists. The sub-regional vulnerability assessments examine water stress, water supply and allocation, water management policies, environmental change threats to water availability, and the linkages between the vulnerability of water resources to environmental change and the impacts of poor water quality and scarce supply to human vulnerability. Initial results from these sub-regional studies were presented at the December 2003 Addis Ababa Meeting of the African Ministers Conference on the Environment.

Participating regional institutions from West, East, and Southern Africa include the Centre for Environment Development for the Arab Region and Europe, Universite Nationale du Benin, the SADC Water Group based in Botswana, and the Pan-African START Secretariat. The project is being jointly implemented by UNEP-DEWA; PASS, GEMS Water Programme and funded by UNEP-DEWA, UNEP-ROA, and START through a grant from USCCSP. Additional information is available at the following website:
<http://www.unep.org/dewa/water/vulnerability/Reports/part1.pdf>

3. Ecosystem Goods and Services: Land-use, Land-cover, Ecosystems, Biogeochemical Change, and Biodiversity

2.2 The MIOMBO Network

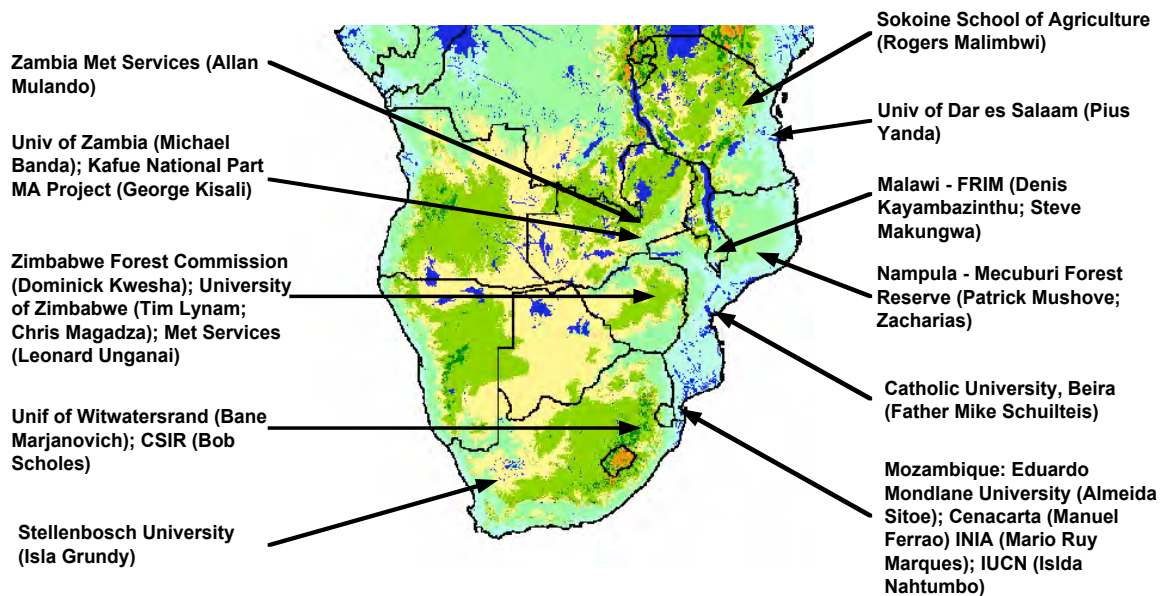
The Miombo Network is a partnership of scientists, natural resource managers and policy makers interested in the sustainable development of the Miombo Ecosystem and its region. It is a member of the Southern African Networks and Associations (SAVANA Consortium). The Miombo Network was founded in 1995 under the auspices of the IGBP, LUCC¹³ and START, and is coordinated by Dr. Paul Desanker of the Pennsylvania State University in the USA. Key individuals from national universities and governmental agencies in Malawi, Mozambique, Zambia, Zimbabwe, Tanzania and South Africa manage activities in the region. Activities of the Miombo regional research network of scientists contribute to LUCC and the Joint Carbon Project. The Miombo Network of researchers undertake research on the critical trends and transitions in land use change, understanding underlying driving forces and processes of change, understanding the complexity of the human-ecological system, as well as understanding the major impacts of land use change on sustainability and development. Current activities include:

- GOFC/GOLD Project – a pilot activity that is developing updated characterization of land cover for Mozambique and regional estimates of carbon in Miombo ecosystem.
- An AIACC project on impacts of climate change especially climate variability and

¹³ LUCC: Land Use and land Cover Change Project of the IGBP and IHDP

- extremes in the Miombo region (see Section 1.1 and more information in the Appendix).
- Southern Africa Fire Network (SafNET) – a program to develop methods for monitoring of fires using remote sensing and GIS tools.
 - Zambezi River Basin Millennium Assessment Project – an activity under the Southern African Millennium Assessment project focusing on the Zambezi River Basin. This project will run for 2 years, and is expected to produce land use change scenarios for the Zambezi region taking into account projections of the main drivers of land use change including population demography, climate change and economic development.

Regional Nodes of the Miombo Network in Southern Africa and Points of Contact



Funding for research activities of the Miombo are funded through direct grants from a number of agencies, including the U.S. NSF and NASA, and by START through its grants from NORAD, NASA and GEF/UNEP. In addition, the Millennium Assessment group has provided funding through START for the Zambezi River Millennium Assessment project. Additional information is available at the following internet address

<http://www.geo.ucl.ac.be/LUCC/data/miombo/intro.html>

3.2 The Kalahari Ecosystem Project

The Kalahari Transect is part of a system of research transects endorsed by the Global Change And Terrestrial Ecosystems (GCTE) project of the IGBP¹⁴. Each IGBP Transect is designed around the variation of a major environmental factor as it influences terrestrial ecosystem structure and functioning. In the case of the Kalahari Transect, the primary gradient is precipitation; secondary gradients concern land use intensity and nutrients fluxes.

¹⁴ IGBP Report No. 42. The Kalahari Transect: Research on Global Change and Sustainable Development in Southern Africa (1997). Edited by R.J. Scholes and D.A.B. Parsons. Stockholm: IGBP, 63pp.

The Kalahari Ecosystem Project consists of a suite of research projects that address land use changes, agriculture, biodiversity, multi-species production systems, ecosystem state and function, biomass burning and aerosols, and water resources. Many of these studies are based at the Harry Oppenheimer Okavango Research Centre. In 2000, a workshop was organized under the aegis of the Botswana Global Climate Change Committee, made possible through funding from NORAD to START, that reviewed overall progress on the transect and set a framework for future research. In addition to the workshop report, a special issue of the *Journal of Arid Environments* (Volume 53, issue 4, April 2003) was published comprising the papers presented at the 2000 workshop.

Subsequent to the catalytic support from the NORAD grant for the Kalahari Transect project, national institutions and universities (e.g. University of Botswana, University of Witwatersrand) are responsible for continuing activities. Related projects, such as the Southern Africa Fire Initiative (SAFARI 2000) have been initiated with funding support from South Africa and NASA-USA. Furthermore, the Kalahari Network Workshop, which resulted in a special issue publication of the *Journal of Arid Environments*, also contributed to the START regional synthesis book “Global regional linkages in the Earth System” published by Springer (2002), and generated substantial interest in the project, resulting in the dissemination of the project results to a wider audience.

Countries participating in the Kalahari Ecosystem project include Botswana, Namibia, Angola South Africa, and USA. Previous research has been partially supported by START through grants from NORAD and USCCSP. Additional information is available at the following internet address http://www.start.org/project_pages/kalahari.html

3.3 Study of Atmospheric Macronutrient Deposition

African lakes, and particularly Lake Victoria, are changing their trophic status, becoming more enriched by nutrient inputs. Based on the information collected under several GEF projects, this process appears to be largely driven by atmospheric deposition of macronutrients. Mobilization of these nutrients into the air comes, in turn, from inappropriate land uses. The objective of this proposed project is to collect sufficient information on seasonal wet/dry deposition of major macronutrients and potential persistent pollutants to be able to model and identify sources of these materials. This would lay the groundwork for a regional strategy to address this problem in a way that benefits both the population in problematic areas, while preserving the ecology and natural resource values of African Great Lakes and the African landscape in which agriculture is nutrient limited. Losses of nutrients from the land and additions to the Great Lakes degrade both agricultural and aquatic resources.

The Equatorial Africa Micronutrient Atmospheric Deposition Study initiative aims at addressing the growing concerns over nutrients in lakes of East Africa. The study will identify nutrient sources and other causes of problems in these lakes as well as establish a monitoring network in equatorial Africa. Identification of the atmospheric fluxes of chemicals to the terrestrial and aquatic ecosystems of central and eastern Africa will form a baseline of data and information on which to better understand the biogeochemical cycling of nutrients and other chemicals in the environment. This activity is linked to the ILEAPS and GWSP of the ESSP.

As part of this initial study, a project proposal will be prepared and submitted to GEF under the following GEF focal area(s), and/or cross-cutting issues: International Waters (sustainable management of African Great Lakes/management of eutrophication processes). The countries in which the project will be implemented are: Democratic Republic of the Congo, Malawi, Zambia, Mozambique, Sudan, the Central African Republic, Ghana, Tanzania, Kenya, Uganda and Ethiopia. The GEF implementing agency will be the World Bank. This project ties to previous, existing and proposed UNDP and World Bank supported projects on African Great Lakes (Tanganyika, Malawi, Victoria, etc.).

A science and planning workshop was held in April/May 2005 hosted by the Lake Victoria Environment Programme (LVEMP) of the World Bank, GEF and three East African countries (Kenya, Uganda and Tanzania). The workshop was organized and conducted by Bill Lane (World Bank), Bob Hecky (GEF) and Shem Wandiga (PACOM). Scientists from Africa, Europe and North America will also participate in the workshop.

The workshop established the state of knowledge on sources, pathways and fate of macronutrients in Equatorial African lakes. Participants at the workshop agreed on wet/dry deposition data to be collected, data quality control and quality assurance protocols, network of monitoring stations and data management. The data and information collected will contribute to the nutrient and sediment transport studies of ILEAPS, GWSP and AFRIFLUX Network. The workshop prepared a PDF-A Medium Size Project (MSP) proposal to be submitted to GEF for funding. A synthesis volume is to be produced for use by lake/river/wetland managers.

4. Capacity Building

In addition to awards through START's general capacity building program, special programs for Africa include:

- Doctoral dissertation awards
- Small research grants for African scientists
- Various short courses in conjunction with collaborative research activities
- Fellowships, visiting and young scientists awards
- Advanced institutes
- Occasional awards for participation in international conferences and workshops

Through these capacity building actions, annually around 100-300 scientists from Africa have been engaged in global change research activities since the inception of START activities in Africa in 1992. The following summaries provide some detail on specific capacity building activities:

4.1 The African Doctoral Dissertation Fellowship Awards

The START/PACOM Global Change Fellowship Awards for doctoral and post-doctoral research, tenable in African universities, are supported by a grant to START from NORAD. These fellowships represent excellent opportunities for outstanding young African researchers undertaking global environmental change research, the main aim being to build regional expertise in global environmental change in Africa. The awards are granted for up to two years leading to completion of Ph.D. dissertation or for the final year of graduate study and an

additional year of post-doctoral research to extend the work done under PhD degree research. Young scientists from all sub-Saharan countries are eligible to apply for such awards. PACOM members as well as representatives of various core projects of the ESSP make the awards on the basis of peer review. PASS and the International START Secretariat jointly implement this effort. Funding support is derived from a grant to START from the Norwegian Agency for Development Cooperation (NORAD). This Fellowship Program is gaining widespread awareness and publicity in the sub-Saharan Africa countries, primarily through the START Networks in Africa, the PASS Database of African Scientists (over 3000 members) and Institutional Heads in various countries.

Since April of 2002, twenty-three awards have been made to a diverse group of young global change scientists pursuing doctorates at African institutions (see Appendix 5 for specific information on each award).

4.2 Small Research Grants for African Scientists

African researchers are frequently hampered in their efforts to develop comprehensive and competitive research programmes due to lack of resources and infrastructure within their home institutions. For example, the lack of a critical piece of equipment can delay the implementation/progress of research for months to years. This activity provides small grants to individual researchers through a competitive process set up by PACOM. With funding from the USCCSP, grants are awarded annually following a competitive Call for Proposals and a two-stage peer review.

The first Call for Proposals took place in 2003 and resulted in 6 competitive awards. The second call, announced in 2004 attracted over 100 applications from all over Africa. 17 Awards were made in the second round. The third call, advertised in September 2004, generated over 130 proposals, and 10 finalists received funding for their selected projects.

Further information on the funded projects is available in Appendix 6.

4.3 Short Courses

While START has helped conduct short course in Africa in collaboration with GAIM/IGBP and MEDIAS; recent short courses have supported regional research projects. For example, the Miombo Network conducted short courses during 2000 on use of GIS tools in ecosystem modeling; the AIACC project has carried out two training courses on methods for developing regional scenarios of climate change and assessing impacts of and adaptations to climatic change in 2002. AIACC also conducted a regional workshop specific to African scientists in 2003 and 2004. Recently, START has supported the climate modeling team at the University of Cape Town to conduct a course on regional climate modeling and scenarios for Africa in collaboration with the Hadley Center of the UK Meteorological Office.

One short training course of particular note carried out on annual basis, since 2002, is the **Lake Victoria Training Program**. The Lake Victoria Training Programme (LVTP) is a training opportunity for university graduates and postgraduates from the African Great Lakes Region who are involved in conservation and management of tropical lakes ecosystem and who are interested in following a career in aquatic sciences. LVTP is a multidisciplinary training in

Tropical Freshwater Ecosystems Management. The training carefully selected graduates, postgraduates and young professionals from Burundi, Rwanda, Uganda, Tanzania, Kenya, Ethiopia, Malawi, Zambia, Mozambique and Congo, who work in government agencies and NGOs, and need hands-on field experience and training in aquatic sciences. The project also involves U.S. graduate students, post-doctoral candidates, and secondary school teachers, as well as scholars from Europe and Africa, in a wide range of research projects on paleoclimate, recent climate variability and change and human impacts, ecology, evolution, and limnology of this Rift Valley Lake. (For more information on LVTP 2004 Participants see Appendix 7A.)

Another short training course targets African professionals and mid-career decision-makers in the areas of resource assessment, planning, and management with background in **Remote Sensing and GIS**. Training and education in GIS/RS sensing is given using examples from areas selected in participants' home countries. A three-day fieldwork is a required component to familiarize the participant with data collection and to link field and satellite observations. ILWIS GIS/RS software, provided by ICT (the Netherlands) is used and a license is issued to every participant to allow them to continue using their new skills in their home institutions.

The first Remote Sensing and GIS training program took place during 18 October to 5 November 2004 at the Regional Centre for Mapping of Resources for Development (RCMRD), Nairobi, Kenya. The training program was held in conjunction with the African Association of Remote Sensing of the Environment (AARSE) Geo-information Sciences in Support of Africa's Development Conference, in order to foster synergies between trainers and other participants in the AARSE conference, a list of the Training Program Participants is available in Appendix 7B.

More recently, START has engaged in discussions with the University of Virginia and Pennsylvania State University aimed at fostering strategic alliances with African universities to promote collaborative research as well as the use of distance learning tools to provide global change related training courses aimed at universities in Southern Africa.

4.4 Advanced Institutes

START has implemented a series of training/research institutes that enhance the pool of trained young scientists from developing countries able to play a leadership role in cross-disciplinary approaches to key issues of global environmental change and sustainable development. Each institute has three elements; 1) an intensive training workshop held at an international center of excellence in the topic, 2) follow-on research projects, which enable the participants to conduct research using the knowledge gained at the workshop, and 3) a summary workshop to exchange results and experiences.

These institutes serve to:

- Stimulate trans-disciplinary conceptual and methodological research on the topics;
- Help identify and train a community of young scientists from developing countries to take leadership roles on these subjects;
- Engage these young scientists in ongoing and emerging international research networks; and
- Initiate and implement on-going collaborative research work.

The institutes address emerging critical issues of global environmental change. Institutes conducted to-date include:

- **Climate Variability and Food Security**
Training Workshop held during July 2002 at the International Research Institute for Climate Prediction, Synthesis Workshop held at the World Meteorological Organization. 19 research projects ongoing of which 7 are based in Africa;
- **Urbanization, Emissions, and the Global Carbon Cycle**
Training Workshop held during August 2003 at the National Center for Atmospheric Research; this activity is in collaboration with the Joint Carbon Project of ESSP and IGAC/IGBP. 16 follow-up individual research projects are supported of which 2 are based in Africa. The Synthesis Workshop will be held in conjunction with the IHDP Open Science Meeting;
- **Vulnerability to Global Environmental Change**
Training Workshop held during May 2004 at the International Institute for Applied Systems Analysis; 20 ongoing research projects of which 7 are based in Africa; this activity is in collaboration with IHDP].

Further information on the African components of the Advanced Institutes is available in Appendix 8.

An advanced institute on water is planned for mid-2006. Given the special emphasis on water issues in Africa, this undertaking will be focused on Africa and for African participants.

5. Future Challenges

Over the past decade, START in Africa has:

- Established an effective and well-organized infrastructure for collaborative regional research on global environmental change,
- Enhanced regional cooperation in global change research
- Increased the number of research initiatives focusing on global change issues of priority to the region,
- Increased the number of publications in peer-reviewed scientific journals and book reports,
- Increased the number of African scientists trained in global change science,
- Increased African participation in international global change science and assessment programs and
- Contributed to the needs of regional and national policy communities,

Much remains to be done. The task of human and institutional capacity building related to environmental changes is still acute across most of Africa. Active engagement of scientific and policy communities in a continuing dialogue remains a challenge. Consistent with the START strategy¹⁵ and regional priorities based on recommendations from MGD, WSSD and NEPAD,

¹⁵ See START Strategy: The next decade (Document available from the International START Secretariat (start@agu.org))

START and PACOM plan to continue research-driven capacity building activities in Africa during the next decade. Building on these accomplishments, START will:

- Strive for greater coordination of its regional thematic research;
- Synchronize regional activities with ongoing and planned work of core and joint projects to facilitate development of common regional agendas
- Support integrated regional studies, such as AMMA¹⁶ and follow-up to the Millennium Ecosystem Assessment
- Focus its policy-related research on regional vulnerabilities, employing methods of risk assessment and propose specific actions to reduce or manage risks, with the goals of integrating adaptation responses into regional development programs and to support multilateral environmental agreements;
- Direct its capacity building efforts to achieving a significant increase in the number of young scientists capable of engaging in world class science and assuming leadership in the international programmes, while giving due regard to strengthening key institutions in developing countries and the needs of least developed countries;
- Seek a significant increase in funding through a variety of avenues and in close collaboration with ICSU; and
- Undertake to strengthen the regional START structure, including PACOM and PASS
- Form strategic regional and international partnerships to promote and foster global environmental change research and related regional capacity building

If it is to achieve these objectives, START counts on the continued support of its programme co-sponsors, financial supporters, and especially the many scientists in developing countries and their overseas partners who have engaged in its activities.

¹⁶ AMMA: African Monsoon Multidisciplinary Analysis

Appendix 1: List of Current PACOM Members

Current members:

Shem Wandiga, Chair, *Kenya Academy of Sciences, Kenya*

Salif Diop, *DEWA/UNEP, Kenya*

Chris Gordon, *University of Ghana, Ghana*

Isabelle Niang-Diop, *Universite Cheikh Anta Diop, Senegal*

Tony Nyong, *University of Jos, Nigeria*

Luanne Otter, *University of Witwatersrand, South Africa*

Bekele Shiferaw, *ICRISAT, India*

Ramadjita Tabo, *ICRISAT, Niger*

Pius Yanda, *University of Dar es Salaam, Tanzania*

Eric Odada, *University of Nairobi, Kenya (PASS Director, Ex-officio)*

Mohamed Salih, *University of Leiden, the Netherlands (START SSC Member, Ex-officio)*

Coleen Vogel, *Witwatersrand University, South Africa (Chair, SC-IHDP, Ex-officio)*

Past members:

Yinka Adebayo, *Nigeria*

Abel Afouda, *Benin*

G. T. Agyepong, *Ghana*

A. T. Ba, *Senegal*

Michel Boko, *Benin*

Mohamed Boulahya, *Niger*

M. Diallo Iam, *Mali*

M. Dolozi, *Malawi*

Pauline Dube, *Botswana*

Peter Frost, *Zimbabwe*

Bruce Hewitson, *South Africa*

Bubu Jallow, *Gambia*

Christopher Magadza, *Zimbabwe*

Lapologang Magole, *Botswana*

Wandera Ogana, *Kenya*

Robert (Bob) Scholes, *South Africa*

Komlavi F. Seddoh, *Togo*

M.V.K. Sivakumar, *Switzerland*

Rian Titus, *South Africa*

Appendix 2: A Summary Tabulation of Current START Activities in Africa

PROGRAMME/ACTIVITY	BRIEF DESCRIPTION	SPONSORS
Global Change Synthesis Book	The synthesis book will be on <i>global change</i> in <i>sub-Saharan Africa</i> and will include global-regional linkages. The book will include any new data since the last synthesis book as well as any new work that is published in the next two years.	NORAD
Lake Victoria Environment Outlook	As part of the AEO process, ecosystem assessments are to be undertaken using an adapted integrated environmental assessment and reporting methodology. The Lake Victoria Basin provides an interesting case due its geographic location in Africa and influence on social, economic and environmental issues in the Great Lakes region and beyond. It will serve as a framework for mitigating environmental impacts and for identifying the many stakeholders who can be brought together to address lake-related environmental degradation.	UNEP-DEWA; START (through the USCCSP - United States Climate Change Science Programme - African Small Grants Research Programme).
Comprehensive Assessment of Vulnerability of Water Resources to Environmental Change in Africa using the Basin Approach	The first phase of the project, which was completed in March 2004, adopted a 'rapid approach' and provided accordingly a summarised overview of four sub-regions (Southern, Eastern, Western and Northern Africa) including an inventory of sources of data and information. Key issues of vulnerability of water resources to environmental change and adaptation and mitigation options emanated from these assessments. This phase now comprises comprehensive vulnerability assessment of Africa's River/Lake/Groundwater Basins aiming at management of vulnerability risks at various levels (local, national, trans-national and trans-regional).	UNEP-DEWA; START
Lake Malawi Drilling Project	After years of planning and identifying sources of funding, a major drilling program was scheduled to begin on Lake Malawi in December 2004. The major purpose of the drilling program is to recover long, high-resolution records of past climate dynamics in the African tropics at about 10 – 12° S latitude. The project involves over 30 scientists and students from the U.S., Europe, Tanzania and Malawi who will be involved in all aspects of sediment recovery and analysis. The drilling program will be the culmination of the International Decade of the East African Lakes (IDEAL), which started with an expedition to Lake Victoria in 1995. The General Contractor for the drilling operations is the University of Rhode Island.	U.S. National Science Foundation; International Continental Drilling Program based in Potsdam, Germany
Equatorial Africa Macronutrient Atmospheric Deposition Assessment	African lakes, and particularly Lake Victoria, are changing trophic status, becoming more enriched. This process appears, from information collected under several projects, to be largely driven by atmospheric deposition of macronutrients. Mobilization of these nutrients into the air comes, in turn, from inappropriate	GEF/World Bank/START

	land uses. The objective of this Medium Size Project is to collect sufficient information on seasonal wet/dry deposition of major macronutrients and potential persistent pollutants to be able to model and identify sources of these materials. This would lay the groundwork for a regional strategy to address this problem in a way that benefits both the population in problematic areas, while preserving the ecology and natural resource values of African Great Lakes and the African landscape in which agriculture is nutrient limited.	
AIACC Africa Projects	The AIACC initiative aims to fill the gaps in scientific and technical capacity as well as in knowledge about climate change vulnerabilities and adaptations. There are 11 projects funded in Africa, covering a diverse range of adaptation and vulnerability issues in agriculture, health etc. Each project is funded at a level of approximately \$300,000. It is a joint project of START, the Third World Academy of Sciences (TWAS), the United Nations Environment Programme (UNEP), and the IPCC.	the Global Environment Facility (GEF); World Bank, US Agency for International Development, Canadian International Development Agency
IDEAL – The International Decades of the East African Lakes	The scientific focus of IDEAL was originally on the unique palaeoclimatic record archived in the bottom sediments of the lakes, but the program rapidly evolved into an investigation of biogeochemical processes in the lakes, as well. Issues now revolve about the following five topical areas: climatology, physical limnology, geochemistry, biological sciences, and palaeoclimatology. It is a program to promote and coordinate research by prioritising research needs, as done in the Implementation Plan; to facilitate research within Africa by individuals and groups; to facilitate communication and collaboration between research groups; to facilitate the sharing of data, equipment, research vessels, etc.; and to train young scientists to participate in lake research.	IDEAL is a consortium of scientists who are individually or collectively funded by numerous international funding agencies, including the U.S. National Science Foundation, the Swiss National Climate Program in Bern, Switzerland, IGBP-PAGES Project, START, and others.
Global International Waters Assessment in Africa (GIWA) – East African Rift Valley Lakes	GIWA has been implemented in 45 sub regions grouped in nine- mega regions across the world. Sub Saharan Africa is one of the nine-mega regions and hosts eight sub regions, Canary Current, Gulf of Guinea Current, Lake Chad, Benguela Current, Agulhas Current, Indian Ocean Islands, Somali Coastal Current and East African Rift Valley Lakes.	UNEP/GEF
Greenhouse Gas and Climate Change Studies in the East African Rift Valley and on Mount Kenya	This initiative on “Greenhouse Gas Research at PASS, University of Nairobi”, started in 2001, is studying and pursuing a better understanding of the process underlying climate change in East Africa. As a Fulbright Research Fellow to Kenya and Tanzania, Professor Donald D. Adams was invited to bring his program (Fulbright) to Kenya/Tanzania and to participate in the PAGES/IDEAL activities through the Department of Geology’s PASS office.	Fulbright Fellowship; START
Framework for recharge estimation in Southern Africa Project	In Southern Africa, and especially in the arid and semi-arid areas, groundwater is a strategic resource of great importance. Groundwater recharge is a key factor in determining the	START; South African Water Research Commission

	sustainable management of groundwater resources. This project intends to increase knowledge and expertise in climate change and spin-off effects, needed for proper long-term catchment management, as well as to enhance our current concepts and understanding of natural groundwater recharge processes under current conditions.	
Global environmental change and water resources in southern Africa	START funded this study in southern Africa to build groundwater concerns into water accounts of three southern African countries (Botswana, Namibia and South Africa), contributing to more integrated water resource management. The study's <i>objective</i> was to improve the integration of groundwater resources in water accounts in Southern Africa, and by exploring the possible effects and impacts of global environmental change through the water accounts.	
'AfriCat' – African Catchment Studies	The LOICZ approach, where the river catchment and its associated coastal zone are treated as one system, integrates the natural and social sciences as well as addressing issues such as critical concentrations and loads, resilience and carrying capacity. The ' AfriCat ' (African Catchment Studies) provided an umbrella for a number of catchment-specific case studies around Africa to be carried out in local institutions.	START; IOC/UNESCO
CAPACITY BUILDING PROGRAMMES		
START Fellowship/Visiting Scientist Awards		NORAD
START/USCCSP African Small Grants Research Programme	The START/USCCSP African small grants program is made possible through a grant to START from The United States Climate Change Science Program, and The National Science Foundation. Based on recommendations of peer reviewers, PACOM endorses projects for awards. Each of these projects contribute to the projects of START's program sponsors (IGBP, IHDP and WCRP).	USCCSP; US National Science Foundation
African Doctoral Fellowships	The START/PACOM Global Change Fellowship Awards for doctoral and post doctoral research, tenable in African universities, are supported by funding from the Norwegian Agency for Development (NORAD) provided to START for regional capacity building for global environmental change research in Africa. These fellowships represent opportunities for outstanding African scientists undertaking global environmental change research, the main aim being to build regional expertise in global environmental change in Africa. The awards are granted for up to two years of study leading to completion of Ph.D. dissertation or for the final year of graduate study and one-year of post-doctoral research.	NORAD
Intensive Institutes		
Lake Victoria Training Programme	The Lake Victoria Training Programme	MacArthur Foundation; NORAD

	(LVTP): A Multidisciplinary Training on Conservation and Management of Tropical Freshwater Ecosystems that is carried out once annually, has been funded in the early years by The MacArthur Foundation and currently, the Norwegian Agency for Development (NORAD). The programme especially targets participants from the African Great Lakes region.	
Nyanza Project	The Nyanza Project is a research-training program on tropical lakes for African and American students. The program, which recently completed its 7th successful field season of operation, is run out of the Tanzania Fisheries Research Institute's (TAFIRI) field station at Lake Tanganyika by the University of Arizona (Tucson, AZ USA) in collaboration with the University of Dar es Salaam, TAFIRI, and starting in 2005, Vassar College (Poughkeepsie, NY USA). The Nyanza Project's educational mandate from NSF is to provide multidisciplinary research training opportunities for undergraduate students, graduate students, secondary school teachers and early career professionals from American and African colleges and universities in tropical lake studies.	The project receives core funding from the US National Science Foundation, with additional support from over the years from various International donors, NGOs and educational and research institutions, especially the Lake Tanganyika Biodiversity Project, the World Wildlife Fund, the Field Museum of Chicago, and the Belgian Project CLIMLAKE.
RECENT/UPCOMING MEETINGS		
Pan Africa PAGES Workshop on <i>African Palaeoperspectives: Linking the Past to the Present and the Future</i> was held from 19 th to 20 th July, 2004 in Nairobi, Kenya.	The workshop brought to the fore information on Africa's palaeoclimate, and has planted the seeds necessary to catalyse research, collaboration and networking amongst African scientists and with those from other regions. The workshop provided a forum for scientists to interact with PAGES SSC members and to obtain more details on how to join and contribute to this very successful international effort to better understand the earth system. Papers presented will be published in Quaternary International and Journal of African Aquatic Sciences.	START (through the USCCRP African Research Grants Program); PAGES; INQUA
Training and education in remote sensing and GIS applications to environmental management in support of policy/decision making	This course targeted mainly the African professionals and mid-career decision-makers in the areas of resource assessment, planning, and management with some background in Remote Sensing and GIS. It included lectures, hands-on and field work experience in Lake Naivasha, Kenya. The ILWIS GIS/RS software was used and one license has been issued to every participant to allow the application of their new skills in their home institutions.	NORAD
11 th World Lakes Conference	The International Conference on the Conservation and Management of Lakes (World Lake Conference) is a biennial conference co-organised by ILEC and a local host. Previous conferences have been held in Japan, USA, Hungary, China, Italy, Argentina and Denmark. In 2005 the Conference moves to Kenya and will be held in Africa for the first time. This conference will be held from 31 October to 4 November 2005 in Nairobi, Kenya. The organisers of the conference are	The mentioned hosts and several other INGOs

	the Ministry of Water Resources Management and Development, Kenya; the International Lake Environment Committee Foundation, Japan; and Pan African START Secretariat, Nairobi, Kenya.	
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Appendix 3: Significant Recent Publications/Reports

1. Desanker, P. (Guest Editor) (2001). Africa and Global Climate Change. Climate Research (CR Special 8). Inter-Research, Oldendorf/Luhe, Germany.
2. Maracchi, G., M. Paganini, F. Sorani and R. Tabo (eds.) (2001). Initial Workshop Proceedings, 23-25 April 2001, CLIMAG - West Africa; A Network for Harmonization of Climate Prediction for Mitigation of Global Change Impact in Sudano-Sahelian West Africa. Bamako, Mali.
3. Tyson P., Fuchs, R., Fu, C., Lebel, L., Mitra, A.P., Odada, E.O., Perry, J., Steffen, W. and Virji, H. (eds.) (2002). Global-Regional Linkages in the Earth System. Springer, Berlin, 198 pp.
4. Odada E.O. and Olago D.O. (Eds.) (2002). The East African Great Lakes: Limnology, Paleolimnology and Biodiversity. Advances in Global Change Research, Kluwer Academic Publishers, Dordrecht, The Netherlands, 587 pp.
5. Arthurton, R.S., H.H. Kremer, E. Odada, W. Salomons and J.I. Marshall Crossland (eds.) (2002). Basins: LOICZ Global Change Assessment and Synthesis of River Catchment-Coastal Sea Interactions and Human Dimensions. LOICZ Reports and Studies No. 25, pp. 181-193.
6. The Lake Victoria Training Project: Annual Report 2002. PASS, Nairobi, Kenya.
7. Community Rangelands (2002). Management and Policy Options for the Sustainable Development of Communal Rangelands and their Communities in Southern Africa (MAPODSA). First Annual Report to the EC, December 2002.
8. Odada, E.O. and Olago, D.O. (2003). Holocene Climatic, Hydrological and Environmental Oscillations in the Tropics with Special Reference to Africa. In: Pak Sum Low (Ed.) *Climate Change for Africa: Science, Technology, Policy and Capacity Building*. Kluwer Academic Publishers, Amsterdam.
9. Odada, E.O., Olago, D.O., Kulindwa, K., Bugenyi, F., Ntiba, N., West, K., Aloo-Obudho, P., Ochola, P., Wandiga, S.O. and Karimumuryango, J. (2003). Global International Waters Assessment: Scaling and Scoping Report for Sub-Region 47, East African Rift Valley Lakes. GIWA Project Office Publication (in press).
10. Olago, D.O. and Odada, E.O. (2002). Palaeo-research in Africa: relevance to sustainable environmental management and significance for the future. In: R. Battarbee, F. Gasse and C. Stickley (Eds.) *Past Climate Variability through Europe and Africa* (in press).
11. Odada E.O., Olago, D.O., Bugenyi, F., Kulindwa, K., Karimumuryango, J., West, K., Ntiba, M., Wandiga, S., Aloo-Obudho, P. and Ochola, P. (2003). Environmental assessment of the East African Rift Valley Lakes. *Journal of Aquatic Research*.
12. The LOICZ report produced for the Africa region has been incorporated into the overall LOICZ synthesis (2002). The Report serves as a contribution into international "BASINS" framework with regional projects in South America, Europe, and East Asia.
13. Beekman, H.E., E.O. Odada, A. Afouda, K. Abu-Zeid, I.S. Sayman, A. Opere, L. Oyebande, A. Kane, K. Kulindwa and S. Hughes (2004) Vulnerability of Water Resources to Environmental Change in Africa: River Basin Approach. A contribution to the UNEP/DEWA assessment project.
14. Arntzen, J., O.P. Dube and M. Muchero. 2004. Global Environmental Change And Food Provision In Southern Africa: Explorations For A Possible GECAFS Research Project In Southern Africa. <http://gecafs.org/outputs/>.

15. Callaway, John M. 2003. Adaptation benefits and costs – measurement and policy issues. OECD Workshop on the Benefits of Climate Policy: Improving Information for Policy Makers. OECD, ENV/EPOC/GSP(2003)10/FINAL.
16. Centro Nacional de Cartografia e Teledeteccao. 2004. Mapping of Flood Affected Areas. Special Report to the Ministerio da Agricultura e Desenvolvimento Rural, Republica de Mozambique.
17. Desanker, P.V. 2004. A dialogue with senior policy makers on climate change in Malawi. (*Climate Policy*).
18. Dube, O. P. 2005. Climate Change In Southern Africa: Implications for the Agricultural Systems of Botswana. *Proceedings of the Botswana Agricultural Research Information Network (BARIN)*. National Veterinary Laboratory, Gaborone.
19. Hughes, G.O., Thuiller, W., Midgley, G.F., Collins, K. 2005. A fait accompli? Environmental change hastens the demise of the critically endangered riverine rabbit (*Bunolagus monticularis*). Submitted to *Biological Conservation*.
20. Magrin, G.O., M.I. Travasso, W.E. Baethgen and R.T. Boca. 2005. Improving applications in agriculture of ENSO-based seasonal rainfall forecasts considering Atlantic Ocean surface temperatures. CLIMAG 2005.
21. Mellouli, H. J., Askri, H. and Mougou, R. 2002. “Drip and Surface Irrigation Water Use Efficiency of Tomato Crop Using Nuclear Techniques.” *Sixth Arab Conference on the Peaceful Uses of Atomic Energy*. Egypt 2002.
22. Midgley, G.F., Hughes, G.O., Thuiller, W., Rebelo, A.G. 2005. Migration rate limitations on climate change induced range shifts in Cape Proteaceae. Submitted to *Global Ecology and Biogeography*.
23. Mougou, R., Rejeb, S and Lebdi, F. 2002. “The role of Tunisian - gender issues- in water resources managment and irrigated agriculture.” The First Regional Conference on Perspectives of Arab Water Cooperation: Challenges, Constraints and Opportunities, Workshop on Gender and Water Management in the Mediterranean. Published in the Acts of the workshop.
24. Parida, B.P., D. B. Moalafhi and P. K. Kenabatho. 2003. Effect of Urbanization on Runoff Coefficient - A Case Study of Notwane Catchment in Botswana. *Proceedings of the International Conference on Water and Environment - 2003*, Bhopal, (Vol. “Watershed Hydrology”, Allied Publishers, India) pp. 123-131.
25. Totolo, Otlogetswe and Raban Chanda (2003) “Environmental change and sustainability issues in the Kalahari region” in *Journal of Arid Environments*. Volume 54, Issue 2 (June 2003), Pages 257-259.
26. Darkoh, M. B. K. (2003) “Regional perspectives on agriculture and biodiversity in the drylands of Africa” in *Journal of Arid Environments*. Volume 54, Issue 2 (June 2003), Pages 261-279.
27. Caylor, K. K., H. H. Shugart, P. R. Dowty and T. M. Smith (2003) “Tree spacing along the Kalahari transect in southern Africa” in *Journal of Arid Environments*. Volume 54, Issue 2 (June 2003), Pages 281-296.
28. Ringrose, Susan, Wilma Matheson, Piotr Wolski and Philippa Huntsman-Mapila (2003) “Vegetation cover trends along the Botswana Kalahari transect” in *Journal of Arid Environments*. Volume 54, Issue 2 (June 2003), Pages 297-317.
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AIACC Working Papers is an on-line, peer-reviewed publication of the AIACC project. Visit http://www.aiaccproject.org/working_papers/working_papers.html to obtain copies of papers.

- Working Paper No. 1: Conservation management in a changing world. Albert S. van Jaarsveld, Guy F. Midgley, Robert J. Scholes and Belinda Reyers. December 2003. (AIACC Project No. AF04)
- Working Paper No. 3: Developing perturbations for climate change impact assessments. Bruce Hewitson. December 2003. (AIACC Project No. AF07)
- Working Paper No. 5: Assessing the suitability of the EPIC crop model for use in the study of impacts of climate variability and climate change in West Africa. James O. Adejuwon. May 2004. (AIACC Project No. AF23)
- Working Paper No. 6: Skill assessment of the existing capacity for extended range weather forecasting in Nigeria. James O. Adejuwon and Theophilus O. Odekunle. May 2004. (AIACC Project No. AF23)
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- Working Paper No. 12: Climatic and Socio-Economic Influences on Malaria and Cholera Risks in the Lake Victoria Region of Tanzania. P. Yanda et al. June 2005. (AIACC Project No. AF91)
- Working Paper No. 14: Performance of NCEP-NCAR Reanalysis Variables in Statistical Downscaling of Daily Precipitation. T. Cavazos and B. Hewitson. July 2005. (AIACC Project No. AF07)
- Working Paper No. 15: Gridded Area-Averaged Daily Precipitation via Conditional Interpolation. B. Hewitson and R. Crane. July 2005. (AIACC Project No. AF07)
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APPENDIX 4: Assessment of Impacts and Adaptation to Climate Change Projects in Africa

	Name	Title	Institution and Country
1.	Robert Scholes	Impacts and Adaptations to Climate Change by the Biodiversity Sector in Southern Africa	CSIR Division of Water, Environment and Forest Technology, South Africa
2.	Bruce Hewitson	Development of Regional Climate Change Scenarios for Sub-Saharan Africa	Climate System Analysis Group, University of Cape Town, South Africa
3.	Balgis M. Osman and Nagmeldin Goubti	Environmental Strategies for Increasing Human Resilience in Sudan: Lessons for Climate Change Adaptation in North and East Africa	Higher Council for Environment and Natural Resources, Sudan
4.	Amadou Gaye	Assessing Global And Regional Climate Change Scenarios for West Africa	Cheik Anta Diop University, Senegal
5.	James Adejuwon	Food Security and Climate Change in Sub-Saharan West Africa	Obafemi Awolowo University, Nigeria
6.	Paul Desanker and Manuel Ferrao	Integrated Assessment of Miombo Region: Exploration of Impacts and Adaptation Options in Relation to Climate Change and Extremes	University of Virginia, USA and Centro Nacional de Cartografia, Mozambique
7.	Opha Pauline Dube	Impacts of Climate Change, Vulnerability and Adaptation Capacity in the Limpopo Basin of Semi-Arid Land Southern Africa: The Case of Eastern Botswana	University of Botswana, Botswana
8.	Ogunlade Davidson	Capacity Building in Analytical Tools for Estimating and Comparing Costs and Benefits of Adaptation Projects in Africa	University of Cape Town, South Africa
9.	Ayman F. Abou Hadid	Assessment of Impacts, Adaptation, and Vulnerability to Climate Change in North Africa: Food Production and Water Needs	Central Laboratory for Agricultural Climate, Agricultural Research Center, Egypt
10.	Shem Wandiga	Capacity Building to Evaluate and Adapt to Climate Change-Induced Vulnerability to Malaria and Cholera in the Lake Victoria Region	University of Nairobi and the Kenya Academy of Sciences, Nairobi, Kenya
11.	Adebowale Adepetu	Rural Households and Drought in the Sahel Region of West Africa: Vulnerability and Effective Mitigation Measures	University of Jos, Nigeria
12.	Rolph Payet	Assessment of Impacts of Climate Change on Tourism in Small Island States Based upon Field Studies in Seychelles and Comoros	The Seychelles Climate Centre (Ministry of Environment), Seychelles

Appendix 5: African Doctoral Fellowship Awardees and Projects

	Awardee	University and Country	Topic
1.	Mohamed Awer Mohamed	Egerton University, Kenya	A comprehensive assessment of the Perkerra River catchment
2.	Agnes Babugura	Ugandan student at the University of the Witwatersrand, South Africa	Vulnerability of rural societies to climate perturbations and their ability to adapt to climate variability in two different climatic regions in Botswana
3.	Anne Barrable	University of Cape Town, South Africa	The impacts of climate change on soil erosion and land degradation in South Africa
4.	Dennis Dlamini	Swazi student at the University of Natal, South Africa	A study of water scarcity at the meso-catchment (50-200 km ²) scale
5.	Benjamin Dovie	Ghanian student at the University of the Witwatersrand, South Africa	A study of linkages between native woody species diversity and the livelihoods of rural households in Southern Africa
6.	Francis Mugabe	Midlands State University, Zimbabwe	The groundwater resources of a semi-arid catchment basin in Zimbabwe
7.	Lawrence Ngorora	Zimbabwean student at the University of Cape Town, South Africa	Identifying the roles of local versus regional and hemispheric climate controls in seasonal climate forecasting
8.	Jane Olwoch	Rwandan student at the University of Pretoria, South Africa	The impact of climate change on tick-host relationships: a critical disease vector
9.	Louis Zapfack	University of Yaoude, Cameroon	The botanical diversity of the semi-deciduous rain forests of Cameroon
10.	Pessiezoum Adjoussi	University of Lomé, Togo	Assessment of the vulnerability of the Togo coastline resources to climate change and sea level rise using remote sensing and GIS
11.	Sithabiso Gandure	Zimbabwean student studying at the University of Witwatersrand, South Africa	Vulnerability assessment on rural Zimbabwe communities during drought
12.	Hamisai Hamandawana	University of Botswana, Botswana	Conducting an extensive study to determine both the direct and indirect effects of human impact on the ecology of the Okavango Delta
13.	Thulie Khumalo Mdluli	Swazi student at the University of Witwatersrand, South Africa	The social and economic impact of phasing out or regulating dirty fuels in South Africa
14.	John Ogola Ogege	University of Nairobi, Kenya	Hydro-geology of Lake Victoria
15.	Moussa Sall	University of Dakar, Senegal	The consequences of coastal zone (sea-level) changes on the Senegalese coast, particularly the delta regions
16.	Paul Tematio	University of	The interactive effects of soil, water, and

		Yaounde I, Cameroon	climate on land degradation and crop yield decrease in the West Cameroon Highlands
17.	Michael Wejuli	Makerere University, Uganda	Promoting the sustainable use of the Lake Victoria catchment area through management and efficient use of pesticides
18.	Modinah Adenike Oladayo Abdul Raheem	University of Ilorin, Nigeria	Monitoring of Ambient Total Oxidants and Their Precursors in Some Nigerian Cities
19.	Paul Otieno Abuom	World Agroforestry Centre (ICRAF), Kenya	Linking Land Use/Cover, Land Degradation Status and Sediment Dynamics of Rivers Nyando and Sondu Miriu Basins of Lake Victoria, Kenya
20.	Samuel Ogada Ochola	Dept of Geology, University of Nairobi, Kenya	The Contribution of Atmospheric Depositions of Phosphorus into Lake Victoria
21.	Shakirudeen Sule Odunuga	University of Lagos, Nigeria	Impact of Urban Landuse Change on Hydrological Fluxes in a Tropical Coastal City
22.	Patrick Eric Ngami- Ntsiba- Andzou	(Congolese student) Universite Cheikh Anta Diop de Dakar, Senegal	Applications de la Teledetection a l'etude de l'evolution de la lagune de Mbodiene (Petite Cote, Senegal)
23.	Isidor Marcel Sene	Universite Cheikh Anta Diop, (LERG), Senegal	Impact des Changements Climatiques sur l'agriculture au Senegal

Appendix 6: Small Research Grants for African Scientists

	Name	Institution and Country	Title
1.	Mateete Bekunda	Makerere University, Uganda	International Workshop on Nitrogen Fertilizer: SCOPE Rapid Assessment Project
2.	Zewdu Eshetu	Wendo-Genet College of Forestry, Ethiopia	Dendroclimatology Research in Ethiopia
3.	Bruce Hewitson	University of Cape Town, South Africa	Climate Trend Detection and Extremes in Africa
4.	Alfred Muzuka	Institute of Marine Sciences, Tanzania	Holocene Climatic Changes in East Africa as Recorded in Lake Sediments and Corals
5.	Stephen Rucina	National Museums of Kenya, Kenya	Late Quarternary Vegetation Dynamics of Central and Southern Kenya: an Integration with Eastern Arc Mountain Project, Tanzania
6.	Bob Scholes	Council for Scientific and Industrial Research, South Africa	Fluxnet Initiation in Africa
7.	Isabelle Ansorge	University of Cape Town, South Africa	Global Change: Monitoring the Indo-Atlantic connections south of Africa (GOODHOPE)
8.	Charles Basalirwa	Makerere University, Uganda	Climate change and variability on water resources in Uganda
9.	Abdelali Boulli	Cadi Ayyad University, Morocco	Inventory and mapping pine populations in Morocco using satellite data and evaluation of their physiological response to environmental stresses
10.	M.B.K. Darkoh	University of Botswana, Botswana	Natural Resource Utilisation and Land Use Conflicts in the Okavango Delta, Botswana
11.	Ekanem Ekanem	University of Uyo, Nigeria	Societal pressures on groundwater resources in southeastern Nigeria
12.	Josiah Murageh Kariuki	Kenya Meteorological Department, Kenya	Representativeness and Long-Range Transport of Carbon Monoxide at Mount Kenya GAW Station
13.	Seifu Kebede	Addis Ababa University, Ethiopia	Modeling the Isotopic Composition of Ethiopian Lakes: a tool for understanding past and future variations in climate and water resources
14.	Wellington Masamba	H. Oppenheimer Okavango Research Center, Botswana	Methane And Nitrous Oxide Fluxes In Different Ecosystems Of Botswana
15.	Aida Diongue Niang	Direction de la Météorologie Nationale du Sénégal, Senegal	Variability and Predictability of West African Monsoon Onset
16.	Donatien Njomo	University of Yaounde, Cameroon	Mapping Deforestation Rates and Carbon Fluxes in the Congo Basin Forest using Multi-Date SPOT-VGT Imagery for 1999 to 2003

17.	Community Project, Eric Odada	University of Nairobi, Kenya	Environmental Assessment of Lake Victoria Basin for AEO Report
18.	Community Project, Daniel Olago	University of Nairobi, Kenya	Pan Africa PAGES Workshop on 'African Palaeoperspectives: Linking the Past to the Present and the Future'
19.	Olatunji Oluwasemire	Ahmadu Bello University, Nigeria	Strengthening Agricultural Research Capacity to Generate Technologies that Adapt to Climatic Shifts and Variability in Nigeria's Dry Belt
20.	Mary Scholes	University of Witwatersrand, South Africa	Fire and climate change feedback in Southern Africa
21.	Chris Shisanya	Kenyatta University, Kenya	Vulnerability Assessment of Maize and Sorghum Crops to Climate Variability and Change in Kenya
22.	Joy M.B. Tukahirwa	The Environmental Conservation Trust of Uganda, ECOTRUST, Uganda	Assessment of land use / land cover changes, socio-economic drivers and associated carbon fluxes in southwestern Uganda
23.	Souleye Wade	Université Cheikh Anta DIOP de Dakar, Senegal	Setting the Benchmark – What do we Know/What is our Future? A science review and synthesis workshop on the long-term impacts of environmental change in West Africa
24.	Ernest A. Afiesimama	Lagos Nigerian Meteorological Agency, Lagos State, Nigeria	Simulation of West African Climate Variability and Change with an Adapted Regional Climate Model
25.	Tenelem Ayenew	Addis Ababa University, Addis Ababa, Ethiopia	Vulnerability of Selected Ethiopian Lakes to Climatic Variability, Neo- Technoism and Water Use
26.	Jean Jacques Bagalwa Mashimango	Center for Research in Natural Science, Lwiro, Democratic Republic of Congo	The Influence of Atmospheric Deposition on Biogeochemical Cycles in Lake Kivu
27.	Abdelfattah Benkaddour	Universite Cadi Ayyad, Marrakech, Morocco	Stable Isotope Records of Holocene Environmental Change from Moroccan Lakes: an Emerging Synthesis
28.	Community Project, Julius Francis	Western Indian Ocean Marine Science Association (WIOMSA), Zanzibar, Tanzania	Supporting African expert contributions to LOICZ II development at the IGBP/IHDP LOICZ II Inaugural Open Science Meeting 27-29 June 2005
29.	Phillipa Huntsman- Mapila	Harry Oppenheimer Okavango Research Centre, Maun, Botswana	Paleo-Environmental Reconstruction of Lake Ngami Basin, Botswana – the Role of Climate Change in Human Biogeography
30.	Community Project, Mohammed Umer Mohammed	Department of Geology and Geophysics, Addis Ababa University, Ethiopia	African Participation at the PAGES Open Science Meeting
31.	Nnadozie Okonkwo Nnoli	Nigerian Meteorological Agency (NIMET), Oshodi, Nigeria	Development of Analytical and Modeling Tools for Reliable Rainfall Prediction for Use in Adaptive Agricultural Decisions in Nigeria

32.	Stuart Piketh	University of the Witwatersrand, Johannesburg, South Africa	Trace Gas and Aerosol Emissions from Domestic Burning in Southern Africa
33.	Mark Zunckel	Environment and Forestry Technology, Durban, South Africa	Understanding the Relative Risks Posed to Agricultural Productivity by Air Pollution and Drought Across the Southern African Region

Appendix 7A: Lake Victoria Training Program, Year 2004 Participants

	Name	Institution	Country
1.	Gerald Maganga	Ministry of Water & Livestock, Dar es Salaam	Tanzania
2.	Priscilla N. Boera	KMFRI, Kisumu	Kenya
3.	Glory J. Kombe	National Environment Management Council Dar es Salaam	Tanzania
4.	Welton Phalira	Chancellor College, Zomba	Malawi
5.	Florence Mahay	Wami Ruvu Basin Water Office, Morogoro	Tanzania
6.	Joyce V. Engoke	Kenya Organization for Environment Education, Nairobi	Kenya
7.	Grace Ssanyu Asiyu	Kyambogo University, Kyambogo	Uganda
8.	Romulus Abila	Maseno University	Kenya
9.	Stephen Syampungani	School of Natural Resources, Copper Belt University	Zambia
10.	Charles Tushabomwe Kazooba	Mbarara University of Science & Technology	Uganda
11.	Caroline Aguti	Makerere University	Uganda
12.	Magreth Musiba	TAFIRI, Mwanza	Tanzania
13.	Austin Mtethiwa	Bunda College of Agriculture	Malawi
14.	Baraka C. Sekadende	TAFIRI, Kigoma	Tanzania
15.	Willy Mbemba Mavula	CRH-Uvira	D.R.Congo
16.	Kakogozo Bombi	CRH-Uvira	D.R. Congo
17.	Martha Muthoni Konje	Western University College of Science and Technology	Kenya
18.	Rukia Haruna	Public Health & Environmental Engineering Laboratory, Makerere University	Uganda
19.	Josephine Mulei	Chepkoiel Campus, Moi University	Kenya
20.	Joseph O. Rasawo	Zoology Department, Moi University	Kenya
21.	Engineer S.K. Ragu	Ministry of Water and Irrigation	Kenya
22.	Robert Mugabe	Water Resources Management, Entebbe	Uganda
23.	Sammy Ochola	University of Nairobi	Kenya

Appendix 7B: GIS/RS Training Program, Year 2004 Participants

	Name	Institution	Country
1.	Joshua Shivachi	Geography Department, Kenyatta University	Kenya
2.	Boitshwalero Katholo	University of Botswana	Botswana
3.	Timothy K. Gontul	University of Jos, Geography & Planning Department	Nigeria
4.	Olipa Simon	University of Dar es Salaam, Institute of Resource Assessment	Tanzania
5.	Eugene Apindi	University of Nairobi, Geology Department	Kenya
6.	Felix N. Welaji	University of Yaonde, Energy Department	Cameroon
7.	Hamisai Hamandawana	University of Botswana, Department of Environmental Studies	Botswana
8.	Robert Ekpenyong	University of Uyo, Geography Department	Nigeria
9.	Polycarp Mwima	Environmental Conservation Trust (ECOTRUST)	Uganda
10.	Aissatou Bailo Diallo	Engineering Geology Consultant, Dakar	Senegal
11.	George Koyier	Ministry of Water, Hydrology Section	Kenya
12.	Patricia Nyamango	Moi University, Department of Environmental Studies / PASS	Kenya

Appendix 8: Advanced Institutes

A list of young scientists from Africa involved in the: (i) Advanced Institute on Climatic Variability and Food Security; (ii) Advanced Institute on Urbanization, Emissions and the Global Carbon Cycle; and (iii) Advanced Institute on Vulnerability to Global Environmental Change

	Name	Title	Country
1.	Samuel G.K. Adiku	Exploring options for improving crop productivity within some farming zones of Ghana using coupled climate-crop models	Ghana
2.	Ngist Biru	Designing a climate sensitive decision support system for South Eastern (Somali region) Pastoral Areas of Ethiopia	Ethiopia
3.	Albert Calitz	An Early Warning and Visualization System to indicate the three monthly status and impact of the El Niño Southern Oscillation on Namibia	Namibia
4.	Trevor G. Lumsden	Application of Seasonal Climate Forecasts to Predict Regional Scale Crop Yields in South Africa	South Africa
5.	Alemu Asfaw Manni	Climate Information System and Food Security in Ethiopia	Ethiopia
6.	Pierre Sibiry Traore	Bytes for bites: translating climate forecasts into enhanced food security for the Sahel (Mali)	Mali
7.	Milton Michael Waiswa	Climate Information for Food Security: Responding to users needs of climate information (Uganda)	Uganda
8.	Claudia Holgate	How decision-makers are informed: A cross-scale approach to climate change information flows in South African Government	South Africa
9.	Isolo Paul Mukwaya	Can city be harnessed to reduce transport energy use? Solutions to greenhouse gas emissions problems in Kampala Region	Uganda
10.	Daniel Dabi	Assessing the Vulnerability of Fadama (Floodplain) Agriculture to Climate Variability and Change: A Case Study of Semi-Arid Northern Nigeria	Nigeria
11.	Delali Dovie	Response Model of Marginalized Rural Households, Natural Resource Use and Biodiversity in a Sporadic Drought Prone Semi-arid Environment	Ghana
12.	Shuaib Lwasa	Land Use Dynamics and Vulnerability in Peri-Urban Areas to Urban Ecological Change: A case study of Kampala, Uganda	Uganda
13.	Azeez Mabawonku	Vulnerability Assessment of Forest Ecosystems and Rural Livelihoods in South West Nigeria	Nigeria
14.	Florence Chidamahiya Nazare	The Institutional Dimensions of Vulnerability to Climate Variability and Change in Southern Africa with Particular Reference to Drought	Zimbabwe

		Disaster Risk	
15.	Peters Omoregie	Spatial Determinants of Resource Condition: A Case Study of South Eastern Nigeria	Nigeria
16.	Rosemary Owigar	Assessment of Vulnerability, Impact and Adaptation to Malaria in the Western Highlands of Kenya	Kenya



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