The global change
Sys**T**em for **A**nalysis, **R**esearch and **T**raining
(START)

START Research and Capacity Building: Helping to Advance the Nairobi Work Programme

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This document provides a brief overview of the global change System for Analysis, Research and Training (START), describes how our work is promoting the objectives of SBSTA's Nairobi Work Programme on Impacts, Vulnerability and Adaptation to Climate Change, and identifies potential areas for new initiatives to help advance the Nairobi Work Programme.

1. START Mission, Network and Partners

Scientific and technical capacity for research, assessment, communication and application of scientific information are critical for understanding and responding to the challenges of global environmental change, which includes climate change as well as land use and land cover change, biodiversity loss, long-distance transport of aerosols and stratospheric ozone depletion. These capacities are insufficient in many developing countries, contributing to their vulnerability and impeding effective adaptation.

START has been working since 1990 to promote and enable research on regional aspects of global environmental change in the developing world. We do this through capacity building programs, collaborative research and assessment projects, scientific networks and forums to share and disseminate information, and mobilization of financial, institutional and human resources. START was established to perform these functions under the aegis of the International Council for Science (ICSU) and is co-sponsored by the International Geosphere-Biosphere Programme (IGBP), the World Climate Research Programme (WCRP), and the International Human Dimensions Programme (IHDP) on global environmental change. We are a partner in the Earth System Science Partnership (ESSP), playing the leading role in supporting ESSP related activities and building capacity in developing country regions.

A network of START research centers and collaborating scientists and institutions throughout Africa, Asia, the Caribbean, Europe, Latin America, North America and the Pacific carries out the work of START. The work is coordinated by START Regional Committees for Africa, South Asia, Southeast Asia, Temperate East Asia, and Oceania, which are composed of leading scientists from each of the respective regions. START research centers, nodes and regional secretariats include:

- The Pan-African START Secretariat and Research Center, University of Dar es Salaam, Dar es Salaam, Tanzania
- START Research Node at University of Cape Town, Cape Town, South Africa
- START Research Node at the University of Ghana, Accra, Ghana
- START Research Node at the University of Nairobi, Nairobi, Kenya
- The South Asia Regional Research Center, the National Physical Laboratory, New Delhi, India
- The Southeast Asia START Regional Center, Chulalongkorn University, Bangkok, Thailand
- The Southeast Asia START Secretariat at the National Central University, Chung-Li, Taiwan
- The Regional Center for Temperate East Asia, Institute of Atmospheric Physics of the Chinese Academy of Sciences, Beijing, China
- The START-Oceania Secretariat and Research Center, University of the South Pacific, Suva, Fiji

The International START Secretariat, located in Washington, DC, coordinates and supports the activities of the START network. The START Scientific Steering Committee guides and oversees the START network. START activities are aided by and done in collaboration with many partners, including the ESSP programs of ICSU, the Asia-Pacific Network (APN), the Inter-American Institute (IAI), the Stockholm Environment Institute (SEI), the Academy of Sciences for the Developing World (TWAS), the United Nations Environment Programme (UNEP), the United Nations Institute for Training and Research (UNITAR), the United Nations University (UNU), the International Foundation for Science (IFS) and many others.

START's programmatic activities are supported by grants from governmental agencies of many different nations, multilateral agencies, private foundations and private enterprise. Some of the achievements of START are described in Table 1 at the end of this document.

2. START Programs

START activities are focused on programs for capacity building; vulnerability, adaptation and risk management; regional research; and strategic partnerships. Current and recent projects are described briefly below. More information about START programs can be found at www.start.org.

2.1. Capacity Building

2.1.1. Advanced Study Institutes

Advanced Study Institutes provide training and research experience to young scientists from developing countries in selected topics related to global environmental change and help to connect them to peers in other countries (see www.start.org/Program/advanced_institutes.html). The institutes combine 3-weeks of intensive, advanced level training in a seminar, a 12-18 month research activity funded by a small grant, mentoring by senior researchers and a synthesis workshop at the end of the research experience to share results. They are organized by START in partnership with an international center of excellence and internationally recognized experts are recruited to participate as faculty and mentors. Topics and partners of the Advanced Study Institutes include:

- Climate Variability and Food Security, with the International Research Institute for Climate and Society, Columbia University (IRI)
- Urbanization, Emissions and the Global Carbon Cycle, with the National Center for Atmospheric Research (NCAR)
- Vulnerability to Global Environmental Change, with the International Institute for Applied Systems Analysis (IIASA) and the International Human Dimensions Program (IHDP)
- Global environmental change and the vulnerability of water resources in the context of Millennium Development Goals, with UNESCO-IHE and Vrije Universiteit

Young scientists are selected to participate as Fellows in the Advanced Study Institutes through a highly competitive, international application and review process. The Fellows are assisted in developing and executing a research project and are encouraged to publish papers from their research. The institutes have resulted in publications of peer-reviewed collections of Fellows' papers: *Climate Prediction and Agriculture*, edited by M.V.K. Sivakumar and J. Hansen and published by Springer, and a forthcoming special issue of *Global Environmental Change* on vulnerability to environmental change.

2.1.2. Building African Capacity for Conserving Biodiversity in a Changing Climate

START and the Institute for Resource Assessment of the University of Dar es Salaam are implementing a program of education and training to build capacity in Africa for conserving biodiversity in a changing climate. Masters level courses and internships targeted to early- and mid-career conservation professionals and researchers will be offered at the campus of the University of Dar es Salaam. Participation is open to persons from across Africa, but priority will be given to applicants from the Albertine Rift countries of Burundi, Democratic Republic of

Congo, Rwanda, Tanzania and Uganda. The courses will focus on changing risks to biodiversity from climate change and other pressures and on strategies to incorporate management of climate change risks into conservation practices. Externships will give participants an opportunity to apply concepts learned in the classroom to the field. Successful participants will receive credits toward a masters of science degree and will acquire enhanced knowledge and skills that will enable them to contribute substantively to adapting biodiversity conservation practices to changing risks in a changing climate.

2.1.3. Fellowship and Visiting Scientist Program

The START Fellowship and Visiting Scientist program provides opportunities for scientists from developing countries to advance their global change related research (see www.start.org/Program/fellowship_vis.html). 175 START Global Change Fellowships and Visiting Scientist Fellowships have been awarded, increasing the number of developing country scientists engaged in global change research and in the international research networks of the ESSP. Global Change Fellowships are offered at the graduate and post-graduate levels to young scientists from Africa, Asia, and Oceania. Recipients of these fellowships use their awards to advance their research by collaborating with senior researchers in leading centers of research related to their research interests. The duration of these fellowships is ordinarily one or two semesters, typically 4-8 months. Intended outcomes of the fellowships include publication in a peer-reviewed journal, development of research proposals for funding, long-term collaborations between the START Fellows and their home and host institutions, and long-term involvement in global change research.

A parallel activity, the Visiting Scientist Program, allows more senior scientists from developing countries the opportunity to undertake short-term visits to major international laboratories to become acquainted with recent advances in research. The intended outcome is the development of long-term programmatic linkages between the individuals and institutions involved. The duration of these awards is usually 1-2 months.

2.1.4. African Doctoral Fellowships

African Doctoral Fellowship awards provide for up to two years of study at an African university leading to completion of a Ph.D. dissertation related to global environmental change or for the final year of graduate study combined with one year of post-doctoral research. 42 doctoral fellowship awards have been made

and provide for tuition, research materials and a small living allowance. See www.start.org/Program/African_Doc.html for more information.

2.1.5. Young Scientist Awards

START's Young Scientist Award program recognizes the achievements of outstanding young scientists from developing countries in Africa, Asia and the Mediterranean region. Nominations for awards are invited for young scientists who have written and published a noteworthy journal article on regional aspects of global environmental change. 263 Young Scientist Awards have been made. Award decisions are based on the quality, innovation and importance of the published papers. Approximately a dozen awards are made each year. See www.start.org/Program/young_scientist.html for more information.

2.1.6. African Small Grants

Approximately 10 small grants are awarded annually by START to African researchers working on topics in the areas of climate variability and climate change; impacts, adaptation and vulnerability to global environmental changes; land use and ecosystem change; bio-geochemical fluxes; and biodiversity. Award decisions are based on scientific merit and on their potential to contribute to the research programs and projects of the ESSP and its partner programs. See www.start.org/Program/African_sm_grants.html for more information.

2.1.7. Young Scientist Conferences

START, working with a variety of partners, organized international conferences in 2003 and 2006 for young scientists working on global environmental change. Participation in these major, high visibility conferences is by invitation, based on merit review of submitted paper abstracts by an international science committee. For each conference, over 700 applications were received, from which 100 were invited to present their papers. The prestigious conference was chaired in 2006 by Professor Peter Tyson of the University of Witwatersrand and keynote speakers included Nobel Prize winner Professor Paul Crutzen and Professor Congbin Fu of the Chinese Academy of Sciences. Awards were made for best paper and best poster in different categories. The conference was held in Beijing in conjunction with the ESSP Open Science Meeting, giving the young scientists an opportunity to interact with many members of the global change research community. See www.start.org/YSC/YSC2006.html for more information.

2.2. Vulnerability and Adaptation Assessment

2.2.1. Assessments of Impacts and Adaptations to Climate Change

Assessments of Impacts and Adaptations to Climate Change (AIACC) was an IPCC initiated GEF funded project that was coordinated by START in collaboration with TWAS and UNEP. The objectives of the project were to enhance scientific capacity in developing countries, advance scientific understanding of climate change impacts, vulnerability and adaptation, establish links between science and policy communities to enable adaptation planning, contribute new knowledge and expertise for National Communications and promote participation of developing country scientists in the IPCC 4th Assessment Report and other international science activities.

Twenty-four regional and national climate change assessments were executed by developing country institutions and experts in Africa, Asia, Latin America, and the Caribbean, Indian and Pacific Oceans. More than 350 scientists, experts, stakeholders and students from 150 institutions in 50 developing countries and 12 developed countries participated in the project. The focus of the assessments varied and included agriculture, food security, water resources, biodiversity, fisheries, forestry, human settlements and human health. The project resulted in more than 60 papers in peer-reviewed journals and books, over 40 papers in the on-line peer-reviewed *AIACC Working Papers* series and numerous other publications, including 25 student theses. Knowledge and expertise developed by the project are contributing to National Communications to the UNFCCC and a variety of adaptation planning activities. More than 30 of the AIACC participants were invited to be authors of the IPCC 4th Assessment Report and

the draft report of Working Group II contains over 100 citations of AIACC publications.

Work continues on synthesis and communication of the findings of the assessments. Two books are in preparation, *Vulnerability to Climate Change* and *Adapting to a Changing Climate*, which are expected to be published in late 2007. *AIACC Working Papers* can be accessed from www.aiaccproject.org/working_papers/working_papers.html. Technical reports from the regional assessments and the draft final report of the project are available at: www.aiaccproject.org/Final%20Reports/final_reports.html.

2.2.2. Advancing Capacity to Support Climate Change Adaptation

Advancing Capacity to Support Climate Change Adaptation (ACCCA) is a 3-year project that was launched in 2006 by START, UNITAR, SEI and other partners to implement pilot adaptation projects in Africa and Asia. The project will bring together stakeholders and scientific communities to implement roughly 18 pilot adaptation actions that will enable and support effective adaptation decisions that reduce vulnerability to climate change while also promoting sustainable development. The pilot actions will identify and prioritize climate risks, assess available information about risks and adaptation opportunities, synthesize and communicate this information for at-risk groups and decision-makers, develop consensus recommendations for adaptation with stakeholders and promote their adoption. Implementation of the project is being shaped by lessons from the AIACC project about the communication of climate risk information, the need to address climate risks and adaptation in an integrated and multidisciplinary way, the importance of substantively engaging stakeholders and the long-term benefits of partnering scientific and policy institutions to better understand and manage climate change risks. Further information about the project can be found at: www.acccaproject.org.

2.2.3. Climate Prediction and Agriculture

The Climate Prediction and Agriculture (CLIMAG) project sought to demonstrate the practical utility of using forecasts of regional climate variability at intra-seasonal to seasonal scales in agricultural decision-making. The project was developed following the International Workshop on Climate Prediction and Agriculture held in Geneva in September 1998. Research activities were undertaken in South and Southeast Asia, China, Oceania and West Africa. Papers from the CLIMAG project were published in a special issue of Climate Research and are available at http://www.int-res.com/abstracts/cr/v33/n1/. Follow-up to the CLIMAG project resulted in the Advanced Study Institute on Climate

Variability and Food Security and publication of the book *Climate Prediction and Agriculture* from the institute.

CLIMAG was implemented by START in partnership with the International Research Institute for Climate Prediction (IRI), the World Meteorological Organization (WMO), the National Oceanic and Atmospheric Administration - Office of Global Programs (NOAA-OGP), the Asia-Pacific Network for Global Change Research (APN), the Agricultural Production Systems Research Unit (APSRU), and the Inter-American Institute for Global Change Research (IAI).

2.3. Regional Research

2.3.1. Monsoon Asia Integrated Regional Studies

START coordinated the initial phases of the ESSP's first integrated project, Monsoon Asia Integrated Regional Studies (MAIRS). Together with the other ESSP partners (IGBP, IHDP, WCRP, and DIVERSITAS), START and its regional networks in East Asia, South Asia and Southeast Asia continues its involvement in the integrated regional studies of global change in Monsoon Asia of the MAIRS project. The long-term objectives of the integrated regional studies include better understanding of how human activities are interacting with and altering natural variability of atmospheric, terrestrial, and marine components of the environment; contribute to the provision of a sound scientific basis for sustainable regional development; and develop a capability for predicting changes in global-regional linkages in the Earth System and consequences of such changes. The MAIRS project is now being managed by a project office located with the START Temperate East Asia Regional Center at the Chinese Academy of Sciences. More information about MAIRS is available at www.start.org/Program/MAIRS.html.

2.3.2. Thematic Regional Studies

START sponsors a variety of small collaborative regional research projects in Africa and Asia. Topics include land use change and its impacts on terrestrial ecosystems, regional climate variability and change, regional changes in the atmosphere, global change and coastal zones and global change and water resources.

2.4. Strategic Partnerships

2.4.1. Global Observation of Forest and Land Cover Dynamics

START partners with the US National Aeronautics and Space Administration (NASA) to support the Global Observation of Forest and Land Cover Dynamics project (GOFC-GOLD). The project is a an international effort to provide ongoing space-based and in-situ observations of forests and other vegetation cover for the sustainable management of terrestrial resources, which are being used to develop an accurate, reliable, quantitative understanding of the terrestrial carbon budget. START's role is to strengthen the participation of developing country scientists in GOFC/GOLD-related activities. This includes participation in a forum for users of satellite data to develop and promote use of globally consistent data processing and interpretation methods; regional and global datasets on location of forest types, changes in forest cover and biological functions of forests; and

international networks for data access, data sharing, and international collaboration. More information can be found at www.start.org/Program/GOFC.html.

2.4.2. Industrial Transformation in Asia

START partners with the New Energy and Industrial Technology Development Organization (NEDO) of Japan, the Industrial Transformation Project of IHDP and the United Nations University to implement the project Industrial Transformation in Asia (IT/Asia). Asia is in the midst of an urban-industrial-led development transition unparalleled in its scale and intensity, which has the potential of radically impacting the regional and global environment. The challenge is to shift to patterns of economic development and urban-industrial systems that are less energy, materials, pollution and water intensive but which will still accommodate needs of economic development. The IT/Asia Asia project is engaging a network of researchers and institutions from Asia with other international partners to examine key issues of industrial transformation including: energy intensities of industrial sectors; strategies for reducing energy use, emissions, and material consumption; legal, financial, social, informational and institutional barriers to technology transfer and adoption; the role of public policy and private sector in promoting adoption of energy and material efficient technologies; and integration of economic and environmental policies to reduce energy and material consumption. Further information can be found at www.start.org/Program/IT.html.

2.4.3. Asia-Pacific Network Projects

START works closely with the Asia-Pacific Network for Global Change Research (APN) to solicit, review and select proposals for projects that advance global change research in Asia and the Pacific, including research on changes in complex climate, ocean and terrestrial systems, and on physical, chemical, biological and socio-economic processes. START and APN also collaborate to sponsor science meetings, e.g. the Young Scientist Conferences on Global Change, and in the MAIRS project. More information can be found at www.start.org/Program/APN.html.

2.4.4. Intergovernmental Panel on Climate Change

START collaborates on a number of activities with the Intergovernmental Panel on Climate Change. The IPCC sponsored the AIACC project, chaired the AIACC Steering Committee and facilitated technical support from leading scientists who are active in the IPCC assessments. START was closely involved in the planning of the IPCC's 4th Assessment Report (AR4) and was consulted to help IPCC identify developing country scientists to involve as authors of the AR4. START and the START Oceania Regional Center are co-sponsoring and co-chairing a major science conference with IPCC, Integrating Analysis of Regional Climate Change and Response Options, to be held in Fiji in June 2007.

3. START and the Nine Work Areas of the Nairobi Work Programme

Most of the work of START cuts across and is relevant to the nine work areas of the Nairobi Work Program (NWP). Below we highlight START activities that are particularly relevant to specific work areas of the NWP.

3.1. Methods and tools

The AIACC project resulted in the development and demonstration of a variety of methods and tools for the assessment of climate change impacts, adaptation and vulnerability. These are documented on the AIACC data, methods and synthesis website (http://sedac.ciesin.columbia.edu/aiacc/), technical reports of the individual assessments and the many publications from the project. Brief descriptions of some of the methods can be found in the UNFCCC compendium of methods and tools for assessment.

The broad approach taken by the AIACC project is one that has been called a 'second generation' approach to climate change assessment. Second generation assessment methods often use climate change scenarios to examine potential impacts, which is the focus of the earlier generation of assessments. But greater emphasis is placed on understanding the environmental, social, economic and institutional factors that shape the vulnerability of a system, place or population that is exposed to climate stresses, the capacity for coping with climate variability and adapting to climate change, and the processes by which adaptation decisions are made.

While the general approach of the AIACC assessments can be categorized as second generation, the specific methods differed across the individual AIACC assessments. Innovative methods developed by AIACC assessments include high-resolution regional climate change scenarios for sub-Saharan Africa (AIACC Project No. AF07), rural livelihoods vulnerability assessments in Sudan, Nigeria, Argentina and Mexico (AIACC Project Nos. AF14, AF92 and LA29), benefit-cost analysis of adaptation in South Africa and The Gambia (AIACC Project No. AF47) and multi-criteria analysis of adaptation in China, Mongolia, Philippines and Jamaica (AIACC Project Nos. AS25, AS06, AS21 and SIS06).

The CLIMAG project tested the use of seasonal weather forecasting applied with crop models to evaluate their potential for improving farm management decisions. Documentation of the tools can be found in the publications from the CLIMAG project (see Section 2.2.3 above).

The ACCCA project will be developing and testing methods for constructing climate outlooks for near-, mid- and long-term time horizons and using the outlooks for adaptation planning. The project will also be testing different methods and tools for communicating climate risk information to at-risk populations and decision-makers. The methods will be disseminated via the project website (www.acccaproject.org).

Training in assessment methods has been provided by START in our Advanced Study Institutes and under the AIACC project. The AIACC project implemented training workshops on climate data analysis, scenarios and downscaling and on vulnerability and adaptation assessment. Training workshops are also being planned for the ACCCA project. The biodiversity conservation and climate change courses that are being developed with the University of Dar es Salaam will provide instruction in methods for biological assessments, modeling climate change impacts on species distributions, and for designing protected area networks that are resilient to climate change.

3.2. Data and observations

The Climate System Analysis Group (CSAG) of the University of Cape Town developed a database under the AIACC project for long-term weather observations at stations across sub-Saharan Africa. The station data, as well as climate change projections (see Section 3.3 below) are distributed via the web at http://data.csag.uct.ac.za/.

The START Temperate East Asia Regional Center in Beijing maintains climatological data for the monsoon Asia region in support of MAIRS and other projects. See www.tea.ac.cn/english/index.asp for more information.

The Miombo Network, established with assistance from START, IGBP and LUCC, provides remote sensing and other environmental data related to land use and land cover change for the Miombo region. The network has activities in Malawi, Mozambique, Zambia, Zimbabwe, Tanzania and South Africa. The data is distributed on CD-ROM and will soon be available on-line. For more information, see www.geog.psu.edu/geclab/miombo/index.html.

3.3. Climate modeling, scenarios and downscaling

Two of the AIACC assessments performed statistical and dynamical downscaling of climate change projections from GCMs to produce high-resolution regional scenarios of climate change. CSAG at the University of Cape Town produced high-resolution climate change projections for sub-Saharan Africa as part of AIACC Project No. AF07 using statistical techniques and

regional climate models. The regional scenarios and GCM outputs, along with weather station data, are available on –line at http://data.csag.uct.ac.za/.

The Laboratory for Atmospheric Physics at the Cheik Anta Diop University in Senegal tested and evaluated a regional climate model for projecting climate changes in West Africa and produced scenarios for the region that can be made available to other users as part of AIACC Project No. AF20. Other AIACC assessments used a variety of techniques to construct scenarios of climate change for their study areas from GCM and RCM outputs.

The START Temperate East Asia Regional Center in Beijing leads the Regional Climate Model Intercomparison Project for Asia to evaluate and improve regional climate modeling of monsoon climate. Ten research groups from Australia, China, Japan, South Korea and the US participate. The project is supported by START, APN and the Chinese Academy of Sciences.

START has provided small research grants and doctoral fellowships to individuals from Africa who participate in the African Monsoon Multidisciplinary Analysis (AMMA) project. The project seeks to improve knowledge and understanding of the West African monsoon for prediction and decision-making.

3.4. Climate related risks and extreme events

All 24 of the AIACC assessments examined climate related risks, including extremes, to promote better understanding of the risks and adaptation options. Flood risks are examined for urban dwellers of Buenos Aires (AIACC Project No. LA26), rice farmers in the lower Mekong River basin (AIACC Project No. AS07), townships of Fiji (AIACC Project No. SIS09), and economies of Central America (AIACC Project No. LA06). Drought risks are assessed for subsistence farmers in Botswana, Nigeria and Sudan (AIACC Project Nos. AF42, AF23, AF92 and AF14). Risks to human health that are related to climate variability and change are investigated for the Caribbean and Lake Victoria region of East Africa (AIACC Project Nos. SIS06 and AF91). Current practices for coping and managing climate risks were examined and lessons derived for enabling adaptation to future climate change. Traditional knowledge was an important factor in several of the assessments (e.g. Botswana, Sudan and Nigeria). A synthesis of findings from the AIACC project about vulnerability to climate risks is provided by *For Whom the Bell Tolls, Vulnerabilities in a Changing Climate*, (see www.aiaccproject.org/working_papers/working_papers.html, AIACC Working Paper No. 21).

Climate related risks and extremes are also central to the CLIMAG and MAIRS projects. The ACCCA project will be promoting understanding of and adaptation to climate risks in Africa and Asia in contexts such as fishing livelihoods of coastal Nigeria and Lake Victoria, subsistence farming in Malawi, weather related disasters in Nepal, rangelands management in Mongolia, and community malaria prevention in Kenya. Several of the Advanced Study Institutes, as well as the biodiversity conservation courses at the University of Dar es Salaam emphasize training of young scientists and professionals in methods for assessing climate risks.

3.5. Socio-economic information

The second generation approach to climate change assessment that characterizes the AIACC assessments places a strong emphasis on understanding the social and economic processes that determine vulnerability to climate variability and climate change. The AIACC assessments collected information about social and economic conditions in their study areas and used this information in their assessments of vulnerability and adaptive capacity.

Scenarios of socioeconomic changes for monsoon Asia will be developed as part of the MAIRS project.

3.6. Adaptation planning and practices

A primary focus of the AIACC project was on research and assessment and not on adaptation planning. Still, the project yielded numerous lessons that can help to guide adaptation planning, which are synthesized in *A Stitch in Time, Lessons for Climate Change Adaptation from the AIACC Project* (see AIACC Working Paper No. 48, http://www.aiaccproject.org/working_papers/working_papers.html).

Adaptation planning is the main focus of the new ACCCA project. Under this joint START, UNITAR and SEI project, stakeholders and scientists will work together to evaluate and prioritize climate risks, assess adaptation options, communicate information about risks and options to at-risk populations and decision-makers, and identify preferred options to be promoted. Examples of decision contexts in which pilot adaptation actions are being planned include community-led adaptation for sustainable livelihoods in coastal south-western Nigeria, water management in Mali, strengthening community management of malaria risk in a changing climate, improving the resilience of subsistence farming in Malawi, adapting fisheries management in Lake Victoria, reducing risks from weather related disasters in Nepal, improving rangeland management and institutions in Mongolia, and integrating development and adaptation policies in India.

Adaptation planning was an important element of the Advanced Study Institute on climate variability and food security and will be a major focus of the biodiversity conservation program at the University of Dar es Salaam.

3.7. Research and technologies for adaptation

The mission of START is to promote and enable global environmental change research in developing coutnries. START activities have engaged more than 1000 developing country scientists in climate change and other global change research, enhanced the capacity of hundreds of young scientists through training, fellowships and research grants, and resulted in 100s of publications. In START's first decade, research conducted within the START network emphasized physical and biological aspects of climate change and other global environmental changes to improve understanding of the causes and consequences. Since 2000, the management of risks from environmental change has been an increasingly important part of our research, as exemplified by the AIACC, CLIMAG and MAIRS projects. Risk assessment and adaptation will continue to be important areas of START research.

3.8. Economic diversification

Diversification of livelihoods and economic activities emerged from the AIACC project as key strategies for reducing risks where economies are highly dependent on climate sensitive natural resources. Diversification strategies for managing current climate risks are in use in settings as varied as subsistence agricultural communities of northern Nigeria, Sudan, Mexico, Lao PDR and the Philippines; smallholder commercial farmers in Argentina, Mexico and Thailand; and pastoralists in Mongolia. Recommendations from these and other studies urge further economic diversification as important for future adaptation to climate change. However, there are significant constraints on diversification which are identified in several of the AIACC studies. Success will require integration of development strategies with adaptation planning (see *A Stitch in Time, Lessons for Climate Change Adaptation from the AIACC Project*, www.aiaccproject.org/working_papers/working_papers.html, AIACC Working Paper No. 48).

4. Potential New Initiatives for START to Contribute to the NWP

4.1. Decision Support for Climate Change Adaptation

Climate change adaptation is best conceived as an on-going process and not as discrete one-time actions or projects. Enabling effective adaptation processes requires a sustainable system for generating and communicating climate risk information and assisting stakeholders with interpretation and application of the information in decision-making. Demonstrations of how this can be done are needed. START proposes a project under which a small number of pilots would be implemented, each of which would assess climate change risks to a well defined sector, system, or population, develop and evaluate adaptation strategies, and establish a sustainable decision support system that will assure that decisions are based on the best possible information. The pilots would be executed by developing country teams that would include scientific and stakeholder institutions - the latter including both government and non-government institutions. The substantive involvement of stakeholders will be critical for assuring that the information systems will be relevant and useful and will receive in-country support and resources for their continuation. An emphasis would be placed on development, demonstration and documentation of methods that could be replicated by others.

4.2. Albertine Rift Integrated Regional Studies

START, the Institute for Resource Assessment of the University of Dar es Salaam, the Makerere University Institute for Environment and Natural Resources and BirdLife International have prepared a proposal at the request of the MacArthur Foundation for an assessment of climate change and biodiversity conservation in the Albertine Rift of Africa. The proposed project, which is under consideration by the MacArthur Foundation, is an initial step to enable long-term conservation planning that will protect the biodiversity of the Albertine Rift region from climate change. START and its partners hope to expand the scope of the project with the support of other donors in order to encompass important social and economic aspects of biodiversity conservation and to consider climate change threats to livelihoods, agriculture, and rural development The goal would be to develop integrated strategies for responding to climate change that would simultaneously promote biodiversity conservation, livelihood security, food security and poverty reduction in the region, consistent with objectives of the Nairobi Work Programme.

4.3. Capacity Building for Climate Change Adaptation

START is in discussions with a number of donors for support of a comprehensive program of capacity building that would target development of the scientific and technical capacities of institutions, researchers and policy practitioners for adapting to climate change risks. The program would focus on the least developed countries and would include comprehensive regional needs assessments, fellowships for early and mid-career researchers and practitioners, Advanced Study Institutes on cross-disciplinary methods for assessing risks and planning adaptation, development of graduate level courses on climate risk assessment and risk management for integration into existing and relevant programs at leading universities in least developed and low income countries, and establishment of regional forums to bring together scientific, development and policy communities to share information on the latest research and applications of research to adaptation.

Table 1: START Achievements

OBJECTIVE	MEASURES OF ACHIEVEMENT
ESTABLISH INFRASTRUCTURE FOR COLLABORATIVE REGIONAL RESEARCH	• 5 Regional START Coordinating Committees established and operating in East-, Southeast-, and South Asia, Oceania, and Africa; • 1 Regional Council (Southeast Asia); • 5 Regional Research Centers/Secretariats (East-, Southeast-, and South Asia, Oceania, and Africa); • 1 Interim Secretariat and Regional Planning Committee (MED)
ENHANCE REGIONAL COOPERATION IN GLOBAL CHANGE RESEARCH	• Numerous collaborative research Networks established on focused themes and issues • >60 countries and >150 institutions participated in numerous multi-institution and multi-country research projects • Over 75 Regional Planning Meetings and Regional Research Network Training Workshops • Successfully engaged numerous developing country researchers with intergovernmental organizations (APN, IAI, IPCC, UNEP, WMO) • >35 developing country START project participants are authors of IPCC AR4, MEA and IAAST
INCREASE RESEARCH INITIATIVES AND PUBLICATIONS	• Developed and implemented major regional research initiatives with partners (AIACC, MAIRS, CLIMAG, ACCCA) • Numerous smaller regional research projects • 10 books and special journal issues published • 100s peer-reviewed publications • Numerous graduate student theses supported and completed
INCREASE UNDERSTANDING OF GLOBAL CHANGE ISSUES AT REGIONAL LEVELS	• *Regional-Global Linkages in the Earth System* (IGBP Series), *Climate Change and Africa* and other publications • On-line *AIACC Working Papers* series • Dissemination of global change information by Regional Centers • Hosting of regional global change awareness symposia with APN • Co-organizing, co-chairing and hosting IPCC regional science conference in Fiji
INCREASE IN NUMBER OF TRAINED DEVELOPING COUNTRY SCIENTISTS	• 263 Young Scientist Awards • 175 Visiting Fellows and Scientists • 21 Guest Lecturers • 42 Doctoral Research Fellowships • 60 GC Training Institutes at Global and Regional Levels • Around 1000 scholars from developing countries involved annually in START-related activities
ENHANCE RESOURCE MOBILIZATION	• $2-4M mobilized annually for developing country scientists and institutions through grants to START from science funding agencies, bilateral multilateral development agencies and private foundations • Substantial in-kind contributions from developing country host governments, institutions and scientific community
FACILITATE DIALOGUE WITH POLICY COMMUNITY AND IMPACT POLICY FORMULATION	• Contributions of START project participants in numerous policy dialogues and policy related assessments, including with IPCC, MEA, WMO, UNEP, UNU, African Ministerial Conference on Environment • Adaptation policy recommendations and initiatives stimulated by AIACC project; Launch of new adaptation policy project, ACCCA. • Interaction with UNFCCC Secretariat, subsidiary bodies, and national climate change committees to help support National Communications to the UNFCCC