Development Impact

Sokoine University of Agriculture, 
P.O. Box 3000, Chuo Kikuu, Morogoro, Tanzania.
**Tanzania - Basic Socio-economic data**

<table>
<thead>
<tr>
<th>Human pop. (x10^6) 2012</th>
<th>45</th>
</tr>
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<tbody>
<tr>
<td>Size (km^2)</td>
<td>939,300</td>
</tr>
<tr>
<td>Arable land (’000ha)</td>
<td>48,100</td>
</tr>
<tr>
<td><strong>Area under cultivation (’000ha)</strong></td>
<td>6,000</td>
</tr>
<tr>
<td>Area suitable for irrigation(’000ha)</td>
<td>29,000</td>
</tr>
<tr>
<td><strong>Area under Irrigation(’000ha)</strong></td>
<td>331</td>
</tr>
<tr>
<td>Protected forests (’000 ha)</td>
<td>35,042</td>
</tr>
<tr>
<td><strong>Rangelands (’000 ha)</strong></td>
<td>50,000</td>
</tr>
<tr>
<td>Cattle pop</td>
<td>21.125</td>
</tr>
<tr>
<td><strong>Dairy cattle (x10^6)</strong></td>
<td>0.720</td>
</tr>
<tr>
<td>Vol. Milk (x10^6) litres</td>
<td>1,800</td>
</tr>
<tr>
<td>Consumption/cap. (L/annum)</td>
<td>42</td>
</tr>
<tr>
<td>Vol. processed</td>
<td>2.3%</td>
</tr>
<tr>
<td><strong>GDP, current prices (billion USD (2013))</strong></td>
<td>33.3</td>
</tr>
<tr>
<td>GDP per capita, 2013 (US$)</td>
<td>743</td>
</tr>
<tr>
<td><strong>Rural income poverty level (&lt;1.25 $/day)</strong></td>
<td>9.7%</td>
</tr>
<tr>
<td>Agric GDP</td>
<td>25.6</td>
</tr>
<tr>
<td><strong>Livestock GDP</strong></td>
<td>4.6</td>
</tr>
<tr>
<td>Dairy GDP</td>
<td>1.4%</td>
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Map of Tanzania - Regions
FOREWORD

For over 40 years, Tanzania through Sokoine University of Agriculture (SUA) has benefitted from the Norwegian Government by supporting capacity building specifically in high level human resources development - in the fields of agriculture, forestry and natural resources. The Norwegian assistance to then Division of Forestry in the Faculty of Agriculture and Forestry, University of Dar es Salaam started in 1973. Later on in the 1980-1990s, the Norwegian support was extended to the Departments of Animal Science, Soil Science and Institute of Continuing Education. The support focused mainly on staff development, postgraduate training, infrastructure development and to a lesser extent on research.

In the mid-1990s, the scope of support changed from individual projects to University-wide support mode. The widening of the scope of support through what was termed as University-wide Frame Agreement led to institutional transformation and sustainable growth of SUA. This Agreement laid foundations, set directions and standards for the proceeding Norwegian supported programmes. The proper coordination of the programmes led to improved teaching and learning environment, expansion and diversification of academic programmes, change from academic research to problem solving or demand driven/action research, development and dissemination of appropriate technologies to end beneficiaries and change from donor to recipient managed development cooperation.

Besides the Frame Agreement, other Norwegian supported programmes include; Tanzania Agricultural Research Programme Phase II (TARP II), Future Opportunities and Challenges in Agricultural Learning (FOCAL), Programme for Agricultural and Natural Resources Transformation for Improved Livelihood (PANTIL), Enhanced Pro-Poor Innovations in Natural Resources and Agricultural Value Chains (EPINAV) and Climate Change Impacts, Adaptation and Mitigation (CCIAM). The programmes in addition to building institutional capacity of SUA also led to improved livelihood of small holder farmers and the capacity of Tanzania to participate in global climate change initiatives.

It is estimated that about NOK 565 million have been utilized over the 40 years period to support teaching, research and infrastructure development activities. Such South-North cooperation is considered to be the longest and one of its kind in Africa. It has contributed significantly to the growth of SUA from a faculty to a fully-fledged University in 1984 and be self-sufficient in human resources.
A team comprising of 11 SUA staff was appointed to prepare a report on the impact of the Norwegian support to Tanzania as channeled through SUA. It is gratifying to see that the team has been able to come up with this report. The report has also been documented in a 30 minutes video clip. This document provides useful information on the contribution and impacts of the Norwegian Development Cooperation support over the 40 years period extending from 1973 – 2015.

On behalf of the SUA and on my own behalf, I take this opportunity to thank the Norwegian government for this generous support and interest in the development of SUA and the people of Tanzania in general. I also wish to thank the government of the United Republic of Tanzania for identifying and supporting SUA to participate in the implementation of the national development agenda.

Prof. G.C. Monela
Vice Chancellor
Sokoine University of Agriculture
## List of Abbreviations

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<th>Full Form</th>
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<tr>
<td>ARU</td>
<td>Ardhi University</td>
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<tr>
<td>ASDP</td>
<td>Agricultural sector development programme</td>
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<tr>
<td>ASDP</td>
<td>Agricultural sector development programme</td>
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<tr>
<td>ASDS</td>
<td>Agricultural Sector Development Strategy</td>
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<td>ASLM</td>
<td>Agricultural sector Lead Ministries</td>
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<tr>
<td>AUN</td>
<td>Agricultural University of Norway</td>
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<tr>
<td>BEST</td>
<td>Tanzania Biomass Energy Strategy</td>
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<tr>
<td>BRELKA</td>
<td>Business Registration and Licensing Agency</td>
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<tr>
<td>BRN</td>
<td>Big Results Now</td>
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<tr>
<td>CA</td>
<td>Conservation agriculture</td>
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<tr>
<td>CCIAM</td>
<td>Climate Change Impacts Adaptation and Mitigation in Tanzania</td>
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<tr>
<td>CICERO</td>
<td>Centre for International Climate and Environmental Research</td>
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<td>CSP</td>
<td>Corporate Strategic Plan</td>
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<tr>
<td>DANIDA</td>
<td>Danish International Development Agency</td>
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<tr>
<td>DASP</td>
<td>Department of Animal Science and Production</td>
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<tr>
<td>DRPGS</td>
<td>Directorate of Research and Post-Graduate Studies</td>
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<tr>
<td>EAFRO</td>
<td>East African agricultural and Forestry research organization</td>
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<tr>
<td>EPINAV</td>
<td>Enhancing Pro-poor Innovations in Natural Resources and Agricultural Value-chains</td>
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<tr>
<td>FFS</td>
<td>Farmer Field Schools</td>
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<tr>
<td>FOCAL</td>
<td>Future Opportunities and Challenges in Agricultural Learning</td>
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<tr>
<td>FREL</td>
<td>Farmer Research and Extension Learning</td>
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<tr>
<td>GPIC</td>
<td>Gender Policy Implementation Committee</td>
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<td>GRASP</td>
<td>Gender-sensitive Research against Small-holder farmers’ Poverty</td>
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<tr>
<td>HIV/AIDS</td>
<td>Human Immuno Virus/Aquired Immuno Deficiency Syndrome</td>
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<td>HPI</td>
<td>Heifer Project International</td>
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<tr>
<td>ICT</td>
<td>Information Communication Technology</td>
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<tr>
<td>ITCB</td>
<td>Institutional Transformation and Capacity Building</td>
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<td>JUMAKI</td>
<td>Jukwaa la Mazingira Kilosa</td>
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<tr>
<td>KCCO</td>
<td>Kilimanjaro Centre for Community Ophthalmology</td>
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<tr>
<td>LAN</td>
<td>Local Area Network</td>
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<tr>
<td>M&amp;E</td>
<td>Monitoring and Evaluation</td>
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<tr>
<td>MAFS</td>
<td>Ministry of Agriculture and Food Security</td>
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<td>MDGs</td>
<td>Millenium Development Goals</td>
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<td>MKUKUTA</td>
<td>Mkakati wa Kukuza Uchumi na Kupunguza Umaskini (National Strategy for Growth and Reduction of Poverty)</td>
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<tr>
<td>MNRT</td>
<td>Ministry of Natural resources and Tourism</td>
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<tr>
<td>MRV</td>
<td>Monitoring Reporting and Verification</td>
</tr>
<tr>
<td>MUCCOBS</td>
<td>Moshi University College of Cooperatives and Business studies</td>
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<tr>
<td>NAFORMA</td>
<td>National Forestry Resources Monitoring and Assessment</td>
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<tr>
<td>AIVs</td>
<td>National Input Voucher System</td>
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<tr>
<td>NARIss</td>
<td>National Agricultural Research Institutes</td>
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<tr>
<td>NARS</td>
<td>National Agricultural Research System</td>
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<tr>
<td>NBS</td>
<td>National Bureau of Statistics</td>
</tr>
<tr>
<td>NGOs</td>
<td>Non-Governmental Organizations</td>
</tr>
<tr>
<td>NIBIO</td>
<td>Norwegian Institute of Bioeconomy Research</td>
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<tr>
<td>NINA</td>
<td>Norwegian Institute for Nature Research</td>
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<tr>
<td>NLH</td>
<td>Agricultural University of Norway</td>
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<tr>
<td>NMBU</td>
<td>Norwegian University of Life Sciences</td>
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<tr>
<td>NOK</td>
<td>Norwegian Kroner</td>
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<tr>
<td>NORAD</td>
<td>Norwegian Agency for Development Cooperation</td>
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<tr>
<td>NORHED</td>
<td>Norwegian Programme for Capacity Development in Higher Education and Research for Development</td>
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<tr>
<td>NORAGRIC</td>
<td>Department of International Environment and Development Studies (at NMBU)</td>
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<tr>
<td>Abbreviation</td>
<td>Definition</td>
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<tr>
<td>NSGRP</td>
<td>National Strategy for Growth and Reduction of Poverty</td>
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<td>NUFU</td>
<td>Norwegian Programme for Development, Research and Education’</td>
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<tr>
<td>NVH</td>
<td>Norwegian School of Veterinary Science</td>
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<tr>
<td>PANTIL</td>
<td>Programme for Agricultural and Natural Resources Transformation</td>
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<tr>
<td>PFM</td>
<td>Participatory Forest Management</td>
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<tr>
<td>PRO</td>
<td>Public relations officer</td>
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<tr>
<td>PRSP</td>
<td>Poverty reduction strategy paper</td>
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<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
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<tr>
<td>REDD+</td>
<td>Reduced Emissions from Deforestation and Forest Degradation plus Enhancement of Forest Carbon Stocks, Conservation and Sustainable Management of Forests</td>
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<tr>
<td>RFE</td>
<td>Research and Farmer Empowerment</td>
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<tr>
<td>RNE</td>
<td>Royal Norwegian Embassy</td>
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<tr>
<td>RSI</td>
<td>Research and Strategic Interventions</td>
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<tr>
<td>RYMV</td>
<td>Rice Yellow Mottle Virus</td>
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<tr>
<td>SACCOS</td>
<td>Savings and Credit Cooperative Societies</td>
</tr>
<tr>
<td>SCAPA</td>
<td>Soil Conservation and Agro-forestry Programme in Arusha</td>
</tr>
<tr>
<td>SDGs</td>
<td>Sustainable Development Goals</td>
</tr>
<tr>
<td>SECAP</td>
<td>Soil and Environmental Conservation and Agroforestry Project</td>
</tr>
<tr>
<td>SHDDP</td>
<td>Southern Highlands Dairy Development Programme</td>
</tr>
<tr>
<td>SLA</td>
<td>Sustainable Livelihood Approach</td>
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<tr>
<td>SMC</td>
<td>Solomon Mahlangu Campus</td>
</tr>
<tr>
<td>STI</td>
<td>Science Technology and Innovations</td>
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<tr>
<td>SUA</td>
<td>Sokoine University of Agriculture</td>
</tr>
<tr>
<td>SUATF</td>
<td>Sokoine University of Agriculture SUA Training Forest</td>
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<tr>
<td>TACCIRE</td>
<td>Tanzania Climate Change Information Repository</td>
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<tr>
<td>TARP II</td>
<td>Tanzania Agricultural Research Project Phase Two</td>
</tr>
<tr>
<td>TAS</td>
<td>Tanzanian Shillings</td>
</tr>
<tr>
<td>TMA</td>
<td>Tanzania Meteorological Agency</td>
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<tr>
<td>TRAHESA</td>
<td>Training and Research in Aquatic and Environmental Health in East and South Africa</td>
</tr>
<tr>
<td>UDSM</td>
<td>University of Dar es Salaam</td>
</tr>
<tr>
<td>UMB</td>
<td>Norwegian University of Life Sciences (until 2014, then NMBU)</td>
</tr>
<tr>
<td>WDSP</td>
<td>Women Development Support Project</td>
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EXECUTIVE SUMMARY

The Norwegian support to SUA started in 1973 with arrival of Forestry students and their Norwegian lecturers from Makerere University in Uganda. They were forced to relocate due to the political upheavals that existed in Uganda at that time. Since then the support and collaboration has continued uninterrupted until today.

This report provides documentation of the various phases of the support and collaboration with Norwegian institutions. The report is arranged in 8 chapters. Chapter 1 provides background information regarding the collaboration followed by a historical description of the various phases of the collaboration. The collaboration started with support to academic programmes and staff development at various departments notably, Faculty of Forestry, Department of Animal Science and Production, Department of Soil Science and institute of continuing education. Chapter 2 provides a historical perspective of the cooperation highlighting, purpose and objectives, justifications and rationale for areas of emphasis of the cooperation given to each phase.

Chapter 3 looks at the institutional transformation aspects which have strengthened the capacity of SUA to deliver on its mandate of teaching, research and outreach service to the Tanzania Society and the wider academic fraternity regionally and internationally. This chapter of the document provides a historical account of what has happened over the years and how the implementation was carried out and managed on both sides. It shows how SUA has transformed itself from a small Faculty of Agriculture of the University of Dar es Salaam from 1969 to a fully-fledged and dynamic Agricultural University in Tanzania in 1984 with less than 400 students and less than 100 teaching staff. To date SUA is the 3rd largest public university in the country with over 8000 students, 30+ undergraduate academic programmes and more than 500 academic staff. The Norwegian support has played a key role in complementing the Government of Tanzania input into this steady and transformational institutional development and growth. In particular major changes started happening from 1996 when implementation of the 1st corporate strategic plan (1995-2010) started with assistance under the Frame Agreement –TAN 091 support.

Chapter 4 describes the research efforts that have been delivered through the various phases of the co-operation especially starting with the Frame agreement in 1996, which for the first time embrace research that was not tied to graduate research for master and PhD students. This was followed by a pure research program, the Tanzania Agricultural Research Project (TARP II). The
Chapter highlights changes in approaches to research from purely academic to more life changing on-farm action research with direct involvement of farmers as co-researchers. Farmers’ empowerment and gender focus formed essential components of technology transfer and adoption. Key achievements regarding productivity enhancement of various technologies are highlighted for each phase.

Chapter 5 gives an account on Gender dimensions of the collaboration and the extent to which the Norwegian co-operation has helped SUA address gender equity issues in its human resources development, student enrolment, in research and addressing crosscutting issues and challenges of our time (HIV-AIDS, environment and sustainability). Chapter 6 provides programme management perspectives regarding programme administration, Financial management and Reporting requirement. It is estimated that about 565 Million NOK has been extended to Tanzania through the SUA support over the last 42 years.

Chapter 7 addresses approaches that have been used to track programme implementation, achievement, outcomes and impacts. Baseline studies have provided benchmarks for monitoring and evaluation, Midterm reviews as well as end line studies on outcome and impacts. Finally chapter 8 provides an overall synthesis and lessons learned, looks at emerging challenges and future outlooks on how to address them and sustain the achievements gained over the last forty years of this unique long standing, fruitful collaboration and co-operation between Tanzania and Norway.

**Major Outcomes and impacts**

Major outcome of the support include capacity building both in terms of human resource and teaching and learning infrastructure. A total of 489 MSc and 119 PhD have been acquired by many Tanzania men and women supported through the various programmes. They provide leadership in research and policy making in agriculture, forestry, wildlife and livestock sectors in the country and in regional and international organizations as well as in government administration.

Support to university common services departments such as Finance and the DRPGS has made SUA capable of attracting and managing research programmes supported by a variety of development partners which has contributed to sustainability of SUA.
Most of the research has addressed farmers’ challenges directly on farm and this has in many ways shortened the time it takes to adopt productivity enhancing and poverty reducing innovations.

Due to the high caliber of SUA staff most of the national policy processes involving agriculture and natural resource sectors have involved participation of SUA experts at various levels. Regarding technological improvements; new crop varieties have been developed and released, pests have been better managed, rainwater harvesting and soil fertility improvement techniques have been demonstrated, introduction of draft animal power have reduced farmers workload by 90%, milk production has increased by 40 - 50% in Njombe and Gairo districts, animal health improvements through better management and vaccination have taken place throughout the country, cassava and other crops processing have improved income, measures to improve child nutrition have been spreading and appropriate timber sawing technologies have increased income in agroforestry farming systems.

Implementation of the Norwegian development cooperation supported programmes over a period of 40 years has provided important lessons and experiences in a number of areas. From project conception, planning, collaboration and partnerships to project implementation, monitoring and evaluation the description provided in the previous chapters show that a lot of achievements have been made. However, this has come about not without challenges and constraints that needed to be overcome. The careful planning and institutional arrangement based on mutual trust, shared goals and common understanding have been the key important ingredients that have made it possible for the collaboration between SUA, other research institutions in Tanzanian and Norwegian institutions to jointly contribute significantly to the development agenda of Tanzania. The collaboration has been among the few long standing, consistent and fruitful engagements in development cooperation. In the sections below are elaborated key lessons learnt in each of the various areas of cooperation. Such lessons are important for future development programming involving different partners, not only in Tanzania but also elsewhere in the developing world.

Staff and student exchange between SUA and Norwegian institutions has contributed to the building of mutual trust and common understanding of social, cultural, scientific aspects of development of the people of Tanzania and Norway. This has major impact on the promotion on global peace, mutual respect and understanding of cultural differences.
Addressing gender has been a key element of SUA’s transformation process. Issues like HIV/AIDS are better addressed through community-based approaches. Had SUA closed itself from the surrounding society in dealing with these challenges perhaps the situation would not have improved as much as seen today.

Lessons learned

Major lessons learnt from implementation of the research component of the cooperation under programmes supported by the Norwegian government include involvement in participatory action research with farmers using multidisciplinary research teams. While in the early years most of the research was academic on station research, the adoption of on-farm research involving farmers has demonstrated effectiveness in promoting farmers’ adoption of proven technologies and practices. This has strengthened the capacity of SUA scientists to transfer technologies to target communities through continuous learning and interaction. It is a valuable experience that can be used in scaling up technologies and experiences more widely. The main challenge for the future is how to institutionalize the outreach activities of the university research community in a more gender-sensitive, coherent and coordinated manner, using the various demonstration units and field stations and the existing outreach oriented units as springboard for such institutionalization.

Farmers exchange visits have proven to be instrumental in promotion of adoption of best practices and technologies generated SUA. Farmer groups have also been identified to be an effective and practical means in the rural areas for implementation of research projects. Organizing farmers into groups did not only promote joint learning but was also instrumental in enhancing collective action in accessing advisory services, farmer training and collective bargaining. Therefore, empowering farmers/local communities and strengthening their capacities to articulate demand for knowledge, identify appropriate technologies and information is important adoption for productivity enhancement.

Experience gained has shown that demand for farmer-oriented research and extension services is high. Provision of adequate technological skills in a package with inputs or materials at the initial stage gives farmers added impetus to adopt technologies and to sustain them with own resources. It was also learned that affordability of inputs by farmers is an important determinant of pace of adoption of technological packages. Gender considerations and selective gender bias of females over male's yields better research results. Moreover, good institutional collaboration is cost effective; while in-built
monitoring and evaluation system in projects is an effective and practical means to successful project implementation.

Collaborative research between SUA and Norwegian researchers provided additional avenues to access research grant opportunities outside the prevailing programme envelope such as NUFU and NORHED. They have also been effective modality for exchange and transfer of technologies.

Timely disbursement of financial resources and commensurate absorption capacity of the recipient was of essence for effective implementation of the programmes. In the early years, funds were administered from the Embassy and directly released to SUA as was required. During the period when staff development was the key element of the cooperation whereby most of the training was taking place in Norway Noragric was responsible for programme management on behalf of N. Later on, funds were handled by consulting firms (SCAN Africa and SCAN Tanzania) on behalf of the Embassy. This however, did not provide an opportunity for the recipient to build capacity in financial management. To address this problem, the recipient was given the ownership and accountability of managing the funds. This arrangement worked well principally because SUA had been assisted to build capacity. Clarity of guidelines and clauses provided in the programme agreements have proven to be instrumental for smooth utilization, management and reporting on financial resources.

The Norwegian policy of emphasis on recipient ownership and accountability has been very successful in building sustainable recipient capacity to manage donor/development cooperation support as well as building confidence to attract other partners to do the same.

A well-coordinated and non-bureaucratic management system is imperative for successful implementation of the programmes. Adequate funding, timely disbursements coupled with thrift financial budgetary ethics are key to success. Coupled with this is the consistent documentation of research findings and their effective dissemination.

Implementation of the various programmes described in this document has enabled SUA to contribute immensely in Tanzania’s human development agenda and towards the realization of the millennium development goals especially in addressing food security, poverty, environmental sustainability, HIV/AIDS and gender. This has to a great extent contributed to Tanzanian’s development agenda. SUA as a partner in national development has been significantly supported by the Norwegian government. The capacity built at
SUA through the Norwegian development cooperation has made SUA a very attractive institution to a number of other development partners, funding agencies and scholars from other universities from across the globe. This development has inspired SUA to position itself to play even greater roles in realization of Tanzania future development agenda, in particular Vision 2025, that is structured to propel Tanzania into a middle income country whose economy is knowledge driven.

Given the importance of natural resources, food security, climate change mitigation, gender and good policies to sustainable development as outlined in the Sustainable Development Goals (SDG), SUA is challenged to continue contributing to the science, technology and innovation agenda of Tanzania. The implication of this is that SUA will need to further enhance its capacity to address emerging Science, Technology and Innovations (STI) challenges for more effective participation in the national development. In this endeavor, continued collaboration with development partners is of essence.
CHAPTER 1

1. INTRODUCTION

1.1 An overview
The Kingdom of Norway has been Tanzania’s development partner since Tanganyika’s independence in 1961 to date. In the early years the Norwegian support was focused towards the fight against the scourges of ignorance, disease and poverty. In the subsequent years development support was extended to issues addressing good governance, culture, gender, energy, higher education, nature conservation and the environment. To this and other effects, Tanzania has been one of Norway’s chief development cooperation partners for several decades. The cooperation is oriented to support Tanzania’s goal of self-reliance and so to become a middle income country by 2025.

In the realm of education and especially higher education, Norwegian development cooperation had its main focus on technology transfer, capacity building, strengthening research capacity and related outreach activities as well as promoting international collaboration between actors in Tanzania and counterparts in Norway, the south and the world in general. Administration of development support initiatives aimed at strengthening higher education has been undertaken through a series of programmes extending direct support to the Government of the United Republic of Tanzania and implemented by Universities and Institutions of Higher Learning. These supports have been mainstreamed through the Ministries responsible for higher education, science and technology as government organizational arrangements have guided from time to time. Such programmes and projects have been implemented at Sokoine University of Agriculture, University of Dar es Salaam and Mzumbe University, to mention a few.

In a deliberate action intended to strengthen universities and enable them play well their important societal, training and research roles about 12 projects/programmes were to that effect developed implemented through bilateral agreements between Tanzania and Norway. The agreements have addressed a diversity of issues and themes in the overall goals focused on better management of agriculture and natural resources, as well as ensuring food security, gender balance, nature conservation and climate change.

Projects and programmes that have been implemented at SUA to that effect have included the establishment of professional level forestry education in Tanzania in 1973. This project, named TAN 022, capacity in forestry education and research for better management of forestry and biological natural resources. Subsequent projects included one based at the Department of Animal Science and Production (DASP), this project started formerly in 1977. This intervention
at DASP involved two separate projects running in sequence one after the other. These were dubbed TAN 069 and TAN 085. The projects at DASP were developed with a purpose of building capacity for strengthening education and research for better management of livestock and food resources of animal origin. Others included the Project TAN 081 in 1980 at the Department of Soil Science and Project TAN 084 at the Directorate of Research and Postgraduate Studies at SUA in 1996. There was also a project support administered through the Institute of Continuing Education whose purpose was to conduct short courses on Management of Natural Resources for Sustainable Agriculture that were tailored for building capacity as well as career enrichment for actors in the Government and NGOs involved in extension services and environment management activities.

1.2 Evolution in development cooperation initiatives
In the initial phase 1973 - 1995, the Norwegian support to SUA was administered under several separate Agreements directed specifically to selected departments. This included what is now the Faculty of Forestry and Nature Conservation, Department of Animal Science and Production, Department of Soil Science and the Institute for Continuing Education. In 1996, the development cooperation support to SUA underwent a paradigm shift where subsequent support activities would be comprehensive, University – wide and programme based. The first programme to this effect was referred to as the TAN 091 Frame Agreement Programme. One year before the TAN 091 programme started, Directorate of Research and Postgraduate studies (DRPGS) at Sokoine University of Agriculture was empowered through capacity enhancement measures and facilitated by Norad in order to enable it acquire necessary human resource, facilities and infrastructural capacities to handle and administer donor funds for the entire University.

Prior to this development administration of the development support to SUA was administered directly by the Royal Norwegian Embassy (RNE) in Dar es Salaam (1973 to mid-1980s). Later the administration was outsourced to consulting firms including SCAN Africa and SCAN Tanzania (1990 to 1995) before being mainstreamed through Noragric (mid-1980s to 1990). Following a concerted capacity building in DRPGS at SUA, the management of development cooperation agreements was fully mainstreamed at SUA from 1995 to-date (2015). Over the years this investment in capacity building has enabled SUA to attract funding and support from more than 50 funding agencies/donors. In the same vain, the number of research projects has increased from about 90 in 1995 to 300 in 2015. Further the numbers of major university-wide and regional-wide programmes have increased from two in 1995 to more than 12 in 2015. The development has been consistent with the Norwegian Government Policy of
ensuring recipient ownership and accountability of the development cooperation support. To that effect, SUA has developed and maintained capacity for managing transactions worth about TZS 30 billion (equivalent to US$ 15 million) of cooperation development support per year as of 2015.

The Frame Agreement, which initially was to cover a period of 4 years up to June 2000, was much broader. Besides encompassing all former Norad supported projects, new projects were also brought on board. Under the Frame Agreement, a strong emphasize was given to training, research, strengthening University wide common service units, rehabilitation of infrastructure and women support. Similarly, After the TAN 091 Frame Agreement Programme 1996 – 2000, subsequent interventions in development were developed under similar arrangements. The Programme that followed TAN 091 included the TARP II – SUA Project 2000 – 2005, the FOCAL Programme 2002 – 2005, the PANTIL Programme 2005 – 2010, the CCIAM Programme 2009 – 2015 and the ongoing EPINAV Programme 2010 – 2016.

This documentation therefore, profiles the contribution of the people of the Kingdom of Norway in supporting Tanzania’s development efforts through Sokoine University of Agriculture (SUA) with special emphasis to initiatives directed at forestry and other natural resources management and conservation, agriculture, food security, climate change, poverty eradication, gender balance and good governance over the period exceeding 40 years, that is from 1973 to 2015.
CHAPTER 2

2 NORWEGIAN DEVELOPMENT COOPERATION SUPPORT AND THE GROWTH OF SUA

2.1 Establishment and development of SUA

The Norwegian development support has played a critical role in the development of SUA from its early formative years to the present standing as a renowned institution of higher learning in agriculture, food security, natural resources management, environment, climate change.

In evolutionary terms Sokoine University of Agriculture (SUA) was initially established by Act No.6 of 1984 (later amended by Act No. 14 of 1984) by elevating the former Faculty of Agriculture, Forestry and Veterinary Medicine of the University of Dar es Salaam to a fully-fledged University of Agriculture. The total number of students at the time of establishment was 444. Act No. 6 of 1984 was repealed in 2005 when the Universities Act came into force. Following the enactment of the Universities Act, SUA was granted its Charter on 28th March, 2007 the year to which it is referred.

The University has four campuses namely the Main campus, Solomon Mahlangu, Olmotonyi and Mazumbai. The Main campus is located in Morogoro town on the foot-hills of the scenic Uluguru Mountains about 220 km from Dar es Salaam along the Tanzania - Zambia highway. In addition, the University has one constituent college, the Moshi University College of Cooperative and Business Studies (MUCCOBS) based in Moshi town in Kilimanjaro region.

During the 2012/13 academic year, the University was running 35 undergraduate programmes, comprising of five non-degree programmes and 28 degree programmes. The majority of the undergraduate degree programmes take three years to complete, except programmes leading to a bachelor’s degree in Agricultural Engineering and Veterinary Medicine which take four and five years, respectively, to complete. During the same period, the University was also running 46 Masters’ degrees programmes and PhD in various fields of specialization.

The academic programmes are organized under four Faculties, two Directorates, one each of an Institute and a Center (Table 1). As of 2012/13 academic year, the total enrollment was 7,691 students comprising 409 non-degrees students (5.3%); 5,451 undergraduate students (70.9%) and 1,831 postgraduate students (23.8%). The overall proportion of enrolled female students was 33% for non-degree and undergraduate programmes and 31% for postgraduate programmes. As of 31st March 2013, the total number of SUA employees was 1,360 comprising of 508 academic staff of which 96 are female (18.9%) and 852 technical and administrative staff of which 299 (35.1%) are female.
2.2 The Early Days of Norwegian Support – Nurturing a Young Institution

In the early days a number of projects were implemented at SUA to enable the University to acquire necessary capacity to deliver on its vision and mission. This support involved the provision of experts from Norway and other countries in Europe especially the Nordic to train Tanzania experts in the fields of forestry, animal science, soil science and allied fields. The subsequent sections give key highlights on the purpose, achievements and impacts of the various projects implemented by Sokoine University of Agriculture under the Norwegian support.

2.2.1 Building Capacity in Forestry education and Research for Better Management of Forestry and Biological Natural Resources

The onset of Norwegian development cooperation support in 1973 at Sokoine University of Agriculture ushered in the establishment of professional level forestry education in Tanzania in 1973. The Norwegian Government support to this effect at that time was administered through Norad, the Norwegian Agency for Development Cooperation. Under this initiative the Department and later the Faculty of Forestry was established in Morogoro as a campus of the University of Dar es Salaam dedicated to university education in agriculture, forestry and veterinary sciences.

As a result of this initiative almost all graduates in forestry in Tanzania are alumni of SUA. Accordingly almost all officers managing the forestry industry/sector in Tanzania are graduates of Sokoine University of Agriculture. This include those working in the Ministry Natural Resources and Tourism and its allied agencies, institutions offering para professional education in forestry and natural resources management, academic and research institutions within and outside Tanzania. A landmark achievement in capacity building at SUA was the award of first PhD in forestry in Tanzania to a Tanzanian in 1980. Subsequently the Norwegian has enabled SUA to produce more than 50 doctorates in forestry from Tanzania and other countries in the region to-date.

The support to forestry education was administered in two phases of the TAN 022 Agreement where PHASE I was Agreement dated November 7th 1974 on the establishment and operationalization of a University level institution for education and research in forestry. PHASE II was an Agreement dated December 12th 1986 aimed to develop and improve the teaching and research capacity of the Faculty of Forestry at SUA.

To the credit of this initiative, an internationally acclaimed facility for professional education in forestry was established which over time has become well equipped with facilities and manpower. The forestry education facility established has also trained professionals from many other countries in Africa including but not limited to Zambia, Rwanda, Burundi, Kenya, Uganda, Sierra
Leone, Nigeria, Togo, Sudan, Ethiopia, Namibia, Swaziland, Gambia and Ivory Coast. At the same time it has strengthened links and collaboration between forestry education institutions in Tanzania and Norway.

A limited tracer study to the effect of the programme above has revealed that on the overall TAN 022 trained 400 BSc, 63 MSc and 9 PhD students graduated since the Faculty inception in 1973 to 1995. In addition the programme trained a total of 19 technicians and technologists.

2.2.2 Building Capacity for Strengthening Education and Research for Better Management of Livestock and Food Resources of Animal Origin

This was a project designed to support capacity building for strengthening education and research for better management of livestock and food resources of animal origin hosted at the department of animal science and production in the Faculty of agriculture.

The project started at almost the same time as the Faculty of Forestry project in 1973 and has continued at various levels of intensity until now in 2015. During the period and largely as result of this support the department has developed adequate teaching faculty, teaching and learning infrastructure; undertaken and introduced productivity enhancing and poverty reducing innovations in the livestock and farmed fish industry in Tanzania. Notable examples include the adoption of dairy goat farming, dry season feeding strategies for dairy cattle, and aquaculture education and training in Tanzania. The dissemination, adoption and adaptation of the technologies above are among key achievements of the support. These achievements have had impacts in improving the socioeconomic wellbeing in poor households in highland areas of Tanzania as well as in assuring food and nutritional security to a number of households.

The implementation of the development cooperation support at the Department of Animal Science and Production during the period extending from 1977 to 1995 was effected through a succession of three Agreements. From 1977 – 1981 was a phase of DASP-NLH Joint MSc. Sandwich programme. During this period a number of academic and technical staff from the University and the Ministry responsible for Agriculture and Livestock development was trained in Norway. This phase was succeeded by the DASP-NLH Norad TAN 510 Programme (1982-1985). The project was funded by the Norwegian Agency for International Development Cooperation (Norad) from 1982-1985. The Funding for TAN 510 was extended for another five years to 1989. Apart from the research on dairy cattle and dairy goats, the Sandwich MSc programme continued as part of TAN 510 until 1989. Between 1977 and 1988, 63 MSc. students were trained in Norway. Further, eight Doctorates (PhDs) were trained under this collaboration.
Following successful staff development programme under TAN 510, it was deemed appropriate to transfer the M.Sc. training programme to be offered fully at DASP-SUA. A new collaborative programme TAN 069 with a financial commitment of NOK 16 million was developed. Similarly, following successful implementation of Project TAN 069 activities and realization of the intended objectives, an evaluation mission recommended further support for a period of four years (1992-1996) under TAN 085.

2.3 Transition from project based to University Wide Frame Agreement (TAN 091) 1996 -2000 support

After 22 years of Department focused and discrete projects oriented development cooperation support, the development cooperation mode of support shifted from project based modalities to programme based mode. This is was a major paradigm shift as it addressed priorities and themes of development for both academic and administrative aspects across the University. Under this paradigm shift, six programmes were implemented. These programmes are profiled below.

2.3.1 TAN 091: University Wide Frame Agreement 1996 – 2002

This programme was developed to consolidate achievements of the support previously administered under several separate and discrete project Agreements. This was in-line with “Frame Agreement 1996 -2002” Programme focus to further enhance capacity building by training, research, strengthening University wide common service units, rehabilitation of infrastructure and women support.

Before the signing of the SUA/Norad Frame Agreement on Continued Norwegian Support to SUA on 10 May 1996, Norad supported SUA through four main projects. The four separate Agreements included Faculty of Forestry and Nature Conservation (TAN 022), Department of Animal Science and Production (TAN 0510, 069 & TAN 085), Department of Soil Science (TAN 081) and Institute for Continued Education (TAN 088). These projects had separate Agreements with Norad and held annual meetings chaired by the respective Project leaders. Under that arrangement, the University higher authority was not invited to the meetings. As a result the top management was not involved in the planning and decision making process. Although the Projects achieved most of the planned targets, there was no central control planning process which led to segregated and uncoordinated developments within the University. In order to address the matters above in May 1996, the Governments of the Kingdom of Norway and the United Republic of Tanzania signed a Frame Agreement for the provision of continued Norwegian support to Sokoine University of Agriculture.

The Agreement was meant to address and rectify some of the shortfalls and weaknesses observed during the implementation of the past Agreements. The Frame Agreement on Continued Norwegian Support to SUA (TAN 091), which had a University wide development outlook, identified four main areas of support. These were; support to Academic units in order to strengthen teaching and research capacity, support to University wide common service units in order
to provide appropriate and efficient services, rehabilitation of buildings and other infrastructure in order to improve the learning and teaching environment and lastly, support to women development in order to promote gender balance.

One year before TAN 091 programme started, Directorate of Research and Postgraduate studies (DRPGS) was supported/facilitated by Norad in order to be able to handle and administer donor funds for the entire University. It is estimated that before the Frame Agreement was signed, the Norwegian support to SUA through various past Agreements whose value was about NOK 135.5 million.

The Frame Agreement, which initially was to cover a period of 4 years up to June 2000, was much broader and besides encompassing all former Norad supported projects, new projects were also brought on board. Under the Frame Agreement, a total of NOK 84 million or TAS 7.77 billion were earmarked for training, research, strengthening University wide common service units, rehabilitation of infrastructure and women support. After 2000, the two Governments signed two more Addenda to the agreement. The first Addendum for FY 2000/01 was signed on 26 August 2000 and provided a total of NOK 15 million to SUA while the second Addendum for FY 2001/02 was signed on 2nd October 2001 and NOK 10 million were set aside. The main goal of the two addenda was to enable SUA wind up the unfinished projects.

The results of implementation of this programme had significant impacts on the development and performance of the institution and sectors involved in higher education, research and management of agriculture, natural resources and the environment.

### 2.3.2 Mainstreaming SUA in the National Agricultural System (NARS): The TARP II – SUA Project 2000 - 2005

This was a programme developed and implemented by Sokoine University of Agriculture (SUA) in collaboration with the Ministry of Agriculture and Food Security (MAFS) and the Norwegian University of Life Sciences (UMB - formerly known as the Agricultural University of Norway (NLH). The Project was undertaken as part of the overall effort of mainstreaming SUA into the National Agricultural Research System (NARS) under the Tanzania Agricultural Research Project Phase II (TARP II). The overall goal of the World Bank funded TARP II was to contribute to sustained poverty reduction in Tanzania. Its immediate objective was sustained generation of ecologically sound technology for crop and livestock production systems and for natural resource conservation in Tanzania.

The project segment designated for SUA targeted implementation of the TARP II Project in the Eastern and Southern Highlands Agricultural zones in Tanzania. It was accordingly referred to as the TARP II – SUA Project. The Tanzania Agricultural Research Project Phase two (TARP II) was embarked
upon in 1998 with the overall goal of contributing to sustained poverty reduction and economic growth in Tanzania. Within this context, the Governments of Tanzania and Norway signed an Agreement on 26th August 2000 for Norwegian financial assistance to implement the research project, Food Security and Household Income for Smallholder Farmers in Tanzania: Applied Research with Emphasis on Women under the Tanzania Agricultural research Project Phase Two (popularly referred to as TARP II - SUA Project) in the Eastern and Southern Highlands zones between September 2000 and June 2004. Additional support was provided for the period July 2004 to June 2005 to facilitate exhaustive completion of activities and to provide time for preparation of another phase.

During the implementation period, a total of thirty-four (34) research projects were successfully carried out during the project life. The analysis has shown that the projects successfully implemented the planned objectives and have produced results responsive to farmers’ needs such as improved production of crops and livestock products, household income, reduced work load, improved nutrition at household level as well as improved processing and storage of perishable products.

On the outputs related to capacity building, training and development of MAFS research staff was undertaken at SUA as part of the overall national effort to improve the quality and efficiency of the researchers, achieve greater research productivity and enhance staff morale and commitment. The objective was to establish a relevant and comprehensive human resource development and training programme at SUA in order to: (1) increase the number of MAFS researchers with postgraduate training at the level of PhD and MSc. so as to reach the desired ratio of 1:3:1 (PhD: MSc.: BSc); (2) Train researchers in an environment which will address the research methodology of farmer-oriented and demand driven research; and (3) Train more staff in local institutions, since it is less expensive compared to overseas training.

The total number of MAFS staff trained between 1999-2005 was 18 at MSc. level (1 died before graduation), 14 at PhD level, and 88 were given short-term training (Figures 1 and 2). The names of staff trained are given in Annex 5. During the bridging period, a total of 40 staff (15 from MAFS, and 25 from SUA) were also trained on the sustainable livelihood approach (SLA). A total of 38 SUA staff were also trained on research proposal writing.

On fostering partnership and collaboration in attaining programme goals, dissemination of results and sustainability of the programme achievements researchers from MAFS, SUA and UMB teamed up as originally planned for joint research project implementation, collaborative research workshops, holding of farmer forums, farmer exchange visits, and training of staff. The Project also collaborated with several projects and NGOs including INADES, SECAP, SCAPA, INTERMON, ADP, Caritas, HAMU, HPI, AHI, which were mainly invited to participate in farmer forums, field exchange visits, and dissemination of technologies already available.
2.3.3 Future Opportunities and Challenges in Agricultural Learning (FOCAL) Programme: 2002 - 2005

This programme was developed to address and respond to the changed policy and legal environment in Tanzania and put emphasis on reforms and implementation of the SUA Corporate Strategy. This led to another paradigm shift from focus on institutional performance and capacity building at the operational levels to poverty reduction, strengthening in entrepreneurship skills as well increasing income generation capacities and stakeholder empowerment as can be seen from a comparison of both programme strategies given below.

The FOCAL Programme goal mirrored the national level goal provided in the Poverty Reduction Strategy Programme (PRSP). The programme purpose is linked to this national level goal as it expects to enable target beneficiaries (i.e. rural producers and SUA graduates) in achieving increased benefits (cash or in kind) from the agriculture and natural resource sectors. The programme was initially designed to extend from 2002 to 2006. However, in 2005 it was merged and subsumed under another programme referred to as the PANTIL (Programme for Agricultural and Natural Resources Transformation), 2005 – 2009. During the implementation period January 2003 – June 2005, a total of 12 research projects focusing poverty alleviation are ongoing. All research projects have an extension aspect inbuilt in the project. A total of 7 advisory services were undertaken and successfully completed.

With respect to outputs related to human capacity development, 15 scholarships (11 MSc and 4 PhD) were awarded in a gender sensitive manner. Thirteen scholarships were awarded to female staff/students and only 2 to male staff. All awardees completed their studies successfully. Under infrastructure development the programme supported the construction of a Zoology Laboratory, and Extension of the Library at the Solomon Mahlangu Campus and Business Service Centre (including space of GIS Remote Sensing Laboratory) at Main Campus. These developments have enabled SUA to offer effective training in ecology and wildlife management as well as wildlife health studies.

On strengthening in entrepreneurship skills as well increasing income generation capacities and stakeholder empowerment, 13 degree programmes were reviewed and enriched with value adding skills to that effect. Similarly, under this programme a number of cross-cutting issues including promotion of income generation and business Management, facilitating the incorporation of HIV/AIDS and Gender issues into undergraduate curricula were undertaken.

2.3.4 Programme for Agricultural and Natural Resources Transformation (PANTIL)

The Programme for Agricultural and Natural Resources Transformation (PANTIL) was a programme that developed by the Government of the United Republic of Tanzania and supported by the Government of the Kingdom of Norway to enable Sokoine University of Agriculture (SUA) (November 2005-December 2009) contribute to the National level goal towards attainment of increased economic growth, reduced poverty and improved social well-being in
Tanzania through transformation of the agricultural and natural resources sectors, as guided by the National Strategy for Growth and Reduction of Poverty (NSGRP) popularly also known as MKUKUTA in Kiswahili. To that effect, the purpose (Immediate objective) of the programme was to ensure that Target beneficiaries, including small and medium scale producers, the rural poor, women and SUA graduates have better access to agricultural and natural resources knowledge and technologies for increasing income and other benefits.

The Agreement between the Government of the Kingdom of Norway and the Government of the United Republic of Tanzania to support SUA under PANTIL was signed on the 2nd of November, 2005. Under this Agreement, the Government of the Kingdom of Norway would provide the Government of the United Republic of Tanzania NOK 83.6 million (Norwegian Kroner eighty three point six million) to facilitate the implementation of the programme. The programme started in January 2006 and its closing date was extended from 30th June to 31st December 2009.

During the implementation period, a total of 23 research projects were implemented under this programme over the four years period. The research activities under PANTIL programme were implemented in villages located across 18 districts in ten regions of Eastern, Southern highlands, Coast, Northern and Lake Zones. It has reached over 2000 contact farm families with various productivity enhancing and poverty reducing technologies. The farmer empowerment focus facilitated the formation of 12 farmer groups and trained many farmers through farmer field schools and farmer forums. Researchers have published 56 journal articles and 65 papers in conference proceedings and 15 extension booklets.

The impacts of the achievements are reflected in the improved farm productivity, incomes and food and nutrition security among the target beneficiaries, and others within and beyond the pilot villages. This was in turn translated into increased household income, improved nutrition and health and at times even improved housing and ability to pay for school fees for children.

Under the capacity building component, 18 for PhD, of whom 8 (44%) were female, and 27 for Masters programmes of whom 19 (70%) were female. Tanzanians obtained PhD and M.Sc. training respectively. Collaboration with UMB and NVH has involved five PhD students. Over 140 SUA staff improved their pedagogical skills through the UTLIP. A total of 2035 SUA Graduates were trained in entrepreneurship and 784 were assisted to obtain job placements in the labour market. Moreover, the capacity of SUA’s teaching and learning environment has been improved by expansion of the Library at Solomon Mahlangu Campus, construction of the Zoology Laboratory and rehabilitation and resurfacing of 2.5 km of internal roads. In addition, curricula have been reviewed and new ones introduced. Consequently, annual student enrolment has expanded from 969 in 2004 to 1722 in 2008.
2.3.5 Climate Change Impacts, Adaptation and Mitigation (CCIAM) 2009 – 2014

The Climate Change Impacts, Adaptation and Mitigation (CCIAM) Programme was developed to help Tanzania Develop and Sustain Adequacy in National Capacity to participate in Climate Change Initiatives and Address the Effects and Challenges of Climate Change. Recognizing that the impact of climate change poses serious challenges to sustainable livelihoods and economic development, the Government of the United Republic of Tanzania and the Kingdom of Norway committed themselves to work together in developing and implementing programmes for adaptation to and mitigation of climate change. This was designed to be a 5-years programme (2009-2014) and has been implemented by three Universities and the Tanzania Meteorological Agency in Tanzanian Institutions, together five academic and research in Norway through the coordination by the Norwegian University of Life Sciences (NMBU). In order to accomplish outstanding activities the Programme was granted no cost extension to December 2015.

Accordingly, in 2009, through an Agreement signed between the two Governments of Tanzania and Norway, NOK 93.88 million were set aside to support the Climate Change Impacts, Adaptation and Mitigation (CCIAM) programme. The programme focused on four main components; Research, Strategic Interventions, Capacity building, and Documentation, Communication and Dissemination.

During the implementation period of the programme, a total of 21 research projects and 12 strategic intervention projects were carried out under CCIAM programme. These projects were implemented in different parts of both Tanzania Mainland and Zanzibar. To this effect, a total of 70 papers have been published in Workshops, Conference Proceedings and Scientific journals. Out of these, 45 papers have been published in peer reviewed journals. Further, the programme supported a number of hard and soft infrastructures in the participating institutions to enable them carry research and training activities to acceptable standards. These infrastructure included construction of buildings, installation of several equipment and improvement of internet connections while establishing links to information sourcing. These improvements on the physical infrastructure have enhanced the teaching and learning environment as well as accommodate the National Carbon Monitoring Centre.

In measure taken to develop and sustain adequacy in national human resource capacity to participate in climate change initiatives and address the effects and challenges of climate change. About 100 people were trained to participate in this initiative. Among the trained included 69 at Master’s and 27 at Doctorate level. Further, the programme trained more than xxx people in various climate change, climatology and REDD+ subject matters through short courses. All of them have been accordingly absorbed in the government departments responsible for climate matters and the environment.
2.3.6 Enhancing Pro-Poor Innovations in Natural Resources and Agricultural Value-Chains (EPINAV) 2010 – 2014

The EPINAV programme was developed in order to consolidate impact of achievements of past programmes as well as increase the participation of various actors in their respective product value chains. It was also designed with intentions to enhance rural producers access to inputs, technologies, markets and policy development for a. To that effect EPINAV was designed to conduct research, strategic interventions and capacity building in order to enable target beneficiaries to have access to and ability to utilize pro-poor agricultural and natural resource management technologies, policies and innovations that enhance livelihood security and adaptation to climate change.

During the implementation period of the EPINAV programme, a total of 17 research projects and 3 strategic intervention projects were carried out. These projects were implemented in different parts of both Tanzania Mainland and Zanzibar. To this effect, a total of 40 papers have been published in Workshops, Conference Proceedings Scientific journals and Chapters in books. Out of these, 29 papers have been published in peer reviewed journals. Further, the programme is supporting the construction and equipping of the natural science laboratories in order to facilitate production of teachers in science subjects for Secondary Schools in Tanzania. Upon completion, the laboratories will have capacity to accommodate more than 320 students at one sitting. This development has contributed significantly to empowering secondary education in science for both urban and rural schools.
CHAPTER 3

3 NURTURING INSTITUTIONAL GROWTH TO EXCELLENCE AND ENHANCED CAPACITY TO CONTRIBUTE TO NATIONAL DEVELOPMENT

3.1 Preamble

The Sokoine University of Agriculture which initially existed as a Faculty of the UDSM dedicated to development of agriculture and natural resources, was identified by the government of Tanzania as an institution of higher learning that would lead the transformation of rural lives. Accordingly, the programmes and priorities of SUA were led by the National development agenda. In efforts to observe consistency in responding to the national development agenda, SUA in the later years moved to customize/mainstream the national development agenda into its institutional strategic plans. The Corporate Strategic Plans (CSPs) were packages of strategies for implementation in a span of five years. The first CSP started in 1997 and with necessary extensions of time ended in the year 2005; when the Second CSP which ended in 2010 took effect. The third and current CSP was designed to last for ten years, extending from 2011 – 2020.

The main target of CSPs was to build, strengthen and sustain human resource and infrastructural capacities to address challenges of projected increase of staff and students population, associated gender imbalance, and enhance institutional capacity to contribute to formulation of policies for development.

The Norwegian Development Cooperation support had a significant impact in the realization of the targets of all SUA CSPs contributing immensely to its growth and achievements in carrying out its vision and mission in large. As a result of this and other initiatives, SUA registered achievements which put in place a number of operational policies, procedures and guidelines which in turn led to increased female students and staff in relative and absolute terms; quality assurance, ICT development, promotion of internal income generation activities as well as generation and dissemination of improved technologies for crops, livestock farming and natural resources management.

As a result of Norwegian support and similar initiatives from the government of Tanzania and other development partners, SUA has developed from a small local institution to an internationally renowned University. To that effect, SUA prides itself of adequate teaching and laboratory facilities commensurate to the number of students, internationally recognized scientists, and capacity to participate in global scientific research and development initiatives.

Further, SUA prides itself in contributing immensely to the high level manpower need of Tanzania, the region and globally. Alumni of SUA occupy important professional and management positions in Government ministries and NGOs including participation in the sector policy formulation and implementation. In the period 2005 – 2015 eight SUA Alumni have served as Ministers and six as Permanent Secretaries. The Alumni play important role in
Impact of 40 Years of Norwegian Support to SUA

Administrative and governance issues as well as research and training of professional and para-professionals in agriculture and natural resources fields.

A good number of Norwegian Development Cooperation scholarship beneficiaries are in service at SUA in areas of teaching, research, extension and consultancy services. Others have been deployed by government to hold executive managerial positions in public universities including SUA itself.

3.2 Human Resource Development and Contribution of SUA to Socio-Economic Development in Tanzania

The SUA’s human resource development over the past 40 years has been backed up by high support from the Norwegian government. This includes the establishment of professional level forestry education in Tanzania and others. The Norwegian support on Tanzania staff development dates back in 1970’s when candidates from Tanzania started moving to Norway for higher degrees to build their careers in academic, technical and administrative issues.

It is estimated that in the 40 years period a total of 106 SUA staff have been trained at various levels and fields of relevance to the disciplines of SUA. In recent times, the ongoing CCIAM and EPINAV programmes under Norwegian Development Cooperation support have trained more than 100 individuals in areas of climate change and adaptation as well as enhancement of pro-poor innovations in agricultural value chains. Most of the supported professionals and para-professionals are working with the government ministries, research institutions, NGOs and private sectors. These professionals contribute key personnel for Tanzania’s participation in the implementation of the Millennium Development Goals (MDGs) and currently in the Sustainable Development Goals (SDGs).

3.3 Infrastructure Development

Norwegian government has been supporting SUA in development of infrastructure and other research facilities and their contribution to the growth and development of the institution is immense. Over 40 years staff and students population have increased from less than 100 to 540 and less 400 to over 8000 respectively. The increase has been enabled by the commensurate development and increase in infrastructure and institutional services and management systems. For example, in the year 1996 SUA was supported by Norwegian government to link various work stations through a Local Area Network (LAN) connecting all to the internet node established by the Belgian government. At the same time, the student’s carrying capacity in respect of laboratory and auditorium space increased from 600 to 5796. In specific terms the developments included the following:

(i). At SUA Main Campus:
   a) Renovation in 1991/92 of the main Forestry building with 34 offices hosting the Dean’s office, Department of Forest Economics and offices built in 1974/75.
b) Construction of XX Wooden staff houses and two office buildings in 1974/75.

c) Construction of a Student hostel (36 beds capacity) with 4 units in 1978. In 1996 the hostel was devoted to Postgraduate students’ accommodation.

d) Construction of Wood Utilization laboratory in 1974/75. The building has three offices including that of the Head of Department, a laboratory (119m² of 30 students capacity), a reprint room, desktop printing room and store. The building was renovated in 1991/92.

e) Adjacent to the Wood utilization laboratory is a carpentry and garage building was constructed in 1991/92.

f) Construction of Forest Engineering building in 1978/88. The building has a total of 7 offices including the office of the Head of Department, a store and meeting room. The building was renovated in 1991/92.

g) Construction of the Forest Biology/Forest Mensuration and Management building in 1986. The building has a total of 11 offices, seminar and computer rooms. It also has two laboratories i.e. Forest Biology laboratory (178m², 45 students’ capacity) and Forest Mensuration and Management laboratory (187m², 45 students’ capacity) with a chemical store and a photo-laboratory. The electrical system of the building was renovated in 1991/92.

h) Construction of the Forest Visitors hostel in 1986/87. The facility contains four single rooms and two double rooms together with common kitchen and living/common room.


j) Construction of Forest Engineering workshop in 1994. The facility supports forest engineering training with the capacity of 40 students.

k) Rehabilitation of three lecture theatres (3, 4 and 5); Crop Science and Old Food Science Laboratories, SUA Main Library, Student Hostel (No. 2), Staff house (No 26 at Kididimo).

l) Rehabilitation of 1.5km SUA access road by putting a new layer of tarmac

m) Establishment of a Printing Press, scientific equipment repair workshop, local area network (LAN) with 250 work station.

n) Establishment of 17.7 ha of Tropical Botanical garden holding about 127 plant species and a tree nursery.

o) Procurement and installation of a new telephone system with capacity of 1200 extension.

p) Construction of research laboratories at the Department of Wildlife Management.

q) Construction of 10 fish ponds at Magadu dairy farm.

r) Construction of “Chako” dam at the university farm for irrigation.

s) Refurbishment of the Soils Science laboratories and ancillary facilities including screen house for pot experiments.

t) Rehabilitation of two catchments (i.e. Mgambazi and Magadu) in the Uluguru Mountains.

u) Construction of an Entrepreneurship and Agribusiness Centre in 2005/06.
v) Installation of Internet bandwidth manager to increase internet speed and protect the server/system from threats at SUA.
w) Strengthening of the GIS Laboratories/databank facilities.
x) Construction of Short Courses/Seminar Facility, Climate Change Research and Modelling Laboratory.

(ii). SMC Campus

a) Rehabilitation of lecture theatres with the capacity of holding more than 1000 students at SMC campus.
b) New SMS Library building in 2005 with the sitting capacity of 235 readers.
c) Construction of the Sciences Teaching Laboratories at SMC specifically for training of Science teachers in secondary school of Tanzania.
d) Provision of more computer work stations including at SMC, The seating capacity in the SNAL was increased from 100 to 210 including more spaces for current volumes of books, journals and other reference materials.

(iii). Olmotonyi SUATF and Mazumbai Campuses:

a) Construction of a field training facility for Practical Forestry Training in forest management and research between 1975 and 1977. The facility has one office block, one classroom, two students hostels, cafeteria and kitchen, one senior staff guest house, one junior staff guest house, two senior staff houses, ten junior staff houses, a garage, a portable sawmill and a workshop mainly for saw maintenance.
b) Strengthening of a Field research laboratory at Mazumbai Montane Natural Forest including rehabilitation of Sagara hostel for research. This has increased the carrying capacity from two to five.

The development of various physical infrastructures at SUA has improved the teaching and learning environment, increased the number of new degree programmes thus increasing student enrollment. Installed LAN and telephone system has improved communication and reduce costs. On the other hand, the establishment of a botanical garden has served as a scientific study site for researchers and students during field practical and as a recreation center for both SUA and Morogoro town residents.

3.4 Responding to Societal Needs through Expansion and Diversification of Academic Programmes

The Norwegian Development cooperation supports has enabled SUA acquire and sustain capacity to address various societal needs. SUA has used this capacity to work closely with communities and empower farmers to engage in various products value chains within the agricultural and natural resources sectors. This engagement with communities has resulted into improvement of rural socio-economic states by increasing income, ensuring food security, women empowerment and poverty reduction. Activities in this direction have included expansion and diversification of academic programmes. Currently SUA has a total of 37 undergraduate and 48 postgraduate degree programmes across the
four faculties. Of these eight degree programmes have been developed through the Norwegian government support to the Institution. The development of new degree programmes at SUA have had substantial impact to national development through production of professions most of them absorbed within the job markets in academic, technical and administrative positions across the agriculture and natural resources sectors.

Through these efforts SUA has succeeded to help framers establish a number of their own product clusters and accordingly link them to relevant markets up the value chains. One of the successful clusters is the dairy cattle in Njombe region, dairy goat in Mvomero district and beef in Hannang, Kilosa, Longido and Monduli districts. Further, in Kilosa district, a forum for environmental conservation groups dealing with nursery trees known as Jukwaa la Mazingira Kilosa (JUMAKI) is a crucial platform for farmers to discuss and implement key issues within the sector while in turn complementing the government efforts of ensuring that environmental are managed sustainably.

3.5 Facilitation of the Collaboration between SUA and Norwegian Institutions

Prior to the signing of the Frame Agreement in May 1996, there were already four agreements signed between the Norwegian Agricultural University (NHL) and SUA to enable the following faculties/Institutes/Departments in their respective Universities collaborate:

i. Faculty of Forestry and Nature Conservation at SUA and Section of Forestry at NLH (1973).


iii. Department of Soil Science at SUA and the Department of Soil Science at NLH (1981).

iv. Institute of Continuing Education (ICE) at SUA and Noragric at NLH (1992).

During the Frame Agreement, a new Agreement of collaboration between SUA and NLH was signed. The signing of this agreement (1996) nullified the past four agreements. Under the Agreement, a University wised steering committee comprising of respective top management of the two institutions, Directors of Noragric and DRPGS and Student government leader was formed to steer the collaborative activities of the two institutions. Later, the Norwegian School Veterinary Science (NVH) was included in what was termed as tripartite Agreement. According to the signed agreement, the following were areas of collaboration:

i. NLH/NVH training SUA staff as part of staff development

ii. NLH/NVH staff serving as part time lectures and external examiners’ for SUA graduates

iii. Writing of Compendia by SUA staff at NLH/NVH

iv. Joint research undertakings by SUA and NLH/NVH staff

v. Exchange/short visits by Senior Administrators and student leaders
vi. Holding joint scientific workshops/conferences and publishing jointly

Both external and internal reviews undertaken in 1997 and 1999 respectively, revealed positive gains and achievements of this collaboration and strongly recommended for its continuation. Besides this Agreement, the programme also supported the collaboration between the Faculty of Forest and nature Conservation (SUA) with Faculty of Forestry at Makerere University in Uganda. This enabled the two faculties to exchange staff and students, apply and undertake joint research, act as external examiners, supervise postgraduate students jointly and part time teaching.

The collaboration between SUA and NLH/NVH enabled several SUA staff to be trained to PhD level and supported a number of SUA staff to write Compendia in Norway. Training of staff to PhD level strengthened the human resource capacity at SUA and reduced the cost and dependence on external part time lecturers. The writing and printing of Compendia in Norway also improved the quality and accessibility to learning materials to both SUA undergraduate and postgraduate students.

Provision of part time lectures by NLH/NVH (while SUA was training its own staff) and external examiners ensured quality education at SUA and adherence to international academic standards; the credibility which is still prevailing to date. Joint research undertakings (with the majority of participants from Norwegian institutions been active in overall research project planning, methodology and experimental design), holding scientific workshops and publications of scientific works built and strengthened the capacity of SUA staff to conduct research (e.g. improved design of research projects) and publishing International journals. Further, staff and students exchange visits exposed them to international contacts and links besides strengthening social, economic and cultural cooperation between the two countries.

Norwegian support has contributed to development of SUA to the extent that the university has become attractive to Norwegians and other researchers for partnerships beyond the description of the programmes. The north-south collaboration has strengthened professional competence and technical capacity in education and research within SUA and created basis for ideas and initiatives at levels of University administration and students organizations for the benefit of both parties. One example of the Norwegian government support in this respect is the Faculty of Forestry subscription to IUFRO in 1987.
Chapter 4

4 BUILDING CAPACITY IN RESEARCH FOR DEVELOPMENT-FROM ACADEMIC TO POVERTY REDUCING ACTION RESEARCH AND INNOVATION

4.1 Preamble

Like any other University, the main mandates of SUA are teaching, research and outreach. During the 40 years of Norwegian government support research capacity and agenda have developed from solely academic and limited in scope to a diverse, innovative and development oriented with main emphasis on poverty reduction and improved management of agriculture and natural resources.

In the early days of its establishment in 1969, research became part of academic endeavor. In addressing the research agenda, undergraduate students undertook short research assignment popularly known as special projects which culminated in presenting dissertations as partial fulfillment of requirements for award of degree in agriculture and allied sciences. Indeed this tradition, maintained to date, has made SUA graduates to have acquired strong research skills when they graduate. Some few, outstanding undergraduate research work, have been so good as to see the light of scholarly publishing in peer reviewed journals. Postgraduate studies at masters level has traditionally been based on taught course and research while PhD student work has been through research only except in cases where candidates are deemed not to be adequately prepared to undergo PhD level training in their chosen field of study in which case they are required to take specified remedial courses.

Hence in the early 1970 up to mid-1980s most of the research output was tied to student academic research done by the young staff who had been recruited to man the various departments and a few postgraduates who undertook sandwich training by attending coursework in overseas universities in Europe and America. The Agricultural University of Norway was for many years a key partner in the sandwich training programmes in Forestry, Soil and Animal science and a few other disciplines. The sandwich programme was an arrangement whereby Tanzanian students pursued their coursework studies at NLH and thereafter they came back to SUA where they undertook the research part of their studies. In coming back for research, they were brought back with necessary research equipment and facilities. This arrangement contributed significantly to building capacity in research at SUA. In subsequent years, as the capacity at SUA grew from one level of strength to another, the sandwich programmes were fully transferred to SUA.

The transformation from academic research to research for development and innovation was effected through a series of development cooperation initiatives in partnership with the government of Tanzania. A number of development partners were involved and the Norwegian development support alone constituted about 30 – 50%.
In this chapter we profile how development cooperation support has helped SUA to evolve from being a minor player in the national agricultural system to a significant contributor of productivity enhancing and poverty reducing technologies and practices within the agriculture and forest ecosystems context.

4.2 R&D paradigm shift: from on-station academic research to livelihood changing on-farm action research

4.2.1 The Mid 1970- Mid 1990: Laying the Ground for Competence Building

4.2.1.1 Forestry Research

Early research in forestry started with undergraduate research project by 10 BSc. forestry students in 1975 under the Norad supported TAN 022 programme. They ranged from research on pine trees (*Pinus radiata* and *Pinus patula*), to appraisal of black wattle (*Acacia mearnsii*). The studies included lumbering and saw-mill operations in various forest plantations in Tanzania. Norwegian expatriate staff also initiated forestry soil research in the Mazumbai natural forest reserve.

During the 1976/77 interest shifted to study of various aspects of *Eucalyptus maculate* and *Tectona grandis*. By 1996, 503 BSc., 68 MSc. and 10 PhD Tanzanian and foreign students had graduated from the Faculty and generated a lot of new knowledge on forest ecosystems, services and products in Tanzania. Other research projects included Uluguru mountains integrated soil conservation; growth and yield studies in Pines and Mangrove forest; agroforestry and use of oxen for skidding logs in plantation forest in Tanzania. Some of these early researches have been the cornerstone of forest science and innovation in Tanzania to date.

Notable outputs and achievements under TAN 022 include two textbooks published by Michael Philip (1983)\(^1\) and Holmes (1995)\(^2\) as well as 61 publications as Faculty Records covering various aspects of forestry and over 300 staff articles in local and international journals disseminated worldwide.

4.2.1.2 Animal science research

The Department of Animal Science and Production (DASP) has been one of the key beneficiaries of Norwegian government support to Sokoine University of Agriculture since 1973. Following the implementation of the joint MSC programme in 1977, a research project on “Improved Feeding of Dairy cattle and Goats in Hot Tropical areas” was initiated jointly between the Department of Animal Science and Production, SUA and the Department of Animal Nutrition of the Agricultural University of Norway (NLH). The project was funded by the Norwegian government through Norad from 1982-1985. Outputs of the mainly MSc. and PhD research were published in two publications by Noragric titled “Improved dairy Production from Cattle and Goats in Tanzania” Part 1 and Part

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\(^1\) Measuring Tree and Forests, 338 pp.
II; Noragric Occasional paper Series no. 8 and 9. Apart from the research on dairy cattle and dairy goats, the Sandwich MSc. programme continued as part of TAN 510 until 1989. Between 1977 and 1988, 63 M.Sc. students and eight PhDs had been trained at NLH under this collaboration. A third series of publication under Noragric Occasional paper was published in 1993 as “Improved dairy Production from Cattle and Goats in Tanzania” Part III; Noragric Occasional paper Series no. 11. It contains seven papers on dairy cattle and goats feeds and feeding practices as well as five abstracts of BSc. special projects.

In 1982, the Department of Animal Science initiated a dairy goat crossbreeding programme with the assistance of the Norad. Sixty, 3-month old Norwegian Dairy Goats were imported into Tanzania and kept at the DASP’s Research and Teaching Farm at Magadu which lies at 500 m a.s.l. and has a hot humid environment.

Plate 1: Dairy cattle at DASP’s Magadu Dairy Research unit developed with support from DANIDA (1970’s) and Norad (mid 1980-1990s)

Plate 2: Norwegian Dairy goats introduced at DASP’s Magadu dairy research farm

Plate 3: One of successful Mgeta dairy Goat Farmer tending his goats
In May 1988, ten crossbred and pure dairy goats were moved from SUA to the first five smallholder farmers in Mgeta village located about 60 kilometers South of Morogoro at an altitude of about 1,600 meters above sea level in the South Western part of the Uluguru Mountains. Two years later (May 1990) the second batch of 5 farmers were provided with 10 cross bred Norwegian dairy goats while the remaining purebred dairy goats were handed over to the first “pioneer farmers”. Initially, the ten “pioneer” farmers were trained at SUA in all aspects of goat management including housing, feeding, breeding, health and record keeping.

The number of dairy goat farmers increased steadily from only 10 in 1988 to 50 in 1999. In 1994 a first Dairy Goat show was organized between SUA and Mgeta farmers. The show was so successful that between this period and 1999 thirty new farmers joined the Dairy Goat keeping Group. On 17th August 1999 a second Mgeta Dairy Show was organized again between SUA and the Mgeta Dairy Goat farmers and it attracted national, regional and district civic economic development specialists and farmers. Leaders of the dairy goat farmers group reported that their surplus goat kids had been sold to most regions in Tanzania. They also reported that their biggest constraint was lack of purebred bucks for maintaining the genetic makeup of milking does at between 50 or 75 percent dairy blood proportions.

A survey conducted in November 2007 showed that there were 33 dairy goat farmers in Gairo owning 230 goats and 249 farmers in Mgeta rearing 140 dairy goats. In March 2009, a census of dairy goats in Mgeta revealed that there were 193 dairy goat farmers in Tchenzema, 127 for Nyandira and 62 in Mwalazi; making a total of 385 keeping 1538 dairy goats of different levels of Norwegian dairy goat heritage (50-> 97%). Over and above maintaining the stocks in these localities, farmers have been selling goats across the country and even outside the country.

It can be summarized that the project has succeeded in alleviating poverty among the dairy goat keepers by enabling them to realize cash returns and it has also improved the household nutritional standards especially among children through the availability of goat milk. More importantly, dairy goat keeping and goat milk has become widely accepted in the country to the extent that about 100,000 households in the country now keep about 400,000 dairy goats according to the National Bureau of Statistics (2012). To date, Mgeta division has become a reputable source of good quality dairy goats in Tanzania and beyond.

4.2.1.3 Soil Science Research
Norwegian support to the Department of Soil Science started in 1980 where the government of the Kingdom of Norway through Norad, assisted Tanzania in training of academic and technical staff. During this period, most of the soil and
water research was related to postgraduate students’ research that was being run as a sandwich programme between SUA and NLH. A total of 31 MSc. and 4 PhD students were supported.

Under TAN 081 Programme, from July 1985 the Departments of Soil Sciences of SUA and NLH initiated various research projects. The research projects were addressing the aspects of land resources evaluation, characterization and management; soil and water conservation and land management for sustainable soil fertility and land productivity. All research projects activities were based in Tanzania. This early support to soils science research coupled with support to equipping of soil science laboratory laid the foundation that has enabled SUA to attain high capacity to conduct soil and soil-water research and analysis in Tanzania.

4.3 Evolution of approaches: from Projects to University-wide Programmes

4.3.1 The Frame agreement

The Frame Agreement (TAN 091) on continued Norwegian support to SUA was signed by the Governments of Norway and Tanzania in May 1996. Initially it was planned to end 2000 but was extended up to 2002.

The signing of the Frame Agreement nullified the then existing Agreements signed before by the two Governments to support individual Departments/Faculties within SUA such as the Division/Faculty of Forestry (1973), Departments of Animal Science and Production (1977) and Soil Science (1981), Institute of Continued Education (1992) and the Directorate of Research and Postgraduate Studies (1995). Unlike the past Agreements which focused on individual departments/faculties, the Frame Agreement had University wide outlook and was meant to support academic and non-academic units across the board. Specifically, the “Frame Agreement” focused on improving institutional capacity to train quality and more graduates in Agriculture and Allied sciences, conduct and build research capacity, undertake extension/outreach services, improve teaching and learning environment, gender balance and strengthened the provision of University wide common services.

It was envisaged that by supporting research projects and procure research equipment the capacity of SUA to conduct research and carry out extension services would have improved by the end of the Programme. During the six years of the Programme, a total of 62 research projects were funded and most of them produced at least one scholarly publication. A total of 82 papers were published. In addition, 39 Special projects and 16 thesis and dissertations were produced for degree awards. The Programme also supported 76 researchers to attend and present research findings in both local and international scientific conferences. Finally, eight Technical papers/Extension manuals based on research results were prepared and disseminated to end users.

Research projects supported by the Programme covered the following areas; plant breeding, food processing, soil and land management, crop pests and
diseases, crop and animal production, food nutrition, epidemiology and control of animal diseases. Other areas included propagation of endangered indigenous forest tree species, monitoring of carbon pools, growth and yield of mangrove forest and *P. patula* under different silvicultural treatments, logging in natural and plantation forests, impact of *taungya* farming system, wood properties and utilization of lesser known tree species, application of ergonomics in improving labour productivity, Community based forest management, Governance and economic development under mono and multi-party systems in Tanzania. Table 1 shows the types of Research projects supported by the Programme between 1996-2002.

Table 1: Distribution of research projects among different thematic areas under the “Frame Agreement” 1996-2002

<table>
<thead>
<tr>
<th>Research areas</th>
<th>Number(s)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary crop production/agronomy and health</td>
<td>9</td>
<td>14.5</td>
</tr>
<tr>
<td>Primary Livestock production and health</td>
<td>20</td>
<td>32.3</td>
</tr>
<tr>
<td>Forestry trees and products</td>
<td>10</td>
<td>16.1</td>
</tr>
<tr>
<td>Post-harvest technologies (crop, livestock and forestry)</td>
<td>10</td>
<td>16.1</td>
</tr>
<tr>
<td>Human nutrition</td>
<td>2</td>
<td>3.2</td>
</tr>
<tr>
<td>Marketing and socio-economics</td>
<td>3</td>
<td>4.8</td>
</tr>
<tr>
<td>Farmers organisations</td>
<td>4</td>
<td>6.5</td>
</tr>
<tr>
<td>Agricultural information</td>
<td>4</td>
<td>6.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>62</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Outreach services provided by SUA through the support of the Frame Agreement included training of lead farmers on the management of dairy goats (33), use of draught animal power for plowing, planting, weeding and transport of agricultural products (165). In addition, the Programme also supplied 70 dairy goats and introduced rabbits rearing to lead farmers. The Programme also supported dairy goat farmers to attend “Nane Nane” Agricultural shows, organized dairy goat shows, produced and distributed extension materials to various stakeholders. Other extension services provided included training 23 farmers on tree nursery management, raising and distribution of 53,971 tree seedlings to farmers and individuals in order to control soil erosion, training of 25 farmers on how to prepare compost manure and planting 124 ha of SUA farm with trees.

Following the competency built through this support to on-farm research; SUA acquired capacity to address problems and challenges facing smallholder farmers in Tanzania. As a result of this competency SUA was embraced within the National Agriculture research system (originally based on seven agro-ecological zones) as the eighth zone with a National wide mandate of doing collaborative research with other national agriculture research institutions (NARIs). By being recognized as part of the national agricultural research system, SUA was invited by the Ministry of Agriculture to participate and lead phase two of the National Agricultural Research Project (TARP II).
4.3.2 TARP II: Working with farmers for poverty reduction

4.3.2.1 Research for and by the farmers

Under TARP II, research activities were conducted in farmers’ fields. Farmers were involved in problem identification, planning, establishment of experiments, data collection, and evaluation. The approaches also included demonstration of best practices. A total of 34 projects were implemented. About 3100 farmers (66% women) were reached. Table 2 shows the thematic research areas addressed and achievements attained.

Table 2: TARPII thematic research areas and achievements

<table>
<thead>
<tr>
<th>Thematic research area</th>
<th>Sub-them addressed</th>
<th>Commodity /issue addressed</th>
<th>Achievements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved crop production</td>
<td>Improvement of low yield varieties</td>
<td>Rice production</td>
<td>Three improved rice varieties (TXD-85, TXD 88, TXD 306) were introduced and adopted in Kilombero District</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sweet potatoes</td>
<td>Drought resistant and high yielding variety-“Ukerewe” was introduced in the Eastern zone.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pigeon peas</td>
<td>Six other high yielding varieties were identified and introduced in the area</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Banana</td>
<td>Variety “TUMIA” with potential yields of 4.7 tons/ha cf. 0.5 tons/ha was released</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mushroom</td>
<td>Oyster mushroom <em>Pleurotus floridanus</em> was identified as suitable high yielding</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Maize and rice straw were identified as best substrate for its cultivation</td>
</tr>
<tr>
<td>Management of crop pests and diseases</td>
<td>Rice production</td>
<td>Sorghum and maize</td>
<td>Two rice genotypes (4H234-18-1-1 and SD35) were identified to be high yielding and resistant to rice yellow mottle virus (RYMV) disease</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rice</td>
<td>The varieties were released for adoption by farmers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Intercropping Sorghum and wild sunflower reduced witch weed infestation and improved yields by 25%.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Use of rice husks mulch reduced weeding labour requirement from 67 to 40 man days</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Increased yields by 80% (2.5 to 4.5 ton/ha) and income by 70%.</td>
</tr>
<tr>
<td></td>
<td>Agro-forestry</td>
<td></td>
<td>Use of farm yard manure, relay cropping with pigeon peas, use of cover crops reduced labour requirements and improved crop yields (cassava, maize) by 42-100-300% respectively</td>
</tr>
<tr>
<td>Improvement of soil fertility</td>
<td>Rainwater harvesting</td>
<td>Draft animal power</td>
<td>Improved household water availability</td>
</tr>
<tr>
<td>Crop water management Tillage and tillage systems</td>
<td>Draft animal power</td>
<td>Introduction of draft animal power reduced farmers workload by 90%;</td>
<td></td>
</tr>
<tr>
<td>Improved livestock</td>
<td>Improved dry season feeding</td>
<td>Dairy cattle</td>
<td>Yield of potato increased from 15-24 tons/ha</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Women’s workload reduced and milk yield increased by 40-50% in Njombe and Gairo districts</td>
</tr>
<tr>
<td>Thematic research area</td>
<td>Sub-theme addressed</td>
<td>Commodity /issue addressed</td>
<td>Achievements</td>
</tr>
<tr>
<td>------------------------</td>
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</tbody>
</table>
| production             | Animal health       | Chicken                    | • Vaccine (MG/10/03/C) against Newcastle disease (ND) was produced from local virus strains and used.  
• Chicken mortalities were reduced by 50% |
|                        | Cattle              |                            | • Adoption of Mastitis control measures reduced infection rate from 90 to 69%,  
• Lactation length increased from 6-12 months  
• Average milk production increased from 5.5- 7.2 litres/day  
• Income increased by 54%. |
|                        | Calf health         |                            | • A regimen on early detection and early treatment (EDET) of east coast fever (ECF) increased calf survival rates from 50 to 98% |
| Marketing and policy   | Balanced diet       |                            | • Cassava processing improved income  
• Feeding cassava products to cows increased milk yield in Kibaha district |
| Nutrition and health   | Balanced diet       |                            | • Dietary guidelines for improvement of nutritional status of the people of Morogoro and Iringa developed and disseminated  
• Weaning foods for enhancing household food and nutrition security introduced and adopted in Namtumbo and Songea Districts, |
4.3.2.2 Farmer Empowerment

Under TARP II, SUA researchers and collaborators undertook deliberate efforts to build the capacity of farmers to identify their research needs and articulate their demand for solutions to the various challenges and constraints facing them in their quest for better livelhoods and pathways out of poverty. A key strategy adopted was to encourage farmers to organize themselves into groups/associations for purposes of promoting organizational, institutional capacities to deal with their challenges; as well as collective actions in accessing inputs and services and marketing of their produce.

The important role of the farmer groups formed under the project and the need to strengthen them through various means was key elements of empowering farmers. Emphasis was placed on adaptability of institutional research impacts for gainful socio-economic effect on the society. The farmer/research/extension linkage was improved significantly through increased collaboration between the actors. This added impetus on the overall effectiveness of the exchange of information and dissemination of developed technologies/best practices. Gender balance and development of gender sensitive technological packages were pursued by all projects.

Strengthening of linkages between farmers, researchers and extension agents was key in bringing about fruitful relationships in the process of ensuring food security and increased household incomes. Towards this objective, activities undertaken included organizing and holding farmer to farmer exchange visits to enhance learning by seeing and doing; and farmer forums that provided opportunities to express their problems to researchers who actively worked to provide solutions.

To that effect, twenty Farmer Forums were organized, 10 in each of the Eastern and Southern highlands zones. They addressed the a number of themes including food and nutrition security, Technology adoption, crop production, livestock production, conflict resolution between crop and livestock farmers, marketing, environmental degradation, group dynamics (formation and management) and crosscutting issues especially gender and HIV/AIDS.

The overall achievements from the forums included identification of farmers’ problems or issues of concern, strengthened relationship and collaboration between farmer groups and other development partners, strengthened relationships between SUA, Local Government officials, the private sector and NGOs and several farmer groups were formed in the projects areas. A total of 549 (42% females) from the categories of farmers, researchers, extension agents and NGOs participated in the forums. In these forums, overall women participation in the farmers’ category was 49%. One remarkable achievement was the increase in the freedom of expression by women compared to when the project started.
In an effort to motivate various participants to perform well in the various farm level activities, their performance was assessed against set targets and criteria for achievement and excellence. The winning individual/group of participants were awarded prizes.

The mid-term review, recommended the Project to disseminate available technologies that have been proved to work elsewhere. Technologies disseminated through the Farmer Research and Extension Learning (FREL) included construction of biogas plants, rainwater harvesting, dairy goat keeping and rehabilitation of two water catchments in the Uluguru Mountains.

In an effort to expose farmers to best practices and facilitate peer learning 11 inter zonal visits and 8 within zones visits were conducted. These visits exposed farmers to ranges of technologies including soil conservation and agroforestry, food processing, rainwater harvesting, livestock husbandry, manure management and construction of biogas plant, crop production and management, beekeeping and fish farming and gender division of labor.

The farmer exchange visits were instrumental in facilitating technology adoption. Major achievements included construction of fuel saving stoves, construction of biogas plants, and adoption of irrigated rice farming, soil conservation and agroforestry practices, rainwater-harvesting technologies. A total of 326 (46% females) farmers and 42 (28% females) extension agents participated in these visits. In the visits, the average female participation (42%) was more or less equal to that in the forums.

Overall, farmer forums and exchange visits proved to be effective strategies for facilitating farmer learning and adoption of technologies/best practices.

4.4 Post TARP II approaches and concepts: Widening the scope
TARP II having been solely a research project provided important lessons for subsequent Norwegian-SUA collaborative program planning and implementation. Targeting and working with farmers, and empowering them through learning and capacity building in a gender sensitive manner provided a strong foundation for subsequent formulations of the Norwegian-SUA collaboration. Following the successful conclusion of TARP II in 2005, a proposal for a new research only programme named GRASP (Gender-sensitive Research against Small-holder farmers’ Poverty – proposal for extension of TARP II SUA Project) was formulated. It did not take off separately. Instead, a decision was taken to merge the proposed research under GRASP with the FOCAL (Future Opportunities and Challenges in Agricultural Learning) which started in 2003 as a follow-up to the earlier Frame Agreement Programme (TAN 091) and was scheduled to end in 2006. In the following sections we review the accomplishments of the FOCAL programme before presenting an overview of the PANTIL (Programme for Agricultural and Natural Resources Transformation for improved livelihoods), which was a product of merging GRASP with FOCAL.
4.4.1 Research under the FOCAL programme

This programme was developed for purposes of identifying and optimizing opportunities in agricultural learning, challenges related to agricultural learning and measures to mitigate. To that effect an agreement between the governments of the Kingdom of Norway and the United Republic of Tanzania to implement the FOCAL (Future Opportunities and Challenges in Agricultural Learning) programme was signed late 2002.

The programme which operated between January 2003 and June 2005 aimed at enabling SUA contributes to the income poverty reduction through rural sector development, with emphasis on management of natural resources. The Programme intended to strengthen SUA’s capacity to negotiate and participate in the sector programme integration process by strengthening the income generation mechanisms, producing job creators or market demanded graduates, undertaking client oriented and demand driven research activities.

In implementation of the research objectives of the programme, a total of 12 research projects addressing ways and means of alleviating poverty, increasing income and improving food security to rural farmers were undertaken in 32 villages of 10 districts across the country. A total of 55 SUA researchers were involved and a total of 9 advisory services from small producers were received and responded within the programme life time.

Research results from the programme have influenced policy change at micro level affecting small producers. Some of the results that have had remarkable impacts include the modification of the yoking system for use in planting and weeding wheat, control of vector borne diseases from ticks and tsetse flies. The modification of the yoking system for use in planting and weeding wheat was proved to reduce weeding time from 15 man days per hectare to merely 3 hours per hectare by one pair of oxen driven by two people. Further, there has been increased use of dipping schemes for control of ticks and tsetse flies among the semi nomadic Maasai pastoralists’ resulting from the project on control of vector borne diseases.
## FOCAL research and advisory services

<table>
<thead>
<tr>
<th>S/No</th>
<th>Title</th>
<th>Achievements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Research</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Strategic interventions against hemotropic parasitic diseases for improved productivity in cattle</td>
<td>Early detection and treatment of ECF in newly born calves reduced calf deaths to less than 2%</td>
</tr>
<tr>
<td>2</td>
<td>Development and dissemination of simple and environmentally friendly tree felling and timber sawing technologies in Agroforestry farming systems</td>
<td>A patent has been registered on a technology for a portable timber sawing platform</td>
</tr>
<tr>
<td>3</td>
<td>Rehabilitation and conservation of the Mzinga river catchment in collaboration with local people</td>
<td>Protection of water catchment areas on river Mzinga which supplies water to SUA and Mindu Dam</td>
</tr>
<tr>
<td>4</td>
<td>Improvement of production and utilization of <em>Vanilla</em> species and <em>Jatropha curcas</em> in Bukoba district</td>
<td>Adoption of the crop as an alternative cash crop to coffee in Kagera region</td>
</tr>
<tr>
<td>5</td>
<td>Improving beekeeping through education, testing and promotion of appropriate beekeeping equipment in Morogoro region</td>
<td>Widespread adoption of the improved beehives for agroforestry systems</td>
</tr>
<tr>
<td>6</td>
<td>Increasing utilization and market promotion of lesser known and lesser utilized timber species in Tanzania</td>
<td>Reduced pressure on utilization of conventional timber trees in natural forests</td>
</tr>
<tr>
<td>7</td>
<td>Promotion of integrated aquaculture with agriculture for improved livelihoods of rural communities</td>
<td>Widespread adoption of farmland Tilapia in Tanzania</td>
</tr>
<tr>
<td>8</td>
<td>Promotion of Tomato production, processing and marketing for enhancing poverty alleviation in Morogoro rural and Kisarawe districts</td>
<td>Year round production of Tomatoes in valleys in and around Morogoro</td>
</tr>
<tr>
<td>9</td>
<td>Development of improved storage strategies, dissemination and integration with indigenous knowledge/practices to reduce postharvest losses of cereals and pulses due to pests</td>
<td>Production of post harvest loses of stored cereals</td>
</tr>
<tr>
<td>10</td>
<td>Promotion of local rose and standard carnation production as an alternative source of income among small-scale farmers and florists</td>
<td>Commercialization of flower production in Njombe and Uluguru Mountains</td>
</tr>
<tr>
<td>11</td>
<td>Promotion of soybean production, processing and utilization for poverty alleviation and improvement of health in Morogoro</td>
<td>Increased utilization of Soybean in child nutrition formulation and adoption of Soybean dehuller</td>
</tr>
<tr>
<td>12</td>
<td>Agroforestry technologies for management of soil water and improved crop and wood yields in Dodoma district</td>
<td>Adoption of agroforestry practices in semi-arid areas</td>
</tr>
<tr>
<td></td>
<td>Advisory</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Modification of the Yoking system and animal drawn implements for planting and weeding operations in wheat production at Kisilo village in Njombe district</td>
<td>Improved efficiency of utilization of animal drawn implements in Njombe</td>
</tr>
<tr>
<td>14</td>
<td>Improvement of the quality of cooking oil, access to better seeds, credit and markets to Manyara farmers and processors</td>
<td>Widespread adoption of sunflower production for income generation</td>
</tr>
<tr>
<td>15</td>
<td>Assessing and/or verifying the suitability of honey in Management of eye diseases as requested by the Kilimanjaro Centre for community Ophthalmology (KCCO)</td>
<td>Promoted use of indigenous knowledge in modern medicine</td>
</tr>
<tr>
<td>16</td>
<td>Introduction of Vanilla to selected villages in Kilimanjaro region</td>
<td>Adoption of Vanilla as an alternative cash crop</td>
</tr>
<tr>
<td>17</td>
<td>Formulation on dry banana value added products for Mwika Development Trust Fund</td>
<td>Adoption of dried Banana preservation</td>
</tr>
<tr>
<td>18</td>
<td>Introduction of management strategies for management of Tick borne diseases for cattle breed of high genetic potential to selected villages in Morogoro</td>
<td>Reduction in early calf mortalities due to Tick borne diseases</td>
</tr>
</tbody>
</table>
4.4.2 PANTIL programme: Improving Livelihoods outcomes and impacts

The PANTIL programme was developed by the Government of the United Republic of Tanzania and supported by the Kingdom of Norway to enable SUA contribute to national wide initiatives aimed at improving the livelihoods outcomes and impacts through transformation of the agricultural and natural resources sectors. The programme used a sustainable livelihood approach in order to enhance the outcome and impacts of research on livelihood of target communities as illustrated in the figure below.

The PANTIL had two components. One was the “Research and Farmer Empowerment” (RFE) component that was designed to implement demand – driven research and activities to empower farmers leading to enhanced technology development and uptake. The second was the “Institutional Transformation and Capacity Building (ITCB)” component that was designed to improve human and physical resource capacity of SUA leading to effective and efficient delivery of teaching, research, extension and strengthening of entrepreneurial skills among graduates. The ITCB component also address cross cutting issues that included gender balance and the scourge of HIV and AIDS.
4.4.2.1 PANTIL Research Accomplishments and Impact Activities

As alluded to earlier, the research and farmer empowerment component was designed to contribute towards improvement of the livelihoods of the rural people through training, research and outreach mechanisms. This is consistent with Tanzania’s key national policies and strategies such as the Agriculture and Livestock Policy, the Forestry Policy, the Development Vision 2025, the National Strategy for Growth and Reduction of Poverty (NSGRP), the Agricultural Sector Development Strategy, and the National Livestock Policy, 2006. PANTIL used a sustainable livelihood approach (SLA) to address challenges and opportunities for enhancing productivity and the socio-economic well-being of farmers.

A total of 23 research projects were implemented under this programme over the four years period. The research activities under PANTIL programme were implemented in villages located across 18 districts in ten regions of Eastern, Southern highlands, Coast, Northern and Lake Zones. The research projects focused on the most important agricultural sub-sectors in the country: crop and livestock production, aquaculture, agro-processing, nutrition as well as management of natural resources. Researchers published 56 journal articles and 65 papers in conference proceedings and 15 extension booklets.

PANTIL reached over 2000 contact farm families with various productivity enhancing and poverty reducing technologies. The farmer empowerment focus facilitated the formation of 12 farmer groups and trained over 2000 farmers through farmer field schools and farmer forums.

Further, dissemination and outreach of the results was also channeled through national and regional agricultural and scientific exhibitions and wide media promotions. This enabled dissemination of results to a much wider audience. The impacts of the achievements are reflected in the improved farm productivity, incomes and food and nutrition security among the target beneficiaries, and others within and beyond the pilot villages. This was in turn translated into increased household income, improved nutrition and health and at times even improved housing and ability to pay for school fees for children.

Plate 4: Research on banana identified high producing and drought resistant varieties that were multiplied through tissue culture technology and distributed to farmers in Mvomero-Hembeti, Mkuranga and Rungwe Districts in Mbeya
This section summarizes some of the major achievements of the programme documented over time. Examples of such achievements include banana Multiplication through Tissue Culture Technology, production and Utilization of Vanilla species and *Jatropha curcas*, cassava Production, Processing and Utilization, diversification of Draft Animal Power utilization, Integrated Dairy Production System for Enhanced Livestock and Crop Production, Improved Breeding of Disease Free Multipurpose Dairy Goats.

Vanilla was introduced in Kagera and Kilimanjaro regions as a complementary crop to coffee (the main cash crop) and banana. The prices of coffee on the world market had fallen at all-time levels in the 1990 and did threaten the livelihoods of thousands of farmers in the two regions. The project was well received and adapted by framers especially in Kagera.
Other achievements included development and adoption of environmentally Friendly Tree Felling and Timber sawing Technologies in Agroforestry Farming Systems as well as utilization and market promotion of lesser known and lesser utilized timber species.

Successful testing of draft animal power technologies related to planting/sowing, weeding and harvesting of various crops were collaboratively done under farmers’ conditions in Siha, Handeni and Kongwa districts.
The programme research thematic themes and achievements are summarized in the table below.

Table 5:  PANTIL research themes, activities and achievements

<table>
<thead>
<tr>
<th>Research themes</th>
<th>Activities</th>
<th>Achievements</th>
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</table>
| Crop Production, Improvement, Diversification and Value Addition | Banana Multiplication through Tissue Culture | • A germplasm collection of 30 local and 10 introduced banana varieties established and well maintained at the SUA  
• Technology was disseminated through 118 contact farmers were involved (39 Female, 79 Male)  
• Demonstrated 217% increase in income from sale of bananas  
• Improved food availability for household.  
• Increased vanilla production from 34 kg to 90.5 kg of cured vanilla beans per year per household  
• Value of income from vanilla increased by 61% compared to before project intervention  
• Improved participating households income by 59%  
• Cassava production increased from 1.2 tons per ha to 1.9tons per ha and increase of 37%.  
• Overall Household income increased by 46% while that from cassava alone increased by 45%  
• Food security of the majority (86%) of participating farmers improved. |
| Production and Utilization of Vanilla species and *Jatropha curcas* | | |
| Cassava Production, Processing and Utilization | | |
### Research themes

<table>
<thead>
<tr>
<th>Activities</th>
<th>Achievements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diversification of Draft Animal Power utilization</strong></td>
<td>Reduced weeding time from 15 Mondays per hectare to merely 3 hours per hectare by one pair of oxen driven by two people. Reduced drudgery to farmers by 1500% in the weeding exercise.</td>
</tr>
<tr>
<td>Modification of yoking system and animal drawn implements for planting and weeding operations in wheat production</td>
<td></td>
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</table>

| **Livestock Health and Production** | |
| Integrated Dairy Production System for Enhanced Livestock and Crop Production | Increased milk production by 100 – 150% from 5-6 litres per cow per day before to 12 to 18 litres per cow per day. |
| Improved Breeding of Disease Free Multipurpose Dairy Goats | Milk production in dairy goat keeping household increased from zero before intervention to an average 2.5 litres/day. |
| | Increased household nutritional security increased. |
| | Increased household income from sale of Goat milk. |

| **Environmentally Friendly Tree Felling and Timber sawing Technologies in Agroforestry Farming Systems** | |
| Construction of an improved portable log sawing steel structure to minimize environmental damages and loss of biodiversity and accidents during felling of trees Utilization and market promotion of lesser known and lesser utilized timber species | Reduced damages to useful plants by 64%. |
| | Reduced construction of sawing platform from 11.6 h to 2.4 h. |
| | Increased site productivity to almost 5 times and tree owners profit by almost 108%. |
| | This technology has earned SUA patent from BRELA. |
| | Three lesser known and lesser utilized timber species identified and promoted into the market. |
| | Stakeholder’s cash income increased by 30%. |
| | 70,000 tree seedlings of different timber species distribute and planted by 12 schools to farmers and planted. |

### 4.4.3 The CCIAM Programme: Building Capacity for Participation in Global Climate Change Initiatives

In recognition of the serious challenges posed by climate change on sustainable livelihood and economic development of least developed countries like Tanzania, Norway committed itself to support Tanzanian’s efforts in the mitigation and adaptation to the effects of climate change. To that effect, the Climate Change Impacts, Adaptation and Mitigation (CCIAM) programme was developed. The aim of the programme was to develop and sustain adequacy in national capacity to participate in climate change initiatives and address the effects and challenges of climate change with particular emphasis on REDD pilot areas.
This 5-years programme (2009-2014) was implemented by four Tanzanian Institutions and six Norwegian Institutions.

The Institutions involved in Tanzania included SUA, University of Dar es Salaam (UDSM), Ardhi University (ARU) and Tanzania Meteorological Agency (TMA). In Norway the partner institutions were Norwegian University of Life Sciences (NMBU), Centre for International Climate and Environmental Research (CICERO), University of Oslo and Norwegian Institute of Bioeconomy Research (NIBIO).

Under this programme, a total of 21 research projects and 12 strategic intervention projects were carried out. These projects were implemented in different parts of Tanzania Mainland and Zanzibar. The projects were developed around three main research themes that addressed development of appropriate climate change mitigation and adaptation strategies in forestry, other land uses, ecosystems and biodiversity management; assessment of climate change impacts on and vulnerability of ecosystem services and livelihoods under REDD initiatives; as well as policy and legal framework analysis of climate change adaptation and mitigation with emphasis on economic efficiency, ecological effectiveness and wider political legitimacy.

Further, under the CCIAM Programme 12 strategic Intervention projects were implemented in different parts of Tanzania mainland and Zanzibar. These projects aimed at testing and developing technologies necessary for addressing climate change impacts, improving livelihoods while increasing the capacity of community adaptation to different ecosystems.

Impacts made by research projects

The CCIAM Programme was designed to be executed through four thematic areas namely research, capacity building, strategic interventions and documentation, communication and dissemination. The programme yielded important results that have had substantial impacts to the ecosystems, livelihoods as well as in the general socio-economic and scientific world of knowledge. The key achievements of the programme are as follows:

(i) Allometric equations and models which are cheap, easy and fast to estimate and predict biomass and carbon changes under different vegetation types have been developed and used by the National Forestry Resources Monitoring and Assessment (NAFORMA), NGOs and other stakeholders;

(ii) Communities living close to the forests in the study areas are now aware of REDD+ initiative objectives and the need to utilize and conserve the forests through sustainable management. This explains why in some areas they have established environmental groups, enacted by laws,
planted indigenous trees in their farms and established agro forestry nurseries;

(iii) Introduction of alternative sources of income to once forest dependent communities is likely to reduce deforestation and improved the livelihoods of the local people, e.g., beekeeping (apiculture), planting of fruit trees, introduction of conservation agriculture, mushroom cultivation and sustainable harvesting of Non Timber Forest Products;

(iv) Since agents of deforestation and forest degradation are now known to local communities and other stakeholders, it has become easy to take mitigation measures. Development of fire reduction strategies has also reduced the frequency of forest fires in Miombo woodlands;

(v) Local communities and other actors participating in REDD+ pilot projects are now aware of their legal rights, are conversant with monitoring and verification of carbon stocks, carbon trade, leakages and the concept of benefit sharing;

(vi) Development of new hybrid governance structures has improved the management of REDD+ projects since all parties are involved effectively in managing and apportioning the benefits accruing from the forests and forest resources;

(vii) Although in some REDD+ projects income from carbon trade was or has been used to support community development projects, apparently it appears majority of people prefer direct payment of carbon money to individual households;

(viii) National guidelines on modalities and mechanisms for community compensation, carbon trade and equitable benefit sharing have been developed and are now awaiting approval by the Government;

(ix) About 100 experts in climate change have been trained at Postgraduate level. This has strengthened research and teaching capacity, participation in policy formulation and decision making forums both nationally and internationally;

(x) ICT improvement, research infrastructure and other capital investments made in the collaborating institutions have improved the working environment and enhanced research, teaching and learning efficiency;

(xi) Establishment of Open Access Repositories, Newsletter and CCIAM website have improved deposition and accessibility to literature and information on climate change impacts, adaptation and mitigation strategies;

(xii) Introduction of alternative sources of energy in some forest dependent villages has reduced deforestation and improved the pass rate of school children in the area;

(xiii) A total of 70 papers on CCIAM have been presented and published in Workshops, Conference Proceedings and Scientific journals. Out of these, 48 papers have been published in peer reviewed journals locally and
internationally. The Programme’s results have been demonstrated or displayed in various Conferences, Agricultural and Trade shows and fairs.

(xiv) Lastly, the CCIAM programme has strengthened research collaboration between Researchers of the four local Institutions and collaboration with five Norwegian Institutions.

4.4.4 The EPINAV Programme: Enhancing Farmers Participation in Agricultural and Natural Resources Value Chains

The programme on Enhancing Pro-poor Innovations in Natural resources and Agricultural Value Chains (EPINAV) was developed in order to enhance farmer’s participation in agricultural and natural resources value chains there by innovating on ways to scale up and scale out the achievements of the past programmes.

EPINAV Programme came into effect on 06 December 2010 when the Agreement between the Governments of the United Republic of Tanzania and that of The Kingdom of Norway was signed. The Programme covered a period of 4 years beginning 1st November 2010 to 30th October 2014.

The EPINAV was a programme that succeeded the PANTIL. While PANTIL used the sustainable livelihood approach, the EPINAV programme used the value chain and innovation systems approaches, while retaining the sustainable livelihoods objectives as shown in figure 2 below.
Figure 2: Conceptual framework of EPINAV

- Shocks
  - Climate change induced
  - Drought
  - Pests and Diseases

- Trends
  - Food prices increases
  - Fuel price increases

- Seasonality
  - Unpredictable weather changes

- Core functions
  - Agricultural value chain
  - Market Information
  - Research and Development
  - Land use services
  - Financial services
  - Extension services

- Support functions
  - Human capital
  - Natural capital
  - Physical capital
  - Social capital
  - Financial capital

- Livelihood strategies
  - Improved: Crop farming and livestock husbandry practices
  - Environmental and natural resources management
  - Capital accumulation and saving
  - Non farm income generation activities

- Livelihood outcomes
  - More Income
  - Improved food security
  - Reduced vulnerability
  - Improved social well-being
  - Environmental sustainability

- Regulatory functions
  - Policies
  - Standards
  - Regulations
  - Codes of Practice
  - Cultural values

Innovation
The EPINAV programme was designed to address the challenges in innovation promotion and participation in value chains through research and capacity building. With respect to research, projects were implemented under four main themes which included innovation systems research for up-scaling of technologies and best practices; adaptation of agriculture and natural resources to climate change as well as innovative communication. A total of 17 research projects were implemented under this programme. The implementation involved 14,023 beneficiaries (46.4% females), 4,151 households, 127 villages distributed in 23 districts and 12 regions. The programme thematic areas, activities and achievements are summarized in the following below sections.

4.4.4.1 Innovation systems research for up-scaling of technologies and best practices

Ten projects are implemented under this theme. Five of them are involved in up-scaling of proven technologies using value chain and innovation systems approaches while three projects are in the category of applied research and two projects are working towards generating new knowledge under a Basic science sub-theme.

Action Research/ Scaling up and applied research

The projects are implemented in 5 regions, 9 districts and have reached a total of 84 villages. The projects involved in dairy cow and dairy goat technologies have up scaled, out scaled and upgraded the technologies in such a way that more than 500 farmers in the respective project sites are benefiting from the technologies. Dairy goats were introduced in Mgeta village in Mvomero district in 1988 to only five farmers. To date about 385 are seven villages in value chains for products, beef and Morogoro and beef and dairy cow and registered at keeping more than 2000 goats in Mvomero district. A total of seven dairy goat products, dairy cow sunflower have been upgraded in Njombe regions. In Kilosa district; products clusters have been formed district level.
Basic Science subtheme
Two projects are implemented in two regions and three districts. A project on Conservation agriculture (CA) is involving a total of 335 beneficiaries from 68 households in Njombe district. About 127 farmers have adopted the CA practice, including integration of livestock/crops, organic/in-organic fertilizer.

4.4.4.2 Adaptation of agriculture and natural resources to climate change
Three projects are involved in addressing the issues of climate change in agriculture and natural resources sectors. In collaboration with Mwanga District Council a project on integration of livelihood and natural resource management to adapt dry land communities to climate change has tested and distributed drought resistant crop seeds namely sorghum and sunflower to farmers participating in the project and those not directly participating as a way of out-scaling the innovations.

Several trainings have been conducted on beef cattle fattening in pastoral communities to improve the quality of meat especially in dry seasons using affordable fattening technologies. About 150 pastoralists in five villages participated in training.

4.4.4.3 Policy and Good Governance
A project on supply chain analysis of agricultural inputs under the national agricultural voucher scheme in Tanzania found out that about 40-70% of inputs distributed through NAIVs during the study period did not reach intended beneficiaries. The major source of loss was many hands involved in the inputs supply along the chain. The project has developed an innovative alternative input distribution scheme that minimizes use of lots of hands in between. The proposed system has already been disseminated to relevant stakeholders including policy makers.
4.4.4.4 Innovative communication
Innovative communication projects are designing an innovative communication and knowledge dissemination pathways by involving various actors in tomato and maize value chains in Dodoma, Morogoro and Iringa regions. This has triggered demand for effective communication systems for other types of crop grown in the study areas. The system has potential to revolutionise the extension messages that are disseminated to farmers.

4.4.5 Overall outcomes and impacts
The 40 years of Norwegian government support has enabled SUA to participate in national development agenda through research, innovations and outreach activities, reaching thousands of farmers directly and influencing many more others indirectly through contacts with local communities and publications of various dissemination materials.
In the course of this engagement with communities, SUA has contributed to decline in levels of poverty in Tanzania in the last two decades. According to the National Bureau of statistic, between 2001 to 2007, basic needs poverty (TAS 13,998) and food poverty line (TAS 10,219) declined only slightly by 2% to 34% and 17% respectively compared to 2000/01 (NBS, 2007). The Household budget Survey 2011/2012 reported recently by NBS (October, 2014) showed that poverty levels in the rural areas has declined further from 34% in 2007 to 28% in 2011/12. The various Norwegian supported research projects have been implemented almost exclusively in rural communities and there is evidence at project level to show that adoption of practices that have been promoted/introduced in various districts and villages have significantly contributed to poverty reduction in areas such as Njombe, Mvomero, Kilosa, and Iringa/Kilolo districts.

| Publications                                                                 |
|                                                                            |
| No. Of Reserach projects        Advisory/Strategic intervention projects | Focus area            | No. Of Districts | No. Of villages | No of farmers (%) | Journal | Proceedings | extension booklets/l leaflets |
| Frame Agreement                | 62 | Eastern and Southern Highlands zones |                          |                  | 3100       | 66        | 152                       |                          |
| TARP II                        | 34 | EZ, SHZ, Lake, Northern Zones (10 regions) |                          |                  | 18          | 2000      | 56                      | 65                      |
| FOCAL                          | 12 | EZ, SHZ, Northern Zones (9) |                          |                  | 9           | 65        | 15                       |                          |
| PANTIL                         | 17 | 3 Zones |                          |                  | 18          | 2000      | 28                      | 7                       |
| CCIAM                          | 21 | 17       |                          |                  | 23          | 127       | 14,023                  | 28                      |
| Total                          | 163 | 12       | 41                      | 127              | 19123      | 66        | 156                     | 65                      |

In general terms the Programmes have contributed to increased productivity, reduction of poverty and farmer empowerment. The trends in diary productivity are a case in point. From year 2000 through various interventions milk yields have increased from 5.5 litres/day to 18 litres/day among participating farmers as illustrated in the figure below.

Similar impacts have been demonstrated in technologies addressing beekeeping, aquaculture, crops and livestock production, agroforestry and horticulture. Also beekeeping and aquaculture have to date gained prominence at national level as a result of pioneering work undertaken under the programmes supported by the Norwegian government over the 40 years period.
4.4.6 Influencing policy at national level

Further, the capacity built over the 40 years, have strengthened SUA’s participation in development and analysis of National level policies and strategies influencing development in various sectors. The application of research results through informing various national level policies has provided effective mechanisms of ensuring sustainability of practices and outcomes of the development cooperation interventions. Foremost is the contribution of SUA experts in national level panels that have formulated various policies and programmes. A few examples of such policies and strategies included the Agriculture policy (1997), Forestry policy (1998), Forest Act (2002), Livestock policy (2006), and their accompanying strategies including the National REDD+ Strategy and Action Plan (2013), Agricultural Sector Development Strategy-(2001), Biomass Energy Strategy Tanzania (BEST) (2014), Horticulture Development Strategy(2012) and programmes (Agricultural sector development programme-ASDP), KILIMO KWANZA, Big Results Now (BRN) and the recent Livestock sector modernization imitative (LSMI).

The other route through which SUA has influenced policy is indirect but important. Through several initiatives taken by SUA to start new degree programmes such as Forestry (1973), Wildlife Management (1998), Home Economics and Human nutrition (1993), Aquaculture (2002), Environmental Sciences and Management (1999), government has mainstreamed these activities in its organizational and governance structures at the central government and local government level and supported undergraduate students to study in these new areas and related research. Other higher learning institutions followed suit and adopted similar programmes. This is perhaps the single most important strategy through which SUA has shaped the national development agenda in the last 2-3 decades.
CHAPTER 5

5 GENDER MAINSTREAMING AND HIV/AIDS INTERVENTION AT SUA -

5.1 Gender Mainstreaming

Through the Norwegian 40 year’s support, SUA has been taking efforts to mainstream gender across the institution. Both TAN 022 and TAN 091 of the Norwegian support put much effort in women development at SUA through training and sensitization of secondary school girls to join Forestry degree programmes. Further, under TAN 091 a project on women development support project (WDSP) was implemented aiming to institutionalize efforts to address gender issues that were evident at SUA and the country at large.

By year 2000, over 75 women staffs were facilitated to attend short courses in their respective fields. Further, within the same period, gender sensitization workshops were carried out to SUA community. A gender stakeholder’s workshop which was conducted towards the end of the WDSP resulted into development of SUA Gender Policy that was officially inaugurated in 2003 and currently implemented by the institution.

Through support from the Norwegian government, SUA managed to implement gender mainstreaming activities which are coordinated by the Gender Policy Implementation Committee (GPIC). The committee reports to SENATE through the Coordinating Committee of the Corporate Strategic Plan (CSP). The committee has several functions including monitoring all activities that relate to gender within the University, work with other relevant institution within SUA to ensure gender disaggregated data are collected, stored and reflected in various documents and reports of the University. It takes the lead in coordination of various gender related programmes, play an active role in developing proposals to develop gender sensitive infrastructure within the University and review the SUA Gender Policy from time to time as necessary. The committee has also been active in sensitizing females to join SUA degree through regular visits to girls’ secondary high schools in Tanzania. The Committee has been taking lead to complement gender activities implemented by various programmes/projects under the Norwegian government support.

By 2015, a total of 182 secondary schools in 21 regions benefitted from the secondary school girls sensitization intervention. More than 5000 pamphlets/leaflets on what SUA can offer in terms of academic programs and students’ welfare were distributed over time in the visited secondary schools. The impact of sensitizing girls from secondary school to join SUA have been
realized to greater extent with large number of them being absorbed to such programmes as forestry, wildlife management and engineering. SUA community having been sensitized through the Norwegian government support is now gender sensitive. Further, in a deliberate move to increase the number of female students joining University degree programmes, about 100 girls were sponsored annually for five years through the female pre-entry programme at SUA. All of them qualified to join different degree programmes at SUA, and many of them proved to be among the best students.

Under the support, gender was mainstreamed into SUA curricula. This included inclusion of gender in different courses, gender and development became a core course in some degree programmes and elective in undergraduate and postgraduate courses.

During this period, SUA has increased awareness on gender equity, equality and empowerment among staff and students through gender sensitization programmes. There has been increase in number of requests/demands for seminars, workshops on gender issues from SUA staff, students and communities. SUA has increased the number of women in management and representation in institutional decision making committees. The institutional policies and guidelines have also been taking into consideration gender issues. These include the SUA gender policy, admission and examination regulations, health policy, ICT policy, Students regulations and by laws, Research policy and guidelines as well as recruitment and retention policy.

Since 1990, SUA takes gender responsive approach in design and construction of facilities for easy access and utilization by the different gender categories. These include new construction projects such as lecture rooms, laboratory and student hostels. The students accommodations have been improved in a gender sensitive manner where by priority is given to students with disability, females, foreigners and first years.

Capacity development on gender issues also involved training of SUA staff (academic and administrative) in different gender themes such as gender and leadership, gender planning and management, gender and financial management and gender and HIV/AIDS. The number of gender reading materials have increased, gender web page established with links to other gender related web sites.

As the result of Norwegian government support, the number of female students at SUA has increased from 9% in 2003 to more than 30% to date and gender issues have been mainstreamed in almost all SUA academic and non-academic
matters or affairs. For example, in the 2013/2014 academic year the overall proportion of enrolled female students was 33% for non-degree and undergraduate programs and 31% for postgraduate programs. Support of Norwegian government to SUA through FOCAL and CCIAM programmes managed to strengthen the institutional staff capacity at MSc. and PhD level by supporting 87% and 30% females respectively. The female SUA staffs are now holding different administrative and technical positions compared to the previous ones.

The number of female students’ enrollment as well as academic and administrative staff employment has been gradually increasing due to the gender policy implementation at SUA. By 2013 the number of female academic staff was 28% compared to 5% in 2001. Currently the number of female academic staff in the Faculty of Forestry and Nature Conservation has increased from zero when the Faculty was established in 1973 to eight in 2015.

5.2 HIV and AIDS Interventions

The Norwegian government has also been active in supporting SUA on other cross-cutting issues apart from gender including interventions on HIV/AIDS and non-communicable diseases at the two campuses and the surrounding communities. Through TAN 091 support, over 50 HIV/AIDS Peer educators and six counselors were trained on HIV/AIDS issues while over 80 work place leaders attended locally organized workshops at SUA. Two billboards with HIV/AIDS messages were erected on both campuses and about 2000 HIV/AIDS leaflets were produced and distributed to staff, students and the neighboring communities. These efforts led to creation of awareness amongst students, staff and the neighboring community on the preventive measures to take including safe sex in order to reduce the spread of HIV/AIDS and non-communicable diseases. The FOCAL programme also intervened in a number of cross-cutting issues including support to HIV/AIDS preventive and curative activities. The PANTIL programme as well under strategic interventions was designed to address several crosscutting issues of importance to enhance overall performance of SUA. Such issues included mainstreaming HIV/AIDS in the undergraduate curricula and support its prevention and care measures. Subsequently and further also to the nation initiatives on the same, HIV/AIDS prevalence figures in the University community have declined from 4.9% in 2005 to 0.41% in 2015.

5.3 Gender Responsive Technologies and Innovations

In technological and innovative research implementation through supported projects, gender issues were taken on board from design to implementation of research projects University wide. Further, there has been an increase in number of women and young researchers participating in research activities, increased participation of women and youth in research activities at field level,
development of gender responsive technologies and extension materials, increased number of researches that target women, as well as improved collaboration between SUA researchers and other institutions and professional bodies including agricultural research institutions, farmers associations/groups, NGOs and private sector.

The CCIAM programme under Norwegian government support, addressed the role and plight of men and women and other vulnerable social groups in project working communities to adapt and mitigate climate change impacts and in turn improve their livelihoods. The programme ensured that these groups were equally represented in training, research and decision making organs particularly in the fields of agriculture and life sciences. Most of the supported research projects were keen in observing gender equity and adequately mainstreamed gender issues in all their activities.
CHAPTER 6

6 FINANCIAL INPUTS AND MANAGEMENT

6.1 Pre-amble
The support of Norwegian government to Tanzania through SUA over 40 years has taken different forms ranging from engagement of expatriate staff, physical facilities, transport, teaching and instructional facilities, staff development to research activities. In this period, SUA received over NOK mil 565 at the current exchange rate of Tsh 230 for one NOK this is equivalent to 130 billion Shillings. Through this support, SUA has managed to carry out a number of researches and development activities which in one way or another have contributed to the current wellbeing of Tanzania citizen.

6.2 From Donor to Recipient managed development co-operation Mode
As alluded to earlier, Norwegian support to Tanzania through SUA started with support to individual Departments/Faculties within SUA from 1973 to 1996 such as the Division/Faculty of Forestry (1973), Departments of Animal Science and Production (1977) and Soil Science (1981), Institute of Continued Education (1992) and the Directorate of Research and Postgraduate Studies (1995). This support was extended to cover the whole University in year 1996 following the signing of the Frame Agreement in May 1996 between the Governments of the Kingdom of Norway and the Government of The United Republic of Tanzania. This agreement brought under one roof all previously supported projects and new areas of engagement including support to the Sokoine National Agriculture Library, the Computer Centre and the Directorate of the Research and Postgraduate Studies (DRPGS). The signing of the Frame Agreement also nullified the then existing Agreements signed before by the two Governments to support individual Departments/Faculties within SUA.

This new arrangement of support brought on board the Directorate of Research and Postgraduate studies. The Directorate became the Manager and responsible party for implementation of the University wide programmes funded by Norwegian government.

This arrangement notwithstanding, some Department/ Faculties continued to receive Norwegian support directly. Thus the Norwegian support was extended to cater for both the department based projects and comprehensive University wide programmes. This chapter presents the Norwegian support to different programmes and projects for the period under review as illustrated in the table 7 below.
In addition to the development cooperation support, extended directly to SUA there have been several other initiatives to support research and capacity building. The initiatives include the NINA-SUA, NUFU and NORHEAD projects and more recently, the establishment of the National Carbon Monitoring Centre (NCMC) as further highlighted below.

### 6.2 Norway based collaborative research projects

#### 6.2.1 The SUA - NINA Project

The first support of the Kingdom of Norway to SUA through the NUFU programme coordinated at SUA was the project known as SUA-NINA (PRO 10/2002) - The Wildlife Management BSc. Programme at SUA: Consolidation through Institutional Capacity. The support was channeled to the Department of Wildlife Management in the Faculty of Forestry and Nature Conservation from 2002 to 2006. The project was executed jointly by SUA and the Norwegian
Institute of Nature Research (NINA). The main objective of the project was to consolidate the BSc. Programme in Wildlife Management at SUA, through strengthening the capacity of Department of Wildlife Management which was newly formed.

6.2.2 NUFU and NORHEAD programmes
The Norwegian Programme for Development, Research and Education (NUFU) was a Norwegian funded programme that ended in 2013. It supported institutional cooperation and projects between Norwegian universities and their partner institutions in the South with the object to build sustainable capacity and competence in research and research based education in universities in the South.

NUFU supported 6 research projects namely: (i) Antelope Conservation and application of molecular Forensics in investigating wildlife crime (ii) ZOOTOX-2007-11: Collaborative research in environmental toxology and zoonotic diseases in the Human – Domestic animal – Wildlife interface areas of Eastern and Southern Africa - A South-North Veterinary Network; (iii) ECOSIASA: Political Ecology of Wildlife and Forest Cover Tanzania (iv) Integrating Livelihoods and Multiple Biodiversity Values in Wetlands Management Tanzania (v) Assessing the impact of forestland tenure changes on Forest resources and rural livelihoods in Tanzania and (vi) Drying of fruits and vegetables, and development. The total value of this investment was NOK 22,933,142 over a period of five years.

6.2.3 NORHED supported Project - TRAHESA
The Norwegian Programme for Capacity Development in Higher Education and Research for Development (NORHEAD) is a Norwegian research programme promoting north-south cooperation in a similar manner to the NUFU and NOMA programmes. The programme provides funding in a competitive basis. A sub component of this programme is the TRAHESA (Training and Research in Aquatic and Environmental Health in East and South Africa). The programme funds a project at SUA since January 2014 supporting capacity building in training and research in aquaculture. One of the objectives of the project is to establish a MSc. programme in health of aquatic resources. In addition, it is planned to train 10 PhD students four from Tanzania, two Kenyans and two Ugandans.

6.2.4 Measuring, Reporting and Verification Project
The purpose of the project was to assist the Government of Tanzania (GoT) in the development of the Measuring Reporting and Verification (MRV) system for the forest carbon in the country. This project is a response to the need for developing and assessing methodologies for MRV based on ground measurements in combination with remotely sensed data. The aim is to develop efficient methodologies that will provide national estimates of forest carbon stocks in Tanzania and changes in such stocks over time. The project based on
data from conventional ground observations of biomass converted to carbon, airborne LiDAR data from a sample survey in a selected district and tied to the ground observations through a statistically sound sampling design, and wall-to-wall land cover data of the entire territory extracted from optical and synthetic aperture radar (SAR) images from space-borne platforms. Under the signed agreement, the Project has an overall budget of NOK 27,532,200 spread over four years beginning 2011.
CHAPTER 7

7 MEASURING OUTCOMES AND IMPACTS

7.1 Preamble

In order to keep track of implementation of project/programme activities various monitoring mechanisms and reporting procedures were put in place. Some of them were part and parcel of the projects/programmes while others were separate interventions commissioned by the Royal Norwegian Embassy (RNE) at mid and end terms. The mechanisms and procedures evolved with the change in modalities of providing support to SUA.

From 1970s to early 1990s tracking of the performance was mainly through progress reports. For example, during the implementation of TAN 022 (Forestry), TAN 0510, 069 and 085 (DASP), TAN 081 (DSS), TAN 088 (ICE) and TAN 084 (DRPGS) these Projects submitted progress reports to the Steering Committee meetings of the respective projects. These were carried out semi-annually.

These reports contained financial and technical aspects that compared achievements against plans. The reports were used to monitor project progress, document problems encountered and corrective measures taken. The reports served also as inputs for the monitoring of corresponding outputs and outcomes. At the end of each year these progress reports were presented to the Annual Meetings which approved work plans and budgets of the following year.

Following the development and implementation of the Frame Agreement (TAN 091), monitoring and evaluation was introduced so as to capture the benefits associated with project monitoring such as typical tracking of progress against a number of pre-established targets/indicators. In addition, for the first time facilitated annual review workshops involving all programme implementers were carried out. This allowed tracking of project progress beyond outputs to assess outcomes, identify both unintended and planned effects, address “how” and “why” questions, provide guidance for future directions and corrective measures. This was very useful in enhancing compliance and transparency with regard to work plans and budgets.

Starting year 2000 impact assessment for all Norwegian supported projects was introduced. This was based on the fact or experience that only a small portion of any research portfolio will lead to widespread uptake and impact. For example, proving attribution, particularly in natural resource management like most of SUA based research and projects, is difficult because of the long and convoluted pathways linking research to impact.
Therefore, Impact assessment as part of evaluation was implemented for the purpose of attributing outcomes and impacts to project operations. It does this by establishing a counterfactual, which is what would have happened in the absence of the project. The counterfactual is what differentiates impact assessment from other forms of project evaluation. It was necessary and important for SUA now to rule out competing explanations for observed results and thereby 'attribute' observed results to project operations.

While progress reports were prepared by research or project implementation teams, monitoring, evaluation and Impact assessment were being carried out by internal and external team of experts. In practice, RNE have been engaging external evaluation while SUA and other implementing partners have engaged (e.g. for the case of CCIAM, PANTIL programmes) internal assessment teams with members from all participating institutions to carry out the exercise.

7.2 Major Outcomes and Impacts of Norwegian Support to SUA
Norwegian support which focused mainly on Capacity building, Institutional Collaboration, Crosscutting and Research had the following outcomes and impacts:

7.2.1 Capacity Building
7.2.1.1 Human resource
Through direct Norwegian scholarships support to SUA 487 Postgraduate students at Master's level and 119 students at PhD level have benefited. These have been absorbed in various sectors of production and services within and outside the country. Majority of them have been or are employed by the Government, Public and Private Organizations where they have served as Top Executives, Managers, Directors, Researchers, Lecturers/Tutors and policy makers.

These well trained staff teach, conduct research and undertake consultancy tasks within and outside the country. They also serve as External examiners, Part time lecturers and coordinate or lead various National and International Research & Development Projects or Programmes. Because of the long working experience and high Administrative skills, some of the SUA staff have or hold high Administrative/Management positions in the Government, Public and Private Organizations. For example, some of the Norwegian supported SUA staff have served or are serving as Ministers, Members of Parliament, Vice Chancellors, Deputy Vice Chancellors, Chief Executives of various Organizations, Directors in both Central and local Governments and Coordinators of various Projects/Programmes within and outside the country where they have influenced policy direction and decision making.
7.2.1.2 Infrastructure Development
Construction and rehabilitation of lecture theatres, laboratories, staff offices, library, student hostels, staff houses, roads and water system have improved the teaching and learning environment, increased student enrollment, attracted and retained qualified staff. Development and rehabilitation of SUA Training Forest at Olmotomyi, Mazumbai forest, Magadu Dairy farm, Botanic Garden and the University farm has also improved students and Researchers working conditions especially during field practical and when undertaking research activities respectively. Imparted practical skills has increased employability rate of SUA graduates and strengthened research experience of SUA staff.

Rehabilitation of SUA Local Area Network (LAN), installation of fibre optic cable and procurement of new telephone system has improved communications within and outside the University. This has significantly reduced Institution and individual communication cost and at the same time improved work efficiency.

7.2.1.3 University Common Services
Training of staff, procurement of office equipment, transport, textbooks, procurement and engagement of Consultants and tenders has enabled SUA Finance Department to computerize the accounting system, SUA library to computerize library services, Computer center to connect all computers to the LAN and the Planning Department to formulate and oversee the implementation of SUA Corporate Strategic Plans. Norwegian support also enabled the Directorate of Research and Postgraduate Studies (DRPGS) to discharge its duties of coordinating and accounting for Research and all Donor funds effectively and efficiently. Improved transport system, procurement and installation of facilities at Solomon Mahlangu Campus (SMC) has improved the teaching and learning environment resulting to the campus hosting all courses offered by the Faculty of Science. In principal, strengthening of DRPGS and other SUA Common services like the Library, Computer Center and the Finance Department has resulted to improved service delivery, timely submission of progress and annual reports and award of continuous clean external audited reports.

7.2.1.4 Institutional Collaboration
Besides encouraging collaborations, Norwegian support also facilitated Institutional collaborations between SUA and other Academic and Research Institutions within and outside the county. Such collaborations have enabled SUA staff to be trained to Masters and PhD levels, participate in part time teaching, serve as external examiners, write teaching Compendia, apply and
undertake joint research projects, and publish jointly with Collaborating partners. Such collaborations have ensured and maintained high academic standards at SUA while staff and student exchange visits have exposed them to new cultures, governance and international contacts. Joint publications has publicized SUA’s name worldwide and this to some extent has attracted more International Organizations to support SUA and its staff to undertake collaborative research projects. SUA collaboration with Norwegian University of Life Science is one of the longest and successful institutional collaborations between South and North Institutions which has transformed from capacity building to equal partnership.

7.2.1.5 Crosscutting Issues
Crosscutting issues supported under the Norwegian support included gender balance, internal income generation and HIV/AIDS prevention. Support given to visit 50 Girls and Co Education Secondary schools in the country to sensitize girls to join SUA degree programmes has increased SUA female enrollment from what used to be less than 10% to now 33%. Degree programmes which benefitted most were BSc (Forestry), BSc (Agric. Engineering) and Bachelor of Veterinary Science where in some years there were no female students admitted at all. Support to pre-entry programme to marginal female students also helped to increase female student enrollment at SUA. Increased pool of female graduates has led to increased SUA female staff ratio which now stands at about 19%. Gender sensitization workshops carried out led to formulation and establishment of SUA Gender policy while deliberate efforts to mainstream gender issues into SUA curricula has led to gender equity and most sectors now being gender sensitive.

Through Norwegian support, over 50 HIV/AIDS peer educators, 5 Counselors and 80 work place leaders at SUA were trained on the safe and preventive measures to take in order to prevent or reduce the spread of HIV/AIDS. Erection of billboards with HIV/AIDS messages, production and distribution of HIV/AIDS leaflets to staff, students and neighboring Communities has created public awareness on the importance of practicing safe sex and taking other precautions.

Formulation of Internal Income Generation policy and establishment of an Internal Income Generation Committee has led to improved internally generated income from what used to be less than 5% in the early 2000s to about 22% in 2015. For example in 2014/15, total Government funds (Salaries and Other charges) disbursed to SUA was TAS 34.98 billion while internally generated income was TAS 9.9 billion. In order to reduce unnecessary cost and to increase efficiency, some workers have been retrenched or re-allocated while
some Units or sections are supposed to be merged or abolished altogether through the on-going restructuring exercise.

7.2.1.6 Research & Extension Services
Through Norwegian support, a number of research projects undertaken were able to produce end results which were responsive to farmer’s needs. Examples of such research projects included those which led to improved crop and livestock production, improved household income, reduced workload, improved health, nutrition, processing and storage of perishable food products.

Some of the Norwegian supported Research projects undertaken to improve crop production included improvement of low yielding rice in Kilombero river basin where production increased from 2.5 tons/ha to 4.2 tons/ha while pigeon pea in Handeni district increased from 0.5 ton/ha to 4.7 tons/ha. Other research projects carried out through Norwegian support included improvement of sweet potatoes, bananas, soya beans and mushrooms through the use of improved high yielding seeds and use of drought and disease resistance varieties. Adoption of new crop varieties and application of integrated crop management by small holder farmers has also led to improved farmer’s earnings and household food security.

Research projects on improvement of animal husbandry, management of livestock pests and diseases including control of tick and tick borne diseases plus tsetse transmitted diseases have resulted to improved milk production by 40%, improved lactation period from 6 to 12 months, reduced calf mortality rate by 80%, controlled mastitis and increased cattle sales. This has increased household income by 20% thus contributing significantly to poverty reduction. Development of Tanzanian vaccine against Newcastle disease has increased local poultry population from 29 to 107 chickens per family and consumption of

Plate 13: Livelihood of farmers such as Ms. Mangula has improved
chicken per family from 5-18 chicken per year. Overall, household income of those farmers who used the vaccine increased by over 370%.

Research on limited access to markets by small holder farmers and improved production practices and processing technologies resulted to commercialization of cassava in Kibaha, Handeni and Muheza districts. Cassava in now used for industrial use, as an ingredient to other food products and as a source of commercial livestock feeds. Assured markets have encouraged farmers to expand acreage of cassava farms and sale of processed cassava chips resulting to increased household incomes and food security. Development of milk collection centers, appropriate milk processing technologies and marketing of milk and milk products has also improved small holder dairy farmer's income in the Southern highlands.

Strengthening of farmers groups and formation of farmer's organizations has enabled small holder farmers in Kilombero, Mvomero and Southern Highlands to access information on agricultural inputs and markets for their agricultural products. As a result of assured markets, this has motivated farmers to expand their farms resulting to more income and improved household food security. Likewise, improved processing technology, packaging and storage of sweet potatoes, cassava, fruits and vegetables have added value and improved their shelf life thus promoting large scale production and commercialization of these crops in Muheza district.

Development of environmentally friendly tree felling and timber sawing technologies in Agro-forestry farming system has reduced damages on coffee trees, timber trees and other crops in agro-forestry farms. It has also reduced stress or workload on labor and improved labor productivity on timber sawing. On the other hand, research on rehabilitation and conservation of Mzinga river catchment by planting fruit trees and Gliricidia as fodder in the Uluguru Mountains has ensured constant and reliable water supply to Morogoro residents, increased soil fertility and reduced soil erosion and sedimentation on Mindu dam.

Intercropping of vanilla crop and Jatropha tree with coffee and banana crops in Bukoba and Moshi did provide farmers with high value crop which increased household income by more than 30%. Promotion of beekeeping and provision of appropriate beekeeping equipment in woodland areas has also diversified economic ventures of rural population and increased household income of targeted farmers by 30%.

Research on promotion of lesser known and lesser utilized timber species in the timber market in Kilimanjaro region has reduced utilization of most common
timber tree species thus contributing to conservation of these tree species and
generation of extra income from sales of abundant lesser known timber tree
species. Promotion of integrated aquaculture with crop farming has also
diversified income sources and improved food security to rural communities in
Morogoro region.

Promotion of tomato production, processing and marketing has enhanced
poverty alleviation in Morogoro rural and Kisarawe Districts. In addition to
providing employment, the introduced simple processing technologies did add
value to harvested tomatoes and reduced post-harvest losses. Research on
development of improved crop storage structures in Handeni district has
reduced post-harvest losses of cereals and pulses by pests by 40%. This has
significantly reduced food shortages and improved household income to
targeted farmers.

Research on promotion and marketing of local rose and standard carnation
production in Mgeta has yielded high returns and created alternative
employment to the rural women and youth. Promotion of soybean production,
processing and utilization has also created an alternative source of income and
protein to Morogoro rural communities. On the other hand, in Dodoma region
where agro-forestry farming system was introduced, it has resulted to improved
agricultural productivity through optimization of soil water content and soil
fertility.

Banana multiplication through tissue culture technology has facilitated mass
production of pest free planting materials which mature earlier and produce
higher yield. This technology which has been disseminated and adopted by
farmers in Morogoro, Mvomero, Mkuranga and Rungwe districts has increased
farmers income and household food security.

Research on modification of yoking system and animal drawn implements for
planting and weeding has significantly improved crop production, increased
household income and reduced workloads/stress to farmers in Njombe, Siha,
Handeni and Korogwe districts. Research also on improved breeding of disease
free Norwegian dairy and meat goats in Mgeta and Gairo has increased the
number of goats in the market, increased milk availability, improved
nutritional status of children and farmers income. Demand for these goats has
exceeded supply and Dar es Salaam and Zanzibar are amongst the big markets
for these goats.

Development of allometric equations and models for estimating and predicting
biomass and carbon changes under different vegetation types has enabled the
Government and different NGOs to carry out forest inventories fast and cheaply. For example, some of the developed models were used in analyzing data collected under NAFORMA. On the other hand, awareness campaigns, trainings and involvement of local communities in all REDD+ initiatives has enabled them to appreciate and value the importance of conserving and utilizing the nearby forests on a sustainable manner. This has resulted to most of local communities setting aside forest land, establishing environmental groups, enacting forest by laws, planting trees in their farms and practicing conservation agriculture. Conservation impacts have been recorded in 9 Norwegian supported REDD pilot projects and once destroyed forests and depleted forest products or resources are now regenerating.

Research projects which led to introduction of alternative source of energy and alternative sources of income to people living close to the forests like beekeeping, mushroom cultivation, establishment of timber and fruit tree nurseries have reduced pollution, deforestation and dependence on forest resources. Knowing the agents of deforestation and forest degradation it has enabled local communities to take mitigation measures against impacts of climate change. Again since local communities are now aware of their legal rights, how to monitor and verify carbon stocks, the processes involved in the carbon trade and leakages, they have been empowered to negotiate for better carbon prices and equitable benefit sharing.

Through research, compensation guidelines and procedures which will hasten and simplify the compensations process and ensure equitable benefit sharing have been developed. These guidelines and procedures await Government approval before they can be applied.

7.2.1.7 Publication, Documentation and Dissemination of Research results

During the past 40 years, the Norwegian Government supported SUA to conduct demand driven Research and Strategic Intervention projects. It is estimated that about 190 research projects and 20 Strategic intervention/Advisory projects were carried out by SUA staffand other collaborating Institutions during this period. Most of these projects had end results which were documented and disseminated in form of publications, presentations in scientific conferences and some exhibited in Agricultural shows.

Records show that from these Research and Strategic Intervention projects, 454 papers have been published in peer reviewed journals and 419 papers published as workshop/conference proceedings. Besides these scientific papers, Researchers were also able to publish extension materials in form of brochures,
manuals, leaflets, fact sheets, newsletters, radio and TV clips. These extension material with detail explanations/procedures and illustrations on how to apply/use the new technologies or practices were distributed to farmers, Local Government Authorities, schools, Non-Governmental Organizations while some were exhibited in National Agricultural/Trade shows. The impact of these extension materials has been very effective in disseminating and adopting the developed new technologies and practices.

In order to ensure that all published materials/papers are documented, SUA through the Norwegian support has established a website, an Institutional Resource Center and a digitized Open Access Depository by the name of Tanzania Climate Change Information Center (TaCCIRe). So far 212 documents have been digitized and uploaded into TaCCIRe while 115 documents have been deposited in the Resource Center. Accessibility of SUA research results by International Academic and Research Community has publicized SUA’s name internationally and improved its ranking by ensuring that it is amongst the best 100 Universities in Africa.

In addition to publication of Research results for public and academic consumption, some Research projects have produced tangible end results which have been registered with BRELPA and given Patents or Intellectual Property Rights (IPR). Examples of such projects funded under the Norwegian support include the one on the development of environmentally friendly portable steel sawing structure in agro-forestry farms and development of local Newcastle vaccine. Registration and patenting of these newly developed technologies is meant to enable SUA to enter into partnership with potential manufacturers in order to share the benefits accruing from the commercial sales and thus improving SUA’s internally generated income.
CHAPTER 8

8 KEY LESSONS LEARNT AND LOOKING AHEAD- A SYNTHESIS

8.1 Preamble
Implementation of the Norwegian development cooperation supported programmes over a period of 40 years has provided important lessons and experiences in a number of areas. From project conception, planning, collaboration and partnerships to project implementation, monitoring and evaluation the description provided in the previous chapters show that a lot of achievements have been made. However, this has come about not without challenges and constraints that needed to be overcome. The careful planning and institutional arrangement based on mutual trust, shared goals and common understanding have been the key important ingredients that have made it possible for the collaboration between SUA, other research institutions in Tanzanian and Norwegian institutions to jointly contribute significantly to the development agenda of Tanzania. The collaboration has been among the few long standing, consistent and fruitful engagements in development cooperation. In the sections below are elaborated key lessons learnt in each of the various areas of cooperation. Such lessons are important for future development programmes involving different partners, not only in Tanzania but also elsewhere in the developing world.

8.2 Institutional collaboration and transformation
The approach of equal partnership and sharing of responsibilities between SUA, other Tanzanian institutions and Norwegian institutions and programme coordinators including gender mainstreaming of programme activities and decision making processes in SUA structures has strengthened good governance and transparency at SUA. This is important for institutional sustainability and growth.

Staff and student exchange between SUA and Norwegian institutions has contributed to the building of mutual trust and common understanding of social, cultural, scientific aspects of development of the people of Tanzania and Norway. This has major impact on the promotion on global peace, mutual respect and understanding of cultural differences.

Addressing gender has been a key element of SUA’s transformation process. Issues like HIV/AIDS are better addressed through community based approaches. Had SUA closed itself from the surrounding society in dealing with these challenges perhaps the situation would not have improved as much as seen today.
8.3 Research for development

Major lessons learnt from implementation of the research component of the cooperation under programmes supported by the Norwegian government include involvement in participatory action research with farmers using multidisciplinary research teams. While in the early years most of the research was academic on station research, the adoption of on-farm research involving farmers has demonstrated effectiveness in promoting farmers’ adoption of proven technologies and practices. This has strengthened the capacity of SUA scientists to transfer technologies to target communities through continuous learning and interaction. It is a valuable experience that can be used in scaling up technologies and experiences more widely. The main challenge for the future is how to institutionalize the outreach activities of the university research community in a more gender-sensitive, coherent and coordinated manner, using the various demonstration units and field stations and the existing outreach oriented units as springboard for such institutionalization.

Farmers exchange visits have proven to be instrumental in promotion of adoption of best practices and technologies generated at SUA. Farmer groups have also been identified to be an effective and practical means in the rural areas for implementation of research projects. Organizing farmers into groups did not only promote joint learning but was also instrumental in enhancing collective action in accessing advisory services, farmer training and collective bargaining. Therefore, empowering farmers/local communities and strengthening their capacities to articulate demand for knowledge, identify appropriate technologies and information is important adoption for productivity enhancement.

Experience gained has shown that demand for farmer-oriented research and extension services is high. Provision of adequate technological skills in a package with inputs or materials at the initial stage gives farmers added impetus to adopt technologies and to sustain them with own resources. It was also learned that affordability of inputs by farmers is an important determinant of pace of adoption of technological packages. Gender considerations and selective gender bias of females over male’s yields better research results. Moreover, good institutional collaboration is cost effective; while in-built monitoring and evaluation system in projects is an effective and practical means to successful project implementation.

Collaborative research between SUA and Norwegian researchers provided additional avenues to access research grant opportunities outside the prevailing programmes such as NUFU and NORHED. They have also been effective modality for exchange and transfer of technologies.
8.4 Programme management
Timely disbursement of financial resources and commensurate absorption capacity of the recipient was of essence for effective implementation of the programmes. In the early years, funds were administered from the Embassy and directly released to SUA as was required. During the period when staff development was the key element of the cooperation whereby most of the training was taking place in Norway Noragric was responsible for programme management on behalf of Norad. Later on, funds were handled by consulting firms (SCAN Africa and SCAN Tanzania) on behalf of the Embassy. This however, did not provide an opportunity for the recipient to build capacity in financial management. To address this problem, the recipient was given the ownership and accountability of managing the funds. This arrangement worked well principally because SUA had been assisted to build capacity. Clarity of guidelines and clauses provided in the programme agreements have proven to be instrumental for smooth utilization, management and reporting on financial resources.

The Norwegian policy of emphasis on recipient ownership and accountability has been very successful in building sustainable recipient capacity to manage donor/development cooperation support as well as building confidence to attract other partners to do the same.

A well-coordinated and non-bureaucratic management system is imperative for successful implementation of the programmes. Adequate funding, timely disbursements coupled with thrift financial budgetary ethics are key to success. Coupled with this is the consistent documentation of research findings and their effective dissemination.

8.5 Envisioning the future and sustaining the relevance of SUA
Implementation of the various programmes described in this document has enabled SUA to contribute immensely in Tanzania’s human development agenda and towards the realization of the millennium development goals especially in addressing food security, poverty, environmental sustainability, HIV/AIDS and gender. This has to a great extent contributed to Tanzanian’s development agenda. SUA as a partner in national development has been significantly supported by the Norwegian government. The capacity built at SUA through the Norwegian development cooperation has made SUA a very attractive institution to a number of other development partners, funding agencies and scholars from other universities from across the globe. This development has inspired SUA to position itself to play even greater roles in realization of Tanzania future development agenda, in particular Vision 2025, that is structured to propel Tanzania into a middle income country whose economy is knowledge driven.
Given the importance of natural resources, food security, climate change mitigation, gender and good policies to sustainable development as outlined in the Sustainable Development Goals, SUA is challenged to continue contributing to the science, technology and innovation agenda of Tanzania. The implication of this is that SUA will need to further enhance its capacity to address emerging STI challenges for more effective participation in the national development. In this endeavor, continued collaboration with development partners is of essence.

OVERALL ACHIEVEMENTS AND IMPACTS

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