

Bio-resources Innovations Network for Eastern Africa Development (Bio-Innovate)

Program Proposal (2010 – 2014)

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TABLE OF CONTENTS

ACRONYMS	4
EXECUTIVE SUMMARY	5
1.0 INTRODUCTION	8
1.1 THE PROSPECT FOR AN EASTERN AFRICAN KNOWLEDGE BASED BIO-ECONOMY	8
1.2 INCREASING DEMAND FOR FOOD AND BIO-BASED RENEWABLES: AN OPPORTUNITY FOR EASTERN AFRICA .	9
1.3 ADAPTING BIOSCIENCES FOR SUSTAINABLE ENVIRONMENTAL MANAGEMENT.....	10
1.4 EXPANDING THE SCOPE AND SCALE OF BIO-RESOURCES VIA SUSTAINABLE AGRO-PROCESSING AND VALUE ADDITION	10
1.5 INNOVATION SYSTEMS PROMOTING SUSTAINABILITY AND POLICY ANALYSIS	10
2.0 SITUATION ANALYSIS	12
2.1 THE RESEARCH FOR DEVELOPMENT SITUATION IN EASTERN AFRICA	12
2.2 THE FOUNDATION FOR THE NEW PROGRAM: OUTCOMES OF THE BIO-EARN PROGRAM (1999-2009) 14	
2.3 RATIONALE FOR A REGIONAL BIO-RESOURCE BASED INNOVATION NETWORK.....	15
2.3.1 Why an innovation systems approach?.....	15
2.3.2 Addressing regional challenges.....	15
3.0 DESCRIPTION OF THE BIO-INNOVATE PROGRAM	17
3.1 GENESIS OF THE BIO-INNOVATE.....	17
3.2 PROGRAM IDENTITY	17
3.3 BIO-INNOVATE PROGRAM NICHE.....	17
3.4 VISION, MISSION AND OBJECTIVES.....	18
3.4.1 Vision.....	18
3.4.2 Mission	18
3.4.3 Strategic Goal.....	18
3.4.4 Purpose.....	19
3.5 PROGRAM RESULTS	19
3.6 BIO-INNOVATE PROGRAM THEMATIC AREAS.....	19
3.6.1 Thematic Area 1: Climate change adaptability, productivity and improvement for food and nutrition security	20
3.6.2 Thematic Area 2: Waste treatment, bio-energy for renewable bio-resources, and securing freshwater resources	20
3.6.3 Thematic Area 3: Innovation incubation and promotion of targeted value chains ----	20
3.6.4 Thematic Area 4: Bio-resource innovation policy and sustainability analysis.....	20
3.6.5 Project Consortia.....	21
4.0 CROSS CUTTING ISSUES	22
4.1 SUSTAINABILITY	22
4.1.2 Strengthening institutional capacities of partners	23
4.1.3 Strategic partnerships.....	23
4.1.4 Integration of critical partners in development arena.....	23
4.2 GENDER CONSIDERATIONS.....	24
4.3 HIV/AIDS.....	24
4.4 ENVIRONMENTAL ISSUES AND CLIMATIC CHANGE.....	24

4.5	ETHICAL CONSIDERATIONS	25
4.6	IPR AND IP MANAGEMENT	25
4.7	COMMUNICATION AND DIALOGUES.....	25
4.8	COST EFFICIENCY.....	25
4.9	FEASIBILITY	26
5.0	BIO-INNOVATE PROGRAM MANAGEMENT -----	27
5.2	<i>Bio-Innovate Competitive Grants Scheme</i> -----	27
	<i>Thematic Leaders (TL)</i> -----	33
	TECHNICAL ADVISORY COMMITTEE (TAC).....	34
	<i>Enhancing regional ownership through linkages with other regional entities in Eastern and Central Africa</i> -----	36
5.6	BIO-INNOVATE INCEPTION SCHEDULE IN 2010	36
	SUBMISSION OF THE BIO-INNOVATE PROGRAMME PROPOSAL.....	36
	BIO-INNOVATE PROGRAMME INCEPTION WORKSHOP.....	36
6.0	PROGRAM FINANCING AND RISK MANAGEMENT -----	37
6.1	PROGRAM FINANCIAL REQUIREMENT AND MANAGEMENT	37
6.2	FINANCIAL MANAGEMENT	37
6.2.1	<i>Contract agreements</i> -----	37
6.2.2	<i>Audit</i> -----	37
6.2.3	<i>Reporting</i> -----	37
6.3	FINANCIAL SUSTAINABILITY	37
6.4	RISKS AND RISK MANAGEMENT	37
	ACKNOWLEDGEMENTS -----	41

LIST OF ANNEXES (available separately)

ANNEX 1: BIO-INNOVATE PROGRAM LOGICAL FRAMEWORK

**ANNEX 2: SUMMARY OF BIOSCIENCE ACTIVITIES IN EASTERN AND
CENTRAL AFRICAN COUNTRIES**

ANNEX 3: (I) A SUMMARY OF BIO-EARN PROGRAM ACHIEVEMENTS

ANNEX 3: (II) BIO-EARN PROGRAM SELF-ASSESSMENT REPORT

**ANNEX 4: ADDITIONAL INFORMATION ON THE DEVELOPMENT OF NEW PROJECTS AND
THE GRANTING PROCESS**

ACRONYMS

AATF	Africa Agricultural Technology Foundation
ABSP	African Biotechnology Support Program
ACTS	African Centre for Technology Studies
AGRA	Alliance for a Green Revolution in Africa
ASARECA	Association for Strengthening Agricultural Research for Eastern and Central Africa
AU	African Union
BecA	Biosciences eastern and central Africa
BIO-EARN	The Eastern Africa Regional Program and Research Network for Biotechnology, Biosafety and Biotechnology Policy Development
Bio-Innovate	Bio-resources Innovations Network for Eastern Africa Development
BTA	Biotechnology Trust Africa
CAADP	Comprehensive Africa's Agriculture Development Program
CIDA	Canadian International Development Agency
CGIAR	Consultative Group on International Agricultural Research
CGS	Competitive Grants Scheme
COMESA	Common Market for Eastern and Southern Africa
CSIR	Council for Scientific and Industrial Research
DFID	UK Department for International Development
EAC	East African Community
FARA	Forum for Agricultural Research in Africa
IARC	International Agricultural Research
IFPRI	International Food Policy Research Institute
IITA	International Institute of Tropical Agriculture
ILRI	International Livestock Research Institute
ICRISAT	International Center for Research in Semi Arid Tropics
IGAD	Intergovernmental Agency on Drought and Desertification
INTOSA	International Organization of Supreme Audit Institutions
IFAC	International Federation of Accounts
IP	Intellectual Property
ISAAA	International Service for the Acquisition of Agro biotechnology
KARI	Kenya Agricultural Research Institute
M&E	Monitoring and Evaluation
MARI	Mikocheni Agricultural Research Institute
MDG	Millennium Development Goal
NARS	National Agricultural Research System
NEPAD	New Partnership for Africa's Development
PAC	Program Advisory Committee
PBS	Program for Biosafety Systems
PI	Principal Investigator
PMO	Program Management Office
R&D	Research and Development
R4D	Research for Development
REC	Regional Economic Cooperation
SADC	Southern Africa Development Community
SAREC	Swedish Agency for Research Cooperation in Developing Countries
SEI	Stockholm Environment Institute
SEK	Swedish Krona
Sida	Swedish International Development Cooperation Agency
SSA	Sub-Saharan Africa
TAC	Technical Advisory Committee
TOR	Terms of Reference
UNEP-GEF	United Nations Environment Program-Global Environment Facility
USA	United States of America

Executive Summary

Eastern Africa is well endowed with many renewable natural resources (bio-resources) that can be harnessed to stimulate economic growth and integrate the region to the wider global economy. Investing in bio-resources development is pivotal to address development challenges such as food and nutrition security, climate change threats and sustainable utilization of natural resources for development. There is a growing recognition in the region that modern bioscience innovations can be a tool to strategically assist countries in Eastern Africa to make the transition to a knowledge based and sustainable bio-resource economy. These aspirations are well articulated at various levels of regional governance and cooperation in Africa, such as by the African Union and its New Partnership for Africa's Development (AU/NEPAD), the Common Market for Eastern and Southern Africa (COMESA) and the East African Community (EAC).

African governments have also recognized the importance of regional collaboration in science and technology to enable the continent to adapt the rapid advances and promises of modern biosciences. In 2005, under the auspices of the AU and NEPAD, African countries designed and adopted Africa's *Science and Technology Consolidated Plan of Action (CPA)*. The plan puts emphasis on improving the quality of African science, technology and innovation, through regional networking and developing more appropriate policies. Biotechnology and biosciences are prioritized areas in the plan, as has been demonstrated by the work of a high level AU/NEPAD African Panel on biotechnology, whose findings are in the publication: "*Freedom to Innovate-Biotechnology in Africa's Development*".

In response to the challenge of mobilising science and technology for Africa's development, the Eastern Africa Regional Program and Research Network for Biotechnology, Biosafety and Biotechnology Policy Development (BIO-EARN) Program was initiated in 1998. The goal was to develop capacity and competencies to use effectively and integrate modern biotechnology in agriculture, industry and in environmental management in eastern Africa. The first and second phases of the BIO-EARN Programme (1999-2005) were focused on building human and infrastructural capacity in using advanced agricultural, environmental, industrial biotechnology and developing bio-policy and biosafety regulatory skills. These phases were co-ordinated by the Stockholm Environment Institute (SEI) in collaboration with Uganda National Council for Science and Technology. The programme was positively evaluated in 2004, which resulted in the third phase (2006-2009) being implemented in the region, with coordination by the Inter-University Council for East Africa (IUCEA). In this phase the capacity of African scientists and policy makers built in the first and second phases of BIO-EARN was used as the basis to develop nine large regional research consortia, involving science and market actors, engaged in research for development (R4D) with a focus on crop productivity, agro-processing, environmental and industrial development.

Over a period of ten years (1999-2009), the BIO-EARN Programme has involved 35 institutions from Ethiopia, Kenya, Tanzania and Uganda and Sweden, more than 100 scientists and an even larger number of policy makers and practitioners from the region. The BIO-EARN Programme, serving as a "regional network of excellence" has been effective in developing Eastern African capacity in biosciences, biotechnology policy and biosafety assessment. The programme has also developed new products such as improved varieties of sorghum, cassava and sweet potatoes, new bioprocess technologies for waste water treatment and energy production and has served as a platform for regional collaboration and information sharing on biotechnology and biosafety policy issues.

The proposed New Program on "*Bio-resource Innovations Network for Eastern Africa Development*" (Bio-Innovate) will target bioscience and product oriented innovation activities in Eastern Africa (Burundi, Ethiopia, Kenya, Rwanda, Tanzania, and Uganda). It builds on previous investments, achievements and experiences from the BIO-EARN Program and other regional initiatives. The New Program will focus on delivering new products through bioscience innovation systems involving a broad sector of actors, including scientists, private sector, NGOs and other practitioners. The New Program will use modern bioscience in practice to improve crop productivity and resilience to climate

change in small-scale farming systems, and improve the efficiency of the agro-processing industry to add value to local bio-resources in a sustainable manner. Bio-Innovate will be user-, market- and development-oriented in order to make a difference on the ground, in supporting poverty alleviation and sustainable economic growth.

In order to strengthen regional ownership and accountability and ensure that “Bio-Innovate” is closely linked with the African regional development agenda, it is proposed that the New Program will be hosted by ILRI at the Biosciences eastern and central Africa (BecA) - ILRI Hub in Nairobi. The BecA-ILRI Hub is a newly created, regionally shared research platform for eastern and central Africa, with first class research and training facilities and supported by efficient management, financial and administrative services. . The BecA-ILRI Hub is sponsored by the AU/NEPAD, as part of its policy for developing centres of excellence for science and technology in Africa. This new managing arrangement will enable Bio-Innovate to establish its own identity, autonomy, accountability and leadership in innovation systems, within a supportive scientific environment. The host institution will provide Bio-Innovate with administrative and financial services, as well as technical back stopping and opportunities for synergies with the BecA-ILRI Hub through joint activities, including resource mobilization. Building synergies with related programs, including some other related actors also co-located at the BecA-ILRI Hub, will accelerate the New Program making a major contribution towards the regional agenda for economic development in Africa, which is being promoted by regional economic and policy bodies such as AU-NEPAD, COMESA, EAC and the Forum for Agricultural Research in Africa (FARA).

In the preparation of this proposal, an analysis of various bioscience related initiatives in Eastern Africa showed that there are many national and international initiatives but only a few addressing regional issues. Most focus on research and capacity building in biosciences and biosafety with an emphasis on plant and animal production and health. The investments are largely fragmented with some duplication of efforts. The missing links are those leading from research to innovation through to delivery to end-users. Market actors such as private sector and NGOs are not sufficiently involved at all stages of the innovation process to ensure that science and technology (S&T) is actively contributing to development and improving livelihoods. Apart from the current BIO-EARN Program, there are few initiatives investing in environmental biosciences, to treat agro-industrial waste and secure freshwater resources. This analysis demonstrates the need for more integrated investments, through a new regional, broad based bioscience innovation program actively linking S&T to the market and addressing priority challenges within the context of the regional development agenda, as articulated in AU/NEPAD’s Comprehensive Africa Agricultural Development Program (CAADP).

Therefore, the New Program is a bold step to bring together partners in Eastern Africa in bio-resources innovation. The purpose of Bio-Innovate is to initiate, intensify and disseminate innovations for sustainable utilization, transformation and integration of the Eastern Africa’s bio-resources for promotion of economic growth and development. The New Program will be managed for results, based on key principles such as value-addition, trans-disciplinarity, competitiveness, subsidiarity, strategic impact in society and mainstreaming of investments into the regional development agenda.

The Bio-Innovate niche is characterized by a focus on the applications of bio-resource innovations to support sustainable growth and transformation of the agricultural and environmental sub-sectors from primary production to value addition, while enhancing adaptability to climatic change and strengthening innovation policy. The Bio-Innovate program will have four thematic areas, all of which are closely connected to and build on AU/NEPAD *Consolidated Plan of Action for Africa’s Science and Technology*. These thematic areas are; (i) climate change adaptability, productivity, value addition and improvement for food and nutrition security, (ii) agro-process waste treatment, bio-energy from renewable bio-resources and securing freshwater resources (iii) innovation incubation and promotion of targeted value chains; and (iv) bio-resource innovation policy and sustainability analysis.

The funding mechanism in the New Program will be through the Bio-resources Innovation Fund supporting applications for regional, multi-disciplinary innovation projects in Burundi, Ethiopia,

Kenya, Rwanda, Tanzania and Uganda. Calls for proposals will be made in the four priority areas. The first priority call will be targeted to the use of biosciences to promote adaptation mechanisms to climate change in the region. The Innovation Fund will be operated on the basis of excellence and the ability to deliver the results. The Program will also promote collaboration with key national, regional and international institutions active in Eastern Africa.

In order to secure efficient management and evaluation the Program will fund not more than 10 regional, multi-disciplinary innovation projects/consortia within the four thematic areas. Depending on the type of project, each consortium will have a budget in the range of 1-3 MSEK/year. These projects will be developed using a Competitive Grant Scheme (CGS) that will involve broad based Eastern African regional innovation consortia. The call for proposals will be framed on the basis of the four Bio-Innovate thematic areas and the priority needs and regional strategies, with an initial focus on climate change adaptation. A strong emphasis in the selection criteria will be based on the active involvement of market actors and practitioners, ensuring that knowledge and technologies are used in response to real needs and that efforts and investments are sustainable. Matching funds and long term commitment from market actors, governments in the region, and potential co-financing with other donor agencies will be strong selection criteria in approving funding for the various project consortia.

The Bio-Innovate Programme will be guided by an independent Technical Advisory Committee (TAC). This TAC will provide oversight of the Programme and peer review of the competitive grant scheme and Programme monitoring and evaluation. Day-to-day management will be provided by a Project Management Team based at ILRI. An annual implementation meeting will be convened by the Project Management Team with TAC and the team leaders from the four thematic areas. The Bio-Innovate Programme will be managed by ILRI through an agreement with Sida.

A prominent feature of the Bio-Innovate Program will be a continuous and rigorous monitoring and evaluation (M&E) system to ensure that the Innovation Fund is being used as efficiently as possible and with a maximum impact. The M&E will be done in such a way that Programme components not meeting their targets and milestones will be shut down.

The intended results of Bio-Innovate are:

1. Strategic Eastern Africa crop innovation systems strengthened to improve productivity and enhance food and nutrition security in the region. This result will generate innovations to enhance crop adaptability to the consequences of climatic change, crop diversification and productivity constraints.
2. Innovations for bioremediation, sustainable waste management and mitigation of climatic change developed and promoted. Efficient and effective bioscience innovations for environmental clean-up, waste management and sustainable use of resources (water and land) will be generated.
3. Eastern Africa innovation systems catalysed to deliver agricultural, environmental and industrial innovations that stimulate sustainable transformation, utilization and productivity of the region's bio-resources. Technology incubation and other mechanisms for putting research into use by communities and industry will be developed and operationalized.
4. Innovation policies for sustainable harnessing of bio-resources developed and promoted. The New Program will undertake policy support analysis studies to provide decision support tools for investment, promotion and management of bio-resource innovations in Eastern Africa.
5. An enabling mechanism for mobilization, catalysis and nurture of a strong bio-resource and science-led economic growth agenda for Eastern Africa strengthened and operationalized. This result will occur as an overall outcome of the above four actions being implemented successfully.

The proposed total budget requirement for the New Program from Sida for the five year period (2010-2014) is SEK 80 million, including a focus on Climate adaptation for 2010 and 2011 (with a budget of SEK 20 million) (approximately USD 11.5 million in total).

1.0 INTRODUCTION

1.1 The prospect for an Eastern African knowledge based bio-economy

Sub-Saharan Africa (SSA) faces both long standing and new challenges as countries move towards achieving the Millennium Development Goals (MDGs). The development of national Poverty Reduction Strategies (PRS) is presently dominating development efforts in the region. The focus on MDGs and PRS are necessary, critical and logical. However, longer term, strategic questions on how SSA countries could build a solid foundation for sustainable economic growth and respond to emerging issues, such as climate change are also critical. This will require African governments and development partners to consider long-term development goals for SSA, which ensure food security, improve livelihoods through diversifying economies and increase competitiveness of African exports in regional and global trade, over the next 10-20 years.

The growing global demand for food, feed and bio-based renewable materials (such as bio-fuels) is changing the conditions for the bio-resource production worldwide, not least for countries in Sub-Saharan Africa. At the same time, modern biosciences is providing an increasingly powerful innovation engine at a global scale for sustainable agricultural production, waste treatment, energy production and development of a diverse range of novel bio-products. The use of modern biosciences are contributing to a transition¹ that by some has been called the development of a *knowledge based bio-economy* transforming biological resources into new, sustainable, eco-efficient and value-added products². The development of a *knowledge based bio-economy* is important for many reasons, including: (i) development of resource efficient and productive agricultural systems able to adapt to climate change, (ii) decreased dependence of fossil energy thereby decreasing emission of green house gases, (iii) the possibility to revitalize rural communities, increasing the production base and the opportunities for local value addition and (iv) increased possibilities to recycle energy and material flows for mitigation of environmental degradation.

Eastern Africa is well endowed with a wide variety of renewable natural resources (bio-resources) that through the application of modern biosciences³ and bioscience innovation systems could be used as a basis for economic growth⁴ and addressing MDGs⁵. By building a capacity to adapt *knowledge based bio-economy*, countries in Eastern Africa would improve their ability to build agricultural production systems adapted to climate change. There is now a growing recognition in the region that bioscience innovations could contribute to new agro-processing opportunities, value chains and diversified small-holder production creating an increased demand for local crops, thereby improving rural livelihoods. The dramatic progress in applications of biosciences in crop agriculture could also help agro-industries⁶ and community based bio-refineries to be more productive and sustainable. With the help of modern biotechnology, agro-waste could be converted into valuable products such as feed, bio-energy, and other valuable by-products that at the same time would reduce environmental impacts. Capacities to adapt and use modern biosciences in various sectors are emerging in Eastern Africa⁷. However, they are still scarce and scattered, with few strong regional initiatives.

¹ A transition whereby fuel, energy, plastics are produced by bio-based alternatives instead of using fossil fuel.

² Cologne Paper (2007). En route to a knowledge based bio-economy. Expert paper on knowledge based bio-economy, resulting from a meeting held in Cologne, Germany on 30th May 2007 and OECD, 2009, The Bio-economy to 2030, Design a policy agenda (www.oecd.org/futures/bioeconomy/2030).

³ Juma, C. and Serageldin, I (2007). Freedom to Innovate: Biotechnology in Africa's Development, Report of the High-Level African Panel on Modern Biotechnology, African Union (AU) and New Partnership for Africa's Development (NEPAD).

⁴ NEPAD (2006). NEPAD Agriculture unit Annual Report (2006-2007); Partnership in support of CAADP. A publication by the NEPAD Secretariat. Johannesburg South Africa.

⁵ Sachs *et al.*, 2005. Investing in Development: A practical Guide to achieving the Millennium Development Goals. UN Millennium Project. A report to the UN Secretary General. UN New York.

⁶ The agro-processing sector, including sugar refineries and breweries, is a crucial industrial backbone in many Sub-Saharan countries.

⁷ See, for example, <http://hub.africabiosciences.org>.

These aspirations are well articulated at various levels of governance in Africa such as African Union/ New Partnership for Africa's Development (AU/NEPAD). African governments have also recognized the importance of regional collaboration to enable the continent to adapt the rapid advances and promises of modern biosciences. In 2005, under the auspices of the AU and NEPAD African countries designed and adopted Africa's *Science and Technology Consolidated Plan of Action (CPA)*. The CPA puts emphasis on improving the quality of African science, technology and innovation, not least through regional networking and more appropriate policies. Biotechnology and biosciences are a prioritized areas in the CPA, which also been explicitly manifested by a high level AU/NEPAD African Panel on biotechnology, which published its findings in the publication "*Freedom to Innovate - Biotechnology in Africa's Development*".

This proposal is aimed at pooling resources and expertise through a regional program able to strategically assist Eastern Africa to make the transition to a *knowledge based and sustainable bio-economy*.

1.2 Increasing demand for food and bio-based renewables: An opportunity for Eastern Africa

The increasing demand for food and bio-based renewable resources will in the long run be beneficial for agricultural economies. Agriculture plays a fundamental role in Eastern Africa's economy and Agricultural GDP averages about 35% with the sector accounting for up to 70% of labour productivity⁸. The sector has been prioritized as critical for poverty reduction and food and nutrition security⁹. As such, national agricultural research systems (NARS) and the CGIAR sponsored international agricultural research centres (IARCs) in Africa are undertaking extensive R4D, mainly on staple crops, livestock and agro-forestry systems important in Africa and on related policies. There is still much work to be done on improving the productivity of key staple crops that underpin food and nutrition security at local level. The vast majority of small scale farmers (70% of the region's population) are vulnerable to a range of production constraints, including new threats such as climate change¹⁰. It is envisaged that these small scale farmers if engaged in agricultural innovation will be able to stimulate the much needed 6% agricultural GDP growth target agreed by African countries through NEPAD as essential for attaining the MDGs¹¹. Consequently, stimulating agricultural productivity among small-scale farmers has been prioritized within the region's economic growth programs.

Through priority setting processes, critical staple crops (cereal and root crops) and other agricultural bio-resources utilized by small-scale farmers in the region have been identified for improvement. Indeed, small-scale farmers would benefit if these staple crops (and other agricultural commodities) could be brought into regional bioscience innovation systems. An ultimate goal of such innovation systems would be to enable small-scale farmers in Eastern Africa to benefit from the remarkable productivity gains possible through modern biosciences. These innovation systems need to be interdisciplinary and include strong policy components to ensure environmental and socio-economic sustainability in the development of pro-poor crop and livestock production systems, for food, feed and fuel. The proposed New Program therefore seeks to strengthen innovation in the region to generate science-based solutions for stimulating adaptability of crop-based farming systems to climate change, enhance crop, feed and bio-fuel productivity and provide farmers with more agribusiness opportunities.

⁸ Bahigwa, G. 2006. Monitoring CAADP Implementation in COMESA: Presentation to Nyali Beach Hotel, Mombasa, Kenya September 27, 2006 during a Strategic Analysis and Knowledge Support System (SAKSS), Eastern and Central Africa meeting.

⁹ CAADP, 2003. Comprehensive Africa Agricultural Development Program. A publication by CAADP Secretariat Johannesburg, South Africa.

¹⁰ The negative consequence of climatic change, especially to the mid- to high production areas of the region, will increase vulnerability, poverty, food and nutrition insecurity and further environmental degradation.

¹¹ Omamo et al., 2006. Strategic priorities for agricultural development in Eastern Africa. IFPRI report No. 150. Washington DC.

1.3 Adapting biosciences for sustainable environmental management

Over the last decade Eastern Africa has experienced a stable economic growth of 5% per annum¹². This economic growth, characterized by expanding industries and rapid population growth, has in many cases resulted in negative impact on ecosystems services and on water resources. For example, rivers, lakes and coastal areas have become dumping sites for industrial wastes¹³. As a consequence, crucial ecosystems such as wetlands are being degraded and water resources for human consumption and agricultural applications is becoming scarce and increasingly polluted¹⁴. Yet the demand for fresh water is expected to increase with the current population growth, which is even more problematic through an expected reduced rainfall precipitation due to climate change. Therefore, the region must take bold steps now to protect its precious water resources to avoid a future crisis. This will require implementation of effective actions, such as enforcing policies to guide water quality standards, investments in wastewater management systems and environmentally sound industrial development, not least in the agro-processing sector. In the New Program, modern biosciences will address the environmental pollution threats by developing efficient waste management technologies and up-scaling of emerging pilot technologies, with a focus on the agro-processing sector. These actions will be undertaken using an innovation systems framework that includes R4D actors, industry, policy and regulatory institutions and other stakeholders. Moreover, the threat posed by climate change on Eastern Africa's bio-resources requires that immediate measure be put in place to secure production and sustainability of the natural resource base. Accordingly, addressing issues of climate change adaptation and coping strategies will be addressed within the framework of sustainable environmental management.

1.4 Expanding the scope and scale of bio-resources via sustainable agro-processing and value addition

Eastern Africa and most of Sub-Saharan Africa have agrarian dependent economies characterized by trade and consumption of unprocessed primary bio-products such as food, feed and fibre. Apart from all lost economic opportunities, the low agro-processing activities further exacerbate food and feed losses due to post harvest wastage. These problems in turn are opportunities that can be harnessed through a transition to knowledge based bio-economy where the countries in the region would increase their capacity to add value to their bio-resources and develop various useful by-products. This includes the use of municipal and industrial wastes for production of products such as improved feed, bio-processing reagents with selective catalysts, safe green chemicals, bio-fuels, biogas, bio-plastics and biopolymers. Such a transition would serve the agro-processing sector in the region, making it more resource efficient and sustainable, which is vital for its competitiveness and survival. Such transition would also support rural livelihoods through increased demand for local crops and bio-resources, enhancing the agribusiness opportunities for farmers in the region. Promoting the conversion of waste into renewable energy (such as biogas, bio-fuel etc) will also reduce the need to import costly fossil fuel and mitigate climate change. This New Program therefore seeks to strengthen innovation in the region by assisting agro-industries and community based bio-refineries to be more productive and sustainable.

1.5 Innovation systems promoting sustainability and policy analysis

Some of the key problems facing Eastern Africa in realising a *knowledge based bio-economy* are the weak innovation systems and poor links between farmers, R&D and market actors in the region. Few Eastern Africa institutions are able to make integrated cross sector, inter-disciplinary analysis and policy relevant research. This makes it difficult for decision makers and policy makers in the region to

¹²ADB and OECD, 2008. Africa Economic Outlook.

¹³Seyoum L., 2004. Developing and optimizing processes for biological nitrogen removal from tannery wastewater in Ethiopia. PhD Thesis. Royal Institute of Technology, Stockholm, Sweden.

¹⁴ Urban slaughter houses near water resources are also a serious source of pollution.

identify the critical science-policy linkages that could be made between major development and environmental issues relating to bio-resource utilization systems. The potential conflict between crops for food and/or biofuels is one such example. Taken together, this leads to an inability to identify and agree on the appropriate intervention points, and priorities in support of agricultural, industrial and environmental sectors. The New Program brings different innovation actors and perspectives together; enabling interdisciplinary, cross-sectoral analysis will be an effective learning and demonstration tool for the region. Such innovation systems will pool key expertise and link value chain actors across the region ensuring coherence and effective implementation.

Well established innovation policies are also a major factor for successful integration of innovations from advanced biosciences in strategic sectors of the economy of the Eastern Africa Region. It is important for policy makers in the Eastern Africa countries to assess, understand, and evaluate how bioscience innovation could support sustainable development in the region. It is also important for the region to prioritise their R4D, product development-commercialisation efforts so that bio-resource utilization, economic development and sustainability are interlinked to bring the desired outcomes.

The proposed New Program aims at pooling expertise through a regional bioscience innovation network, enabling cross-sectoral and interdisciplinary policy and sustainability analysis on how bioscience innovation could support sustainable development in the region.

2.0 SITUATION ANALYSIS

2.1 The research for development situation in Eastern Africa

Sustained economic growth and improved living standards in society is dependent on ability to produce, select, adapt, commercialise and use knowledge as a knowledge-based economy (15, 16). In the case of Eastern Africa, economic growth will largely depend on building a knowledge-based economy underpinned by sustainable use of natural resources specifically, the bio-resources. Indeed, economic growth policies of Eastern African countries all include a R4D agenda based on their natural resources. At a regional level, the R4D goal is to increase economic growth and improve livelihoods, while enhancing the quality of the environment by promoting sustainable productivity, value addition and competitiveness of the regional agricultural system (17). A recent study has identified eight agricultural developmental domains that inter-phase production potential, access to markets as well and demography¹⁸. The study also shows that:

1. Focusing on productivity growth in selected staple crops will sustain economic growth;
2. Growth will be in non-tradable commodities with value added in storage; processing and distribution will be the source of income and stimulus for economic growth;
3. Exploiting opportunities through regional collaboration in information, research spill-over and cross-border market access is critical for success;
4. Strengthening capacity of policy makers to deal with cross-sector linkages is critical for impact driven innovation and;
5. Building new strategic partnerships is crucial to harness new and existing knowledge opportunities in order to deal with development challenges.

The New Program is cognizant of these development imperatives and the opportunities they carry. As such, it is designed to catalyse an integrated delivery of impact oriented science based solutions where they are needed most, which is at farmers' levels or by various value chain actors in the bio-resources sub-sector. Within agricultural biosciences over the last decade, the main emphasis has been on capacity building and development of various tools supporting breeding of new crops and cultivars. Other livestock-related bioscience R4D activities are mainly focusing on production of diagnostic kits, immune-regulators and vaccines to protect livestock against disease. The BIO-EARN Program pioneered R4D in the area of environmental biosciences generating outputs for industrial applications, such as the use of micro-organisms for treatment of industrial and agricultural wastes and waste water, and the production of value added chemicals and products from agro-industrial wastes.

An illustrative list of regional and international programs and actors involved in bioscience and bio-resource innovation activities relevant to the region is provided in Annex 2. They include; ASARECA (supporting mainly agricultural biotechnology); the BecA-ILRI Hub (new facilities, research projects and capacity building programs); CGIAR IARCs (crops and livestock research); IFPRI Program on Biosafety Systems (PBS); UNEP/GEF programs on bio-safety; AATF (technology transfer); BTA (technology); ACTS (policy); ISAAA (communications and knowledge management) and ABSF (bio-policy development).

Various other bioscience research projects in the region include those supported by Bill and Melinda Gates Foundation (agricultural biotechnology in crops, especially maize, root and tuber crops) and several multi and/or bilateral donor and national government supported activities.

¹⁵ OECD, 1998. Technology, Productivity and Job Creation." Best Policy Practices. Paris.

¹⁶ World Bank, 1999. World Development Report 1998/1999: Knowledge for Development. Oxford University Press

¹⁷ ASARECA, 2007. Strategic Plan 2007- Fighting Poverty, Reducing Hunger and Enhancing Resources through Regional Collective Action in Agricultural Research for Development – (www.asareca.org).

¹⁸ Omamo *et al.*, 2006. Strategic Priorities for Agricultural development in Eastern and Central Africa. IFPRI, Research Report Number 150.

Elsewhere in Africa and internationally, there are a number of actors whose activities will contribute to the bio-resource innovation processes in Eastern Africa. These include, for example, CSIR and the University of Cape Town in South Africa; several universities and national research institutions in Europe, North America, Australia, Asia and Latin America. This latter category reflects the global centres of knowledge that will link with the New Program in different ways, depending on the thematic areas.

The Consultative Group on International Agricultural Research (CGIAR) and their International Agricultural Research Centres (IARCs) are also in the forefront of bioscience innovation in the region, with several CGIAR centers having agricultural, environmental and policy related activities in the region (as described in Annexes 2 and 6). The CGIAR research is often strategic, involving many international researchers of highest quality, and is of great value to the region. However, the CGIAR R&D is not per se targeted to strengthening the capacity of the various national institutions in the region to adopt and use modern biosciences. To use modern biosciences as a tool for development, including knowledge and tools developed at the CGIAR centers, effective regional R&D networks comprised of researchers based at various East African institutions needs to be supported. This is the niche that the Bio-Innovate Program seeks to fill, as derived from analysis of ongoing bioscience innovation activities in the region.

In the preparation of this proposal, an analysis of various bioscience related initiatives in Eastern Africa showed that there are many national and international initiatives but only a few addressing regional issues. Most focus on research and capacity building in biosciences and biosafety with an emphasis on plant and animal production and health. The investments are largely fragmented with some duplication of efforts. The missing links are those leading from research to innovation through to delivery to end-users. Market actors such as private sector and NGOs are not sufficiently involved at all stages of the innovation process to ensure that science and technology (S&T) is actively contributing to development and improving livelihoods. Apart from the current BIO-EARN Program, there are few initiatives investing in environmental biosciences, to treat agro-industrial waste and secure freshwater resources. Some examples of biosciences R4D activities in Eastern Africa are listed in Annex 2.

This analysis demonstrates the need for more integrated investments, through a new regional, broad based bioscience innovation program actively linking S&T to the market and addressing priority challenges within the context of the regional development agenda, as articulated in AU/NEPAD's Comprehensive Africa Agricultural Development Program (CAADP).

There is a need for intensification of efforts, particularly with the threat posed by climate change and the need to harness the opportunities of growing demand for food, feed, water and energy locally and globally. Accordingly, investing in bio-resource innovations to enhance crop adaptability to ecological changes, increase production and crop value addition options are still critical, requiring up- and out-scaling efforts. There is also a need to apply and adopt modern technologies to improve waste treatment, by-product utilization (such as biogas production from waste), in particular from the agro-processing sector in the region. Another critical gap is packaging and translation of innovations into forms easily adopted and used by farming communities, agro-processing actors, and other stakeholders in the economy. There are no technology incubation centres and limited private sector participation. Investment in bio-resource innovation is limited in the region. Countries in the region also lack a favourable policy environment for innovation. The capacities for policy analysis on how and to what degree bioscience innovation could support sustainable development in the region need to be strengthened. These are some of the key issues to be addressed in the New Program.

2.2 The foundation for the New Program: Outcomes of the BIO-EARN Program (1999-2009)

The Sida funded Eastern African Regional Program and Research Network for Biotechnology, Biosafety and Biotechnology Policy Development (BIO-EARN) started in 1999. Phase I and II (1999-2005) focused on capacity building, by supporting PhD scholars from the region to undertake their studies in Sweden. The third phase (2006-2009) has focused on support for research being undertaken by these scholars and their collaborators when they returned to their home institutions in Eastern Africa. This phase focuses on biosciences R4D in agriculture and the environment, with support to several research consortia linking countries in the region.

The Program has involved some 35 institutions and more than 100 scientists from four Eastern African countries (Ethiopia, Kenya, Tanzania and Uganda) and partners from Sweden. The Program has distinguished itself by combining several aspects of biotechnology development (agricultural, environmental, biopolicy and biosafety) within one Program. The BIO-EARN Program has also generated a number of outputs (products, processes, knowledge and information (publications) and built R4D capacity. A summary of results and outputs from Phases I-III (1999-2009) are presented in **Annex 3** (i & ii). The key results of the BIO-EARN Program are given below.

- **Regional capacity to address existing and new challenges was strengthened through human and infrastructure development.** A total of 31 PhD and some 60 MSc graduates trained in advanced molecular techniques and tissue culture for the partner institutions in the region, including Addis Ababa University, Ethiopia; Makerere University Uganda; Moi University, Kenya; University of Nairobi, Kenya; University of Dar es Salaam, Tanzania, as well as the National Research Institutions within the participating countries. In addition, various scientific equipments were purchased and installed as part of upgrading of research infrastructure, especially in participating universities in the region. This equipment is currently in use in these institutions. Swedish Universities have also built capacity to engage in international development. Both partners and collaborating institutions benefited from staff exchange and sharing of experiences.
- **Information regarding key crops, environmental technologies and biopolicy systems were generated.** Useful knowledge was generated on management of diseases in *sweet potato* and *maize*, endophyte enhancement of tissue culture *bananas*, starch biochemistry in *cassava*, *sorghum* and *enset*, oil quality and quantity in *sesame*, genetic diversity and marker studies in *coffee*, *cassava*, *enset* and *hagenia*. In addition, advanced waste management techniques, which are now being used on a pilot scale were developed. BIO-EARN partner institutions were integrated into national innovation systems (agriculture and environmental) for economic development. BIO-EARN was one of the pioneers of biosafety policy development in Eastern Africa.
- **Competitiveness in R4D among partner universities and research institutions enhanced.** By enhancing human and infrastructure capacity in these institutions, BIO-EARN improved their competitiveness and capacity to participate in quality training and research for national and regional development. For example, BIO-EARN partner universities are now offering training in molecular techniques and attract research grants from the public and private sectors to undertake R4D. BIO-EARN scientists in both universities and national research institutions are engaged in major regional undertakings such as virus elimination in vegetative crops, enzyme production for industrial processes and scale-up procedures for waste management.
- **An integrated innovation approach involving the environment, agriculture, food and nutrition was initiated.** The BIO-EARN Programme provided mechanisms for integrating agricultural production, waste management and industrial biosciences. For example, there was a focus on increasing *sorghum* and *enset* production intended for food and feed, and other industrial products. Other projects on cassava and sweet potato were intended to improve food security and generate surplus for industrial use. Another project focused on production of novel

enzymes for industrial processes and degradation of solid wastes from agro-industries. In all these projects, potential added value products and processes have been realized for improved food security, and small scale farmer productivity.

2.3 Rationale for a regional bio-resource based innovation network

2.3.1 Why an innovation systems approach?

A key lesson coming through from the BIO-EARN Program¹⁹ and other R4D activities in and out of Africa is the need to undertake developmental activities within innovation systems. An innovation system refers to a set of distinct institutions which jointly and individually contribute to the development and diffusion of new technologies which provide the framework within which governments form and implement policies to influence the innovation process²⁰.

The adoption of an innovation systems approach is critical for the transition to a knowledge-based economy²¹. Accordingly, the New Program will use an innovation systems approach engaging new and existing actors in and outside the region in bio-resource innovations, laying foundation as well as up- and out-scaling approaches for development. This will expand the scope and scale of opportunities for the region's bio-resource evolution, paving way for the long awaited "doubly green" revolution in Africa.²²

2.3.2 Addressing regional challenges

2.3.2.1 The benefits of a regional approach

Regional integration and shared approaches are increasingly important factors in promoting development in Africa. This is mainly reflected in areas such as natural resource management, innovation and environmental protection, where African governments, through their regional bodies have shouldered greater responsibility. Regional bodies, such as the African Union, NEPAD, EAC, and Southern African Development Community (SADC) are thus central actors in shaping regional collaborative agendas. In order to be successful, these regional bodies also need to be linked to strong operational programs (such as Bio-Innovate), which can serve as innovative examples and guiding mechanisms in shaping a broader regional collaboration by demonstrating successful implementation of a regional R4D agenda. The New Program will support the work of regional bodies, particularly AU-NEPAD and the implementation of the CAADP.

There are many small and fragmented investments at national level in several countries seeking to address common developmental challenges in the region. Specifically regional efforts will enhance complementarities and efficient use of resources (financial, human and infrastructural). Moreover, there are many R&D activities in the various areas of biosciences globally and having a regional network will facilitate mobilization of resources and technology from elsewhere in a focussed manner, for example from CSIR (South Africa) and Embrapa (Brazil). Africa also recognizes the need to tackle common regional challenges collectively, for example through common markets for trade and science and technology initiatives. The Common Market for Eastern and Southern Africa (COMESA) is in the process of developing harmonized biosafety guidelines and means for countries' sharing risk assessment and risk management data for biotechnology²³. Development partners also recognize the need for common efforts in addressing development challenges. For example, the Alliance for a Green Revolution in Africa (AGRA) is co-funded through a multi-donor trust fund led by Bill and Melinda Gates and Rockefeller foundations. The regional agricultural research organisations, ASARECA and FARA are also funded through multi-donor trust funds.

¹⁹ The BIO-EARN Program is currently involved in an in-depth analysis of bioscience innovations systems in the region

²⁰ Metcalfe, S. 1995. The economic foundations of technology policy: equilibrium and evolutionary perspectives. In: *Handbook of the economics of innovation and technological change*, edited by P. Stoneman. Oxford, UK: Blackwell.

²¹ Cologne Paper, 2007. En route to a knowledge based bio-economy. Expert paper on knowledge based bio-economy, resulting from a meeting held in Cologne, Germany on 30th May 2007.

²² Conway, G. 1997. *Doubly Green Revolution*. Penguin Classics.

²³ COMESA expert panel meeting on biotechnology, Lusaka, August 2009.

The proposed New Program, *Bio-resource Innovations Network for Eastern Africa Development (Bio-Innovate)*, is a bold step to bring together partners from the south and north through a new bio-resource innovation regional platform. It will target bioscience innovation activities in Eastern Africa (Burundi, Ethiopia, Kenya, Rwanda, Tanzania, and Uganda) and operationally support regional agendas, in particular those articulated by AU-NEPAD. The New Program will be operated in a truly regional manner, which will have the following advantages:

- Challenges dealing with bio-resources including agricultural productivity constraints, market opportunities, environmental problems such as climate change are regional in nature and require regional convergence and joint efforts;
- There are common development agendas within the regional policy bodies (IGAD, ECA, CAADP, NEPAD, ASARECA, etc.), which would benefit from joint regional implementation;
- A regional approach enables sharing of scarce R&D infrastructure and key competences to avoid duplication and harness available resources; this is the genesis of the BecA-ILRI Hub, sponsored by AU/NEPAD;
- The regional approach has proven useful and is an effective way of building capacity for producing regional public goods by reducing transaction costs and enhancing economies of scale, scope and size;
- A regional program is an efficient mechanism in bringing new knowledge and technologies to a broad set of institutions and can thus serve as a dynamic and effective means for developing regional public goods and new products.
- The six target countries in the sub-region share development challenges that require collective regional action to maximize synergies and impact;
- Adoption of modern biosciences requires highly skilled scientists and policy analysts. A regional approach helps to create a critical mass of skilled scientists and policy researchers;
- For potential international collaborators interested in working with Eastern African partners, on biosciences innovation issues, a regional program is an attractive and cost efficient vehicle for finding suitable partners.

3.0 DESCRIPTION OF THE BIO-INNOVATE PROGRAM

3.1 Genesis of the Bio-Innovate

In the first quarter of 2008, the BIO-EARN Regional Coordination Office and other partners in and outside of the region began planning and consultations for the development of a new Program. These consultations continued with a wider group of stakeholders during the BIO-EARN scientific conference held in Kampala in November 2008 under the theme “*Harnessing bio-resources socio-economic transformation for Eastern Africa.*” The Kampala meeting endorsed the creation of the new Program focussing on *bio-resources innovation* and generated thematic thrusts. A draft concept note was prepared by the BIO-EARN secretariat in close cooperation with SEI and presented to the Program Advisory Committee (PAC) of Bio-EARN in Addis Ababa in February 2009. The PAC reviewed and made recommendations on the strategic thrusts of the Program. The PAC also appointed a Drafting Committee to develop proposal on behalf of the region. Through a series of consultations, drafting meetings and peer reviews (within and outside of the region), a concept note, followed by a full proposal, was developed and formally submitted to Sida by the Chairman of the Governing Board of the BIO-EARN Program in June 2009. Between August and November 2009, the Drafting Committee, in consultation with Sida and SEI, completed the proposal for final submission. The final proposal addresses the strategic thrusts of the new Bio-Innovate Program, its management and strategic planning for the future.

3.2 Program identity

The Bio-Innovate Program builds on the experiences, capacity and lessons learnt in Eastern Africa over the past decade through biosciences capacity building and research activities of BIO-EARN and other actors. The Bio-Innovate Program is underpinned by regional operations managed in an environment that promotes synergy and complementarities with other initiatives. The Bio-Innovate Program will focus on bio-resource innovations for product development and delivery systems, and be based on regional, interdisciplinary innovation projects, linked as consortia. The innovation consortia will be based on addressing agricultural and environmental developmental challenges and be comprised of a range of value chain actors critical to span the process from science to production and markets. The Bio-Innovate Program has identified four strategic, thematic areas that interface value addition and innovation through interlinked activities in Eastern Africa. These thematic areas will add value and create synergies for the Bio-Innovate Program to be of strategic value to the region. The activities will be implemented at a regional level with the purpose of generating regional public goods.

3.3 Bio-Innovate Program niche

Bio-resources and specifically, the renewable resources, occupy a central place in most of African economies. Indeed, the pivotal role of the bio-resources sector in Africa’s development is embodied in the continent’s bold move to stimulate and sustain economic development and growth using its bio-resources. Africa’s ambition to address poverty and food security through intensified investment in agriculture and other natural resources is expressed by the AU-NEPAD (24) through Africa’s Science and Technology Consolidated Plan of Action (CPA) and the Comprehensive Africa’s Agriculture Development Program (CAADP) (25) and FARA’s Framework for Africa’s Agricultural Productivity (FAAP). These Pan African policy instruments provide over-arching guidance for mobilizing R4D to contribute to economic and social development across Africa.

Mobilization of Africa’s science and technology (S&T) capacity to develop the bio-resources has been fragmented and highly sectoral. There are few cases where the linkages between the various sub-sectors of Africa’s bio-resources have been targeted by S&T. One such example comes from the

²⁴ NEPAD, 2001. The New Partnership for Africa’s Development. A publication by the NEPAD Secretariat. Johannesburg, South Africa.

²⁵ CAADP, 2003. Comprehensive Africa Agricultural Development Program. A publication by CAADP Secretariat Johannesburg, South Africa.

earlier activities of the BIO-EARN program that brought together agricultural and environmental science and technology activities and agro-processing and value addition. The outcomes of these activities (as described in Annex 3 (i) and (ii)), lay a firm foundation to intensify investments in the broader agricultural innovation sub-sector. Bio-Innovate Program activities will enhance adaptability to climate change and support transformation of the bio-resources (agricultural and natural resources) sub-sectors from primary production activities to value addition. This interface between the bio-resources sub-sector elements is unique to the Bio-Innovate Program and is a niche within which the program will contribute to transformation of Eastern Africa's bio-resource economy.

Bio-Innovate Program core elements are described briefly below:

- **Crop production, adaptability and diversification:** The focus is on intensification of R4D that promote bio-resource innovations to enhance productivity, nutrition and food quality and foster climate change adaptation of selected strategic commodities such as sorghum, millet, cassava and sweet potato in Eastern Africa²⁶. This focus is underpinned by the fact that climate change is likely to affect production of bio-resources including crops and therefore is of strategic importance to the region.
- **Environmental protection and management.** This theme targets two areas: (i) Protection of water resources and the environmental areas within the agriculture and natural resources sub-sectors. R4D will focus on bio-energy recovery from solid waste and wastewater, wastewater treatment and reuse, bioremediation of contaminated environment and carbon sequestration; and (ii) Undertaking studies on the potential impacts of climate change on Eastern African agriculture and the broader natural resource sub-sector; including studies on mitigation and adaptation options to climate change, including policy options for different countries.
- **Technology incubation.** The aim is to enhance up- and out-scaling of new innovations through technology incubation centre(s) and innovation platforms, thereby, improving adoption and deployment of science-based solutions to development challenges in the region.
- **Policy advisory and advocacy activities.** The purpose is to harness and/or develop the enabling policy environment(s) for bio-resource innovation, adaptation and diffusion according to the needs, abilities and opportunities within Eastern Africa.

Bio-Innovate Program uses an innovation systems approach that integrates the above core elements to catalyse and harness delivery and use of science-based solutions for environmental challenges, as well as contribute to food and nutritional security and income generation. Implementation of these activities will galvanize critical actors from within and outside of the region to generate bio-resource innovations, building on lessons learned and tapping into new R4D opportunities within Africa and internationally.

3.4 Vision, mission and objectives

3.4.1 Vision

To develop into a Program of excellence that contributes to sustainable and integrated utilization of bio-resources for economic growth and development of Eastern Africa.

3.4.2 Mission

To create and promote bio-resource based innovation systems in Burundi, Ethiopia, Kenya, Rwanda, Tanzania and Uganda for sustainable utilization and integration of the innovations into Eastern Africa's economic development processes.

3.4.3 Strategic Goal

Eastern Africa bioscience innovation systems mobilized and deployed to harness bio-resources, thereby promoting socio-economic development of the region.

²⁶ The ASARECA Strategic Plan has prioritized investment in selected staple crops (cereals and root tubers) as critical to support the 10% Agricultural GDP needed to stimulate economic growth of the region (for details www.asareca.org).

This goal will be achieved by implementing a results-focused and highly integrated set of critical objectives (presented below). These objectives will be implemented using a regional innovation fund that operates through a competitive grant scheme (CGS) and which targets the best available science and technology and human resources in Eastern Africa to deliver the Program results.

3.4.4 Purpose

To create a Program whereby innovations for sustainable utilization, transformation and integration of Eastern Africa's bio-resources are discovered, developed, intensified and disseminated to promote regional economic growth and development.

Bio-Innovate Program will be managed for results, using mechanisms that build on lessons learnt in previous programs supported by Sida and other investors. The key principles that will guide this purpose include: Value-addition, multi-disciplinarity, competitiveness, subsidiarity and mainstreaming of investments into national and regional development agenda.

3.5 Program results

The New Program will deliver five result areas, each with a number of activities that will be implemented over a period of five years. (These results and how to achieve them are described in detail in the attached Logical Framework, **Annex 1**). The key result areas are:

- (1) Strategic Eastern Africa crop innovation systems strengthened to improve productivity and enhance food and nutrition security in the region. This result will generate innovations to enhance crop adaptability to the consequences of climate change, crop diversification and productivity constraints.
- (2) Innovations on sustainable waste treatment securing freshwater resources, bio-energy from renewable bioresources mitigating climatic change developed and promoted. Efficient and effective bioscience innovations for environmental clean-up, by-products utilisation, waste management and sustainable use of resources (water and land) will be generated.
- (3) Eastern Africa innovation systems catalysed to deliver agricultural, environmental and industrial innovations that stimulate sustainable transformation, utilization and productivity of the region's bio-resources. Technology incubation and other mechanisms for putting research into use by communities and industry will be developed and operationalized.
- (4) Innovation policies for sustainable harnessing of bio-resources developed and promoted. The New Program will undertake policy support analysis studies to provide decision support tools for investment, promotion and management of bio-resource innovations in Eastern Africa.
- (5) An enabling mechanism for mobilization, catalysis and nurture of a strong bio-resource and science-led economic growth agenda for Eastern Africa strengthened and operationalized. This result will occur as an overall outcome of the above four actions being implemented successfully.

3.6 Bio-Innovate Program thematic areas

The Program will implement activities using a results oriented, thematic approach. Thematic based innovation consortia will be created following innovation systems frameworks. These thematic innovation teams will have been created following successful bidding via the program's competitive grants scheme (CGS) (as described in section 5.1.2). All the four themes within Bio-Innovate Program are closely connected to each other and will all be contributing towards a more productive and sustainable agricultural/agro- processing sector in the region, which serves as an engine for pro-poor economic growth. Description of the four thematic areas is provided below.

3.6.1 Thematic Area 1: Climate change adaptability, productivity and improvement for food and nutrition security

This theme focuses on generating and promoting technologies to boost productivity of strategically important crops under the threat posed by climatic change. Such crops are important to small-scale farming and rural livelihood strategies. The theme aims at unlocking genetic potential of the crops for climatic change adaptability. The thematic area seeks to produce crop varieties that are high yielding and resilient to biotic and environmental stresses and address nutritional quality. The theme focuses on strategically important crops²⁷ of the region, adding value to ongoing initiatives by tackling both input and output traits (processing and other quality attributes). The innovations will boost food and nutrition security, lower food prices, offer more opportunities for income growth through crop diversification, and reduce crop intensification pressure in fragile agro-ecologies.

3.6.2 Thematic Area 2: Waste treatment, bio-energy for renewable bio-resources, and securing freshwater resources

This theme will focus on treatment of agro-processing waste through reuse, conservation of water and other bio-resources. It will also generate coping strategies, through innovations to reduce the impact of green-house gas emissions as well as generate innovations to enhance bio-energy recovery from solid and wastewater and provision of clean freshwater resources. An important focus would be on use of agro-processing by-products, waste treatment and bio-energy production from existing and ongoing agro-processing activities in the region. The use of wastes for production of value added products such as improved feed, bio-processing reagents with selective catalysts, safe green chemicals, bio-fuels, biogas, bio-plastics and biopolymers would serve the agro-processing sector in the region by making it more resource efficient and sustainable, which is vital for its competitiveness and survival. Such links would also support rural livelihoods through increased demand for local crops and bio-resources, enhancing the agribusiness opportunities for farmers in the region. Promoting the conversion of waste into renewable energy (such as biogas, bio-fuel etc) will also reduce the need to import costly fossil fuel and mitigate climate change. Another important focus will be on promoting innovation on local small scale bio-refineries at village level by assisting local communities to add value to their local crop produce. Innovative ways to use bio-waste for energy production and minimize greenhouse gas emissions will also be sought in the first call for proposals.

3.6.3 Thematic Area 3: Innovation incubation and promotion of targeted value chains

This theme will focus on taking near market products generated by Bio-Innovate Program from the above two thematic areas and their partners along the value chain to end-users. R4D institutions will apply for support to cover pilot level testing for economic feasibility, marketability and acceptability. The Program will seek opportunities for innovations that will have wide applications in the Eastern Africa. The theme will also seek opportunities to leverage additional funds from other partners for venture capital and pilot testing activities.

3.6.4 Thematic Area 4: Bio-resource innovation policy and sustainability analysis

This theme will address issues needed to provide a supportive policy environment for the ultimate development and promotion and uptake of bio-resource innovations. It will include policy analysis, national and regional policy support, as well as socio-economic and environmental analysis. The theme will address issues of sustainability analysis, done in combination with Themes 1, 2 and 3 above, including:

- Analysis of and addressing gaps in the technology dissemination chains within current and future projects. This would include analysis and exploration of roles and responsibilities along the value chain.
- Market analysis and potential of addressing regional markets.

²⁷ The crop/constraint priorities are obtained from the ASARECA Strategy, "Staple Crops Program Strategy" and a recent BIO-EARN PAC meeting held in Ethiopia in February 2009.

- Exploring technology transfer models with a view to maximize the impact of new technologies, by achieving balance between making the technology as widely available as possible, while providing sufficient incentives to the innovators and investors for early adoption.
- Exploring and analysing models of funding of technology dissemination processes.

Other policy analyses on cost effectiveness, socio-economic and environmental soundness as well as competitiveness will be done under this theme. A key question for the policy studies in Bio-Innovate Program is to analyse how applications of biosciences in Eastern Africa could lead to a more sustainable agricultural and agro-processing sector, able to promote economic growth and effectively alleviate poverty.

It is envisaged that these four thematic areas will be addressed using approximately 10 regional multi-disciplinary innovation projects. Detailed description of the structures of the innovation projects are given in section 5.1.2 below.

3.6.5 Project Consortia

The call for proposals for the competitive grants scheme will be developed in such a way that it favors the formation of broad based innovation consortia. These consortia will be comprised of a range of value chain actors critical to span the process from science to production and markets. Involvement of market actors and other practitioners in planning the project will be crucial in order to ensure that products, knowledge and technologies reach the market and specified end users. Thus, Bio-Innovate Program will be user-, market- and development oriented, in order to make a difference on the ground, by supporting poverty alleviation and sustainable economic growth. Involvement of private sector and other market actors will also ensure that the Program funds are matched by other investments, which will increase impact and increase sustainability of all efforts.

4.0 CROSS CUTTING ISSUES

Bio-Innovate Program is cognizant of shared values, goals, principles and commitments that governments and development partners have identified as critical for the success of development programs. Several critical issues for the successes of this program are described below. They will be integrated in all activities of the Program.

4.1 Sustainability

4.1.1. Financial sustainability

Sida support to the Bio-Innovate Program is expected to generate substantial and sustainable incremental financial and economic benefits in Eastern Africa. The Program will seek to bring together development partners with shared vision from within and outside the region to partner in the development and application of bio-resource innovations along the value chain. The sustainability of the Bio-Innovate Program is underpinned by bringing different actors: Public and private, local, regional and international, to engage collectively in bio-resource innovation. Currently the major funding streams include:

1. **Agricultural and environmental sub-sectors-**: These are funded via MDG1 and MDG7 targeted interventions. They are part of poverty reduction strategy papers (PRSPs) funded by Government and donor basket funding to national ministries. The private sector is mainly focused on agro-processing and agro input-dealerships with limited R4D investments made. The R4D effort for both sectors is still publicly funded, albeit with limited scope-focused on selected national crop and animal production issues.
2. **Climate change adaptability.** This is a new area with limited public funding. R4D investment imperatives are largely framed by a combination of global and regional to national actors. Current funding is mainly targeting climate change **mitigation** rather than **adaptation**. Key funding agencies include: UNEP- Global Environment Facility (UNEP-GEF) and selected Overseas Development Aid (ODA) agencies. There are also regional activities mainly supported by Regional Economic Communities such as IGAD, EAC and agricultural related issues by ASARECA.

The Program will leverage resources mentioned above by engaging actors as partners (individuals and institutions), who are involved in bioscience innovation such as public universities, National Agricultural Research Institutes, Private sector agencies, Regional bodies etc. Bio-Innovate Program will be guided in this process through a Resource Mobilisation Strategy to be developed in year one of the new Program. The Strategy will mainstream Program results into National and Regional development agenda to leverage Government and AU-NEPAD support, and at the same time, harness support from existing and new funding streams. The Resource mobilisation strategy will also guide joint efforts to raise resources in partnership with the BecA-ILRI Hub, AU-NEPAD and other actors.

At project implementation level it is envisaged that, the private sector will pursue investment opportunities created by the Program and ensure that public sector driven research will be up- and out-scaled and disseminated to the various markets. This is based on lessons learnt from elsewhere (South East Asia, Japan, China, South Africa and other OECD countries)²⁸ as a strategy to up and outscale public investments in R4D. As such a strong emphasis in the selection criteria of project partners will be based on the active involvement of market actors and practitioners, ensuring that knowledge and technologies are used in response to real needs and that efforts and investments are sustainable. Matching funds and long-term commitment from market actors, governments in the region, and

²⁸ Callisto Madavo, 2005. Africa: The Development Challenges of the 21st Century. AFRICA Programme Occasional Paper series. The World Bank No. 4. September 2005.

potential co-financing with other donor agencies will also be strong selection criteria in approving funding for the various project consortia. This involvement and investment of private sector partners and other actors in the region will also provide a long-term solid basis for the Program and increase its sustainability.

Thus Bio-Innovate Program will have strong public-private partnerships in the design and implementation of activities to enhance resource availability, use and impact of the investment. This approach of partnerships with private and public agencies includes the following features (described in sections 4.1.1- 4.1.4 below) to assure its sustainability and scalability.

4.1.2 Strengthening institutional capacities of partners

Sustainability is about ownership, responsibility and building internal capacity for continuity of efforts and investments. Bio-Innovate Program will strengthen both human resource and institutional capacities to engage in pro-poor based interventions in the region. This capacity will be multiplied within and beyond the region by working in teams, which will, in the medium to long-term, result in enhanced capacities of individual partners and communities to generate resources and innovations.

4.1.3 Strategic partnerships

Bio-Innovate Program is itself a mechanism for sharing regional capacities and resources to implement Program activities and for continuity. The strategic partnerships with other frontline actors, including private sector linkages with delivery of innovations, will provide increased potential for joint mobilization of resources for a shared interest and scaling up. The Program will serve as a strong operational platform for a broader regional collaboration for mobilizing regional resources in adopting and applying modern biosciences innovations to solve regional problems. This is mainly reflected in areas such as use of innovations for value added crop production, environmental and natural resource management where African governments, through their regional bodies have shouldered greater responsibility.

It is envisaged that each consortium will develop other partnerships within the region and internationally in order to deliver certain agreed outcomes. These partners may be drawn from global centres of knowledge and innovation in the south (South Africa, South America, Australia and Asia) or the north (Europe, USA and Canada). Other potential partners within Eastern Africa include the African Agricultural Technology Foundation (AATF); the Biosciences eastern and central Africa (BeCA) - ILRI Hub; the Consultative Group on International Agricultural Research (CGIAR) research institutes; the African Union's New Partnership for Africa's Development (NEPAD); the Forum for Agricultural Research in Africa (FARA); the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA); the East African Community (EAC); and Inter Governmental Authority on Desertification (IGAD), amongst others. These partnerships may involve brokering partnerships, joint resource mobilization, supporting policy development and/or sharing facilities. The program will develop strategic alliances with a range of such like minded organizations to help achieve the strategic objectives of the Program.

4.1.4 Integration of critical partners in development arena

By focusing on outcomes as well as outputs, Bio-Innovate Program stands a high chance of attracting support from many partners including policy organs and communities. The Program brings different innovation actors from the region and internationally together to enable cross-disciplinarity, cross-sectoral analysis and linkage to market actors. Bio-Innovate Program can thus be used as an effective learning and demonstration tool for the region, in effect acting as an innovation platform. Such an innovation platform would enable the pooling of key expertise across the region while also creating synergies with actors from other regions within Africa and globally. The Program also makes use of a strong knowledge base and policy components to ensure environmental as well as socioeconomic sustainability in the development of pro-poor bio-resource production systems.

4.2 Gender considerations

The central role played by women in agricultural production in Africa is well known. The existing social and cultural constraints mean that women usually farm with fewer resources and/or with less decision-making powers. Men and women also have varying capacities or resources to make use of new technologies. Thus research that is intended to provide assistance to small scale farmers must be based on an understanding of these different responsibilities. In general, research intended to increase crop productivity would potentially be equally positive for both female and male farmers. Research intended to decrease negative impact on water quality and increase the processing options of agricultural products would also potentially be equally positive for both men and women. However, gender issues and analysis is an important part of the technology dissemination and product development process, and will be addressed in Bio-Innovate Program.

One of the problems is that there are relatively few women scientists in the region. Traditionally, women have been discouraged from pursuing careers in science (e.g. girls are discouraged from studying science in secondary school, from pursuing post graduate studies in science or from seeking employment as scientists). To counterbalance this history of discrimination, it is necessary to build a critical mass of female scientists and this must be done in a highly proactive, disciplined way. The BIO-EARN Programme strived to reach an equal balance between men and women in capacity building activities during phase I and II and has been committed to build up the number of women scientists in the Eastern Africa region. Bio-Innovate Program will give equal opportunity to females in the implementation of project activities and will proactively target females in governance, management and training opportunities. Targets will be set to assure participation of women at various levels of project activities at 50% or more.

4.3 HIV/AIDS

AIDS is still one of the leading causes of death in the world and the primary cause of adult death in Africa. Sub-Saharan Africa accounts for a staggering 68% of the world's population of persons living with HIV/AIDS²⁹. Tackling the HIV/AIDS pandemic is a global concern that like other development issues requires an integrated approach. Bio-Innovate Program is cognizant of the need for the development of innovations that ameliorate AIDS. The Programme will not in itself have a focus on HIV/AIDS. Nevertheless, improving crop productivity, food security and rural livelihoods and contributions to secure clean freshwater will assist families to afford treatments and improve quality of life³⁰. The Programme will thus indirectly have positive effects on human health and strengthen the capacity of the region to fight HIV/AIDS.

4.4 Environmental issues and climatic change

Environmental considerations are a core element of any development initiative. One of the main objectives of Bio-Innovate Program is to reduce the negative impacts of the agricultural and industrial sector on the environment. More specifically, the Program's projects will have positive implications on the environment by:

- Producing and distributing crop varieties with inherent resistance/tolerance to biotic and abiotic stresses that will enhance their resistance to climate change and lead to less use of soil amendments and pesticides;
- Developing and applying novel technologies for producing clean fresh water from urban and agro-industrial effluents and use waste for generation of useful products, such as bio-energy;
- Using waste to produce renewable energy thereby reducing emission of green house gases.

²⁹ EU 2007. European Union. A European Program for Action to Confront HIV/AIDS, Malaria and Tuberculosis through External Action (2007-2011). Communication from the Commission to the Council and the European Parliament. Brussels 2007.

³⁰ Sachs *et al.*, 2005. Investing in Development: A Practical Plan to Achieve the Millennium Development Goals," (New York: UN Millennium Project, 2005), www.unmillenniumproject.org

4.5 Ethical considerations

The New Program is not expected to raise or violate ethical principles in the region. All proposed activities fall within existing laws of the implementing countries. A formal statement on ethical principles for the New Program will be developed during the inception of the new Program in 2010.

4.6 IPR and IP management

Many modern biosciences inventions are under proprietary control. Hence patent and proprietary issues will be an important part of Bio-Innovate Program for ensuring that institutions can access and use bioscience technologies under appropriate conditions. Intellectual Property (IP) issues will be managed through the various agreements for the Program's support for regional, collaborative innovation projects. Most Eastern African R4D institutes likely to be participants in the Program have recently adopted, or are in the process of developing their own institutional IP policies. Generally, public research institutes now have stronger and more specific IP policies. Bio-Innovate Program will modify and use model IP management tools previously developed under the BIO-EARN Programme (Material Transfer Agreements and Alliance Agreements) It will also: (i) raise awareness and ability to address IP issues within the projects; (ii) ensure that research results and IP assets are identified systematically and protected if necessary; and (iii) ensure that third-party intellectual property is accessed and utilized in a fair and transparent way.

To meet the above needs on IP management, Bio-Innovate Program will develop an IP policy and a common framework of IP agreements for the implementing partners in the Program. As part of this process, Bio-Innovate Program will make an initial IP assessment and "freedom to operate" exercise for each of the Program projects. It is proposed to collaborate with AATF for this activity, due to their expertise in IP issues in the region. BIO-EARN previously established an Intellectual Property Management Committee (IPMC) consisting of institutional Intellectual Property (IP) and Technology Transfer (TT) officers from the various participating institutions in the region. It is suggested that this group will form the basis of a new IP Management Committee for Bio-Innovate Program.

4.7 Communication and dialogues

In order for the countries in the Eastern Africa to use biosciences efficiently, strategically and in a sustainable manner, a forum whereby different types of stakeholders can meet on a regular basis is important. Bio-Innovate Program with its mix of disciplines and broad network is very well suited to arrange such a forum. The convening power of the Program will also be strengthened through the production of high quality biotechnology policy studies and policy briefs within the Program serving as background material for structured discussions. This would be a forum where academia can meet government, private sector and market actors and discuss key issues, including potential collaborations. It will also be a forum where R&D actors, stakeholder and government actors could discuss how to promote bioscience innovation structures that could promote sustainability and make a difference for farmers and communities in the region. Linkages with other regional entities, such as AATF, BecA, ISAAA and PBS who promote communications and dialogue on biosciences and biosafety issues will be important, when developing the Bio-Innovate Forum, in order to complement and cooperate with other biosciences initiatives.

4.8 Cost efficiency

Bio-Innovate will pursue measures that are cost effective and assure returns to investment and value for money. The cost-share activities in management by implementing institutions will contribute to lower operational costs.

4.9 Feasibility

Bio-Innovate Program will establish procedures for vetting of research and innovation proposals as well as for monitoring and evaluation of supported projects. The implementation of a competitive grants scheme will draw on best practices from previous experience in Eastern Africa and internationally. New management and institutional arrangements will be used by the Program Management Team (PMT) to implement the Program in a cost effective and sustainable manner. These new arrangements are described in Section 5.

5.0 BIO-INNOVATE PROGRAM MANAGEMENT

5.1 Overview

The Bio-Innovate Program will be implemented through a Competitive Grants Scheme (CGS). The operation of the Competitive Grants Scheme is described in Section 5.2 below.

During the preparation of the proposal, the Program drafting committee developed some criteria and guidelines for the development of the management arrangements for the New Program. These are described in Section 5.3 below. They provided the basis for the selection of the management entity for the New Programme.

The Bio-Innovate Programme will be managed by ILRI through an Agreement with Sida and in accordance of the provisions set out in this Agreement and its Enclosures. These two Enclosures herewith describe the Bio-Innovate Programme itself (Enclosure 1) and its approved Budget (Enclosure 2). The details of the Programme management arrangements are described in Section 5.4 below. These details include the Terms of Reference for the three positions that will comprise the Programme management team (PMT) at ILRI; and the membership, roles and responsibilities of the Technical Advisory Committee (TAC).

The successful implementation of the Bio-Innovate Programme will require collaboration amongst a number of partners, notably ILRI, the BecA-ILRI Hub and AU/NEPAD. The roles and responsibilities of the various parties are given in Sections 5.5. The linkages of the Bio-Innovate Program with other regional entities in the Eastern Africa region through its intersections with the research for development agenda are also given here.

Finally, an implementation schedule to start the BioInnovate Programme in 2010 is given in Section 5.6. It is anticipated that program implementation will commence in the first quarter of 2010.

5.2 Bio-Innovate Competitive Grants Scheme

The Bio-Innovate Programme will be implemented through four consortia in the sectors on climatic adaptation strategies in crop agriculture and environment, technology incubation and in policy advice and advocacy, as described in Chapter 3 (Section 3.5) above. Each consortia will consist of a number of individual but related projects. These consortia will be selected via a Bio-Innovate Competitive Grant Scheme (CGS). The CGS will be operated through a number of strategically developed calls for proposals in the four thematic priority areas described above. The priorities are closely linked to the needs and strategies for the region and in support of the AU/NEPAD agenda for science, technology and agriculture.

The **Competitive Grants Scheme** will be managed on the basis of the following key principles:

- **Calls for proposals.** The CGS will be operated through a number of calls with different criteria, targeting each of the four thematic areas. This arrangement will allow the Programme to address and focus on regional priorities in a flexible manner. It will also allow the New Program to benefit from the experiences of a wider network of partners, enabling the Programme, and the region to broaden its capacity. The research and innovation funds will also be effective means to promote the capacity for interdisciplinary analysis in the region. The CGS will be operated on the basis of excellence and the ability of applying partners to deliver results. The calls will be developed by the Bio-Innovate Programme Management Team, with the advice of the Technical Advisory Committee. The calls will be developed in close consultation with key stakeholders including research for development agencies, RECs and the Eastern Africa government bodies.

- **Composition of teams.** Teams may be drawn from within and outside of the region. Collaborating institutions from the public and private sectors from within and outside of the Region will be involved at various levels of support in the innovation process. Each call will be designed to ensure regionality, relevance, efficiency and impact orientation. Accordingly, each team is expected to include at least two institutions from different participating countries in the region (one of whom will be the designated project lead institution), as well as collaborators from at least one private sector company or NGO, and at least one other collaborator from within or outside the Region. The participating countries in Eastern Africa are Burundi, Ethiopia, Kenya, Tanzania, Rwanda and Uganda. The projects will also be designed to ensure up- and out-scale results to the region. It is expected that current BIO-EARN network partners, through their already well established capacities, will be able to successfully respond to proposal calls and build new linkages in a competitive manner.
- **Co-funding.** Support from Bio-Innovate Program funds will be approved on the basis of strong institutional support. This may be based on either provision of matching funds and/or in kind contributions of staff, infrastructure and other institutional support. The Program will be able to explore and form new and strategic partnerships, and develop joint interdisciplinary research and policy oriented projects with like-minded partners in an effective manner.
- **Decisions for funding.** Funding shall only be given to innovation and policy projects where it can be clearly demonstrated that a regional approach is more effective than individual national projects. Funding shall also be dependent on demonstrated ability and capacities of partners and a rigorous peer review process. Evaluation of proposals will be made by the Technical Advisory Committee, following a peer review process by at least three independent experts. The TAC will make recommendations on the successful awards to the Program management team (PMT), for endorsement of the final project portfolio to be funded through the Competitive Grants Scheme.
- **Funding policy.** The funded Bio-Innovate consortia and their component projects will have a clear and highly strategic value to the region, and be based on national and regional strategies, and add value to already ongoing national and regional initiatives, avoiding duplication of efforts.

Schedule of calls for proposals

Calls for proposals will be sent out by the Program Management Team (PMT) and advertised widely in the region. In order to ensure proper focus and enable effective evaluation of proposals, it is suggested that each of the above thematic areas are promoted separately through targeted calls for proposal in a sequence, starting in early 2010. The schedule of the calls for proposals is given in **Table 1**.

Two calls will be made in the first half of 2010 with respect to Thematic areas 1 and 2. The first call will target climatic adaptation strategies in agriculture and environment. The second call will address broader issues beyond climate change but within Thematic areas 1 and 2 (**Table 1**). Calls for project proposals in Thematic areas 3 and 4 on technology incubation and policy advice and advocacy will be made in June 2010 after the specific Projects in Thematic areas 1 and 2 have been identified. The Proposals in Thematic areas 3 and 4 will be expected to actively support projects that target climatic adaptation strategies in crop agriculture and environment (Thematic area 1 and 2) and directly support creation of related innovation incubations and contribute to creating an enabling environment for technology and products adoption and diffusion. In addition, activities under the policy component will contribute also to the longer-term sustainability and visibility of the New Program.

The anticipated time-frame for the start of the Competitive Grants Scheme is as shown in (**Table 1**). Further details on the Competitive Grants Scheme are given in **Annex 4**.

Monitoring and Evaluation

A prominent feature of the Bio-Innovate Program will be a continuous and rigorous monitoring and evaluation (M&E) component, ensuring that the Bio-Innovate Innovation Fund is being used as efficiently as possible and with a maximum impact. The M&E system will be developed so that the Program can evaluate its working performance in terms of strategy and direction, research and program development, effectiveness, approach and management, outputs, internal communication and collaboration, and fundraising efforts, uptake of outcomes and impacts in society.

Each of the projects will be required to produce clear log frames on outputs, outcomes and activity schedules, which will be closely monitored by the Program Management Team. Annual peer review evaluations will also be done, and assist the Technical Advisory Committee (TAC) to make an assessment if projects are on track. Consortia, projects and/or project components not effective or not achieving desired outputs and progressing towards outcomes will be reviewed by the PMT, on the advice of TAC and may be terminated early, if they are not making satisfactory progress towards achieving the mutually agreed annual milestones towards results. This option will be made clear to each consortium and its projects and be explicit in all contracting of partners. Unused funds from any such terminated projects may be reallocated by the Programme Management Team, after consultation with Sida, and used to reinforce the Program in achieving its results. In order to manage efficient M&E and potential reallocations of Program budget, effective reporting regimes and routines will be developed by the Programme Management Team, in consultation with Sida. A crucial task for the Programme Management Team is to ensure that the M&E routines are established and fully implemented.

Table 1. Activity plan and sequence of thematic calls for proposals

Year	2010		2011		2012		2013		2014	
	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec
A. Call for proposals specifically on climate adaptation										
Evaluation and decision on proposals on climate adaptation										
Implementing activities on climate adaptation										
B. Call for proposals under Theme 1 and 2										
Evaluation and decisions on proposals under Theme 1 and 2										
Implementing activities under Theme 1 and 2										
C. Call for proposals under Theme 3 and 4										
Evaluation and decisions on proposals under Theme 3 and 4										
Implementing activities under Theme 3 and 4										

5.3 Guidelines for Identifying Management Arrangements for the New Programme

During 2009, the Programme Drafting Team considered various options in programme management arrangements that would enable the New Program to establish its identity under regional leadership, while also linking with and establishing positive synergies with related programs, and making a major contribution towards the regional agenda for economic development being promoted by regional economic and policy bodies such as AU/NEPAD, COMESA, EAC, FARA, ASARECA.

The Programme Drafting Team developed several criteria to assist in comparing various options and identifying a possible management arrangement for the New Programme, for consideration by Sida. The criteria for identifying a suitable management arrangement were:

- The Programme should be managed by a supportive bioscience institution located in Eastern Africa that shares a similar vision and mission in promoting the applications of biosciences in agriculture and the environment;
- Close linkages should be established with the African regional agenda for biosciences, as articulated by regional bodies, such as the Regional Economic Communities (RECs); the African Union's New Partnership for Africa's Development (AU NEPAD) in support of its Comprehensive African Agricultural Development Program (CAADP); and ASARECA's strategy and priorities for biotechnology, biodiversity and staple commodities;
- The Programme will operate within the administrative policies, financial and audit guidelines of the management entity during the Programme's implementation;
- The management entity is able to provide efficient management services to the Programme, in areas such as finance, audit, and human resources management and contracts, as will be mutually agreed between the management entity and the funding body;
- The management entity should have a system that meets international standards on financial management, audit and accountability;
- The management entity should have some experience with similar management arrangements.
- The Bio-Innovate Programme management team would agree to abide by the managing entity's institutional policies and best practices in relation to the areas where the managing entity would provide management support to the Programme (such as human resources management, finance, audit, contractual arrangements);
- The management entity would provide a supportive environment for the Programme, whereby the Programme Management Team and Bio-Innovate Programme participants would have access to a wide range of technical expertise relevant to the Programme (e.g. in plant biosciences, bioinformatics, innovation systems, policy analysis, climate change expertise). Such ready access to a wide range of technical advice would provide an efficient means for the management entity to backstop the Programme and link with other on-going science and technology and innovation programs in the region;
- The shared interests in science and technology and innovation between the Bio-Innovate Programme and the management entity would offer potential synergies during Programme implementation and opportunities for additional resource mobilization and/or joint activities.

The intent of the new management arrangements is to facilitate African leadership, visibility and efficient management of the Bio-Innovate Programme, by means of selecting a management entity that will provide efficient management of the Bio-Innovate Programme in a supportive, science based environment.

5.4 Bio-Innovate Program Management Arrangements

The Bio-Innovate Programme will be managed by ILRI through an Agreement with Sida and in accordance of the provisions set out in this Agreement and its Enclosures.

It is proposed to have a small Bio-Innovate Program Management Team (PMT) at ILRI, who will manage the day to day activities of the Bio-Innovate Program. ILRI also manages the BecA-ILRI Hub, an existing biosciences platform that serves Eastern Africa. The Programme Management Team will be advised by an independent Technical Advisory Committee (TAC).

The Program Management Team will support four Thematic Leaders (TL), one responsible for each of the four priority thematic areas. The innovation consortia and their thematic leaders will be selected via the Competitive Grants Scheme described above (Section 5.1), for implementation at institutions within the region. The Theme Leader will be located at the lead institution for their consortium.

Programme Management Team

The Programme Management Team will consist of three positions:

- (1) Bio-Innovate Program Manager (PM);
- (2) Finance and administration officer (FAO);
- (3) Administrative assistant (AA).

The terms of reference for the three positions within the Programme Management team are given below:

Bio-Innovate Program Manager

The PMT shall be led by the Programme Manager who will have the following attributes:

- Qualifications in the field of biosciences and or bio policy areas;
- Proven track record of program management preferably at regional and international levels;
- Proven track record of resources mobilization for research and development;
- Good networking and interpersonal skills.

The Bio-Innovate Programme Manager will be responsible for:

- Set up of the competitive grants scheme
- Develop implementation guidelines to ensure efficient execution of Bio-Innovate projects and consortia;
- Prepare contracts for all institutions involved in the implementation of the projects;
- Serve as secretary to the Bio-Innovate Technical Advisory Committee
- Develop guidelines for project monitoring and evaluation and sub-contracts as deemed necessary;
- Prepare work plans, progress and financial reports for submission to Sida for approval;
- Organize the Bio-Innovate inception workshop, stakeholders meetings and Project review meetings;
- Coordinate marketing, communication, advocacy and public relations to communicate Bio-Innovate activities and achievements;
- Networking with relevant partners and stakeholders and ensure that Bio-Innovate activities are harmonized and the necessary synergies are created both within and with other activities in the region;
- Facilitating development of Intellectual Property Rights agreements between partner institutions;
- Prepare semi annual and annual technical and financial reports for submission to Sida

Finance and administration officer (FAO)

- Keep up-to-date financial records and management standards in accordance with the financial and operational guidelines of the host institution (ILRI);
- Design financial reporting mechanisms in accordance with Sida reporting requirements and the institutional arrangements of the host institution;
- Maintain valid and accurate records pertaining to financial utilization by projects in the innovation program thematic areas;
- Prepare semi-annual and annual financial progress report for submission to Sida;
- Manage procurement and logistics and other administrative services for the Bio-Innovate management team;

Administrative assistant

- Provide administrative support to the Program manager and the finance and administration officer.
- Maintain data bases on Bio-Innovate projects
- Update the web site,
- Other administrative duties (eg. travel arrangements, workshop logistics) for the Program Management Team

Recruitment of the BioInnovate Programme Manager: The Programme Manager will be recruited from within the 6 participating countries within the Eastern Africa region, through a transparent and competitive recruitment system, overseen by ILRI in consultation with NEPAD. The Curriculum vitae of the short listed candidates shall be sent to SIDA and NEPAD for consultation, prior to the final selection and appointment of the Programme Manager. In the event of unsatisfactory performance, ILRI as the Bio-Innovate managing entity, after consultation with Sida and NEPAD, may replace the Programme Manager during the course of the Programme, via a similar transparent recruitment process within the region.

Thematic Leaders (TL)

Each of the Programme's four thematic areas will be led by a Thematic Leader. Each thematic area (or consortium) will consist of several projects, selected using the competitive grants scheme described above (Section 5.2) Each project will involve a number of partner institutions across Eastern Africa.

The thematic leaders will be responsible for:

- Routine management of the projects within their consortium;
- Effective management of the consortium to ensure that the individual projects within each consortium contribute to the overall objectives of the Program and deliver the intended results/outcomes;
- Backstopping project teams in management of operations;
- Ensure that effective communications and the necessary scientific synergies are maintained within the consortium and with other Program thematic areas;
- Coordinate contractual arrangements between the PMT and the project teams;
- Prepare all thematic area work plans, and progress and financial reports and submit to PMT;
- Maintain valid and accurate records pertaining to innovation program thematic areas;
- Prepare summary briefings on the program thematic area for use during M&E;
- Closely work with the PMT on communications activities;
- Address problems within the program thematic area including operation of projects;
- Facilitate signing of MOUs, MTAs among innovation project implementing institutions;
- Perform any other activities for the smooth operations of the program thematic area.

Technical Advisory Committee (TAC)

The independent Technical Advisory Committee (TAC) will consist of six members, 4 of whom will be independent experts, these being persons not applying for nor implementing Bio-Innovate projects; plus the AU-NEPAD African Biosciences Initiative (ABI) Director as a voting Member of TAC and the BecA-ILRI Hub Director as a nonvoting member of TAC. The Programme Manager shall serve as secretary to the TAC. The TAC shall meet at least semi annually in person and by tele-conference in the alternating quarters, if so requested by the TAC Chair and/or the Program Manager.

The Roles and Responsibilities of TAC are to:

- Ensure consistency the Bio-Innovate Program with regional agendas particularly with the AU-NEPAD CAADP and other regional and continental initiatives;
- Evaluate and advise on the relevance and importance of the Program achievements and its impact on development in the region;
- In collaboration with the PMT, develop the detailed terms of reference of the various thematic calls for proposals and corresponding monitoring and evaluation criteria (as described in Section 5.2 on the Competitive Grants Scheme);
- Provides peer review mechanism for Competitive Grants scheme,
- Makes recommendations to PMT on fund allocations for competitive grants;
- Provide technical guidance on Program implementation issues including a regular review and assessment of program/project outputs/outcomes to ensure that the Program maintains a high international standard;
- Ensure the necessary synergies and collaborations between project consortia and harmonization of Program activities with other activities in the region, is created and maintained;
- Recommend to the PMT changes to the Program and its projects if needed to ensure high quality and that the Program fulfils the projected outcomes.

TAC members appointment process: Sida, ILRI and NEPAD will jointly agree on the four independent members of TAC, one of whom shall be the TAC Chair. A short list of potential appointees will be developed as a result of consultations amongst AU/NEPAD, the BecA-ILRI Hub, other regional biosciences programs and national science and technology commissions and other government bodies in the participating countries, in seeking suitable nominations. The TAC Chair and 3 independent members will be appointed for a 2 year term, renewable. The invitation letter for the appointment of TAC Members shall be sent out jointly by NEPAD and ILRI.

5.5 Roles and Responsibilities of Various Parties in relation to the Bio-Innovate Programme

ILRI

The primary responsibility of ILRI, as the signatory to the Bio-Innovate Agreement with Sida, is management of the funds and accountability to Sida for the use of the funds in accordance with the intent of the Bio-Innovate Proposal as approved by Sida (December 2009) and in accordance with the terms and conditions of the Agreement between the Parties (January 29 2010). This responsibility includes the set up and management of the Bio-Innovate Program, (as described in this Proposal), which is a challenge fund with a competitive grants scheme (CGS). Day-to-day management will be provided by a Project Management Team based at ILRI. As described in the management arrangements above (Section 5.4), there will be an independent Technical Advisory Committee (TAC) established to develop the calls for proposals and make recommendations to the Program Management Team on the Bio-Innovate grants to be awarded from the fund.

In fulfilling the management responsibilities for the Bio-Innovate Program, ILRI shall provide the Bio-Innovate Program Management Team (PMT) at ILRI with the necessary professional and administrative support, human resources management and personnel services, legal advice from ILRI's Contracts office and other services necessary for the successful execution of the program. The specific services required by the team will be agreed between the Bio-Innovate Program Management Team and ILRI management at the commencement of the Bio-Innovate Program implementation in the first quarter of 2010. Furthermore, ILRI shall ensure that administration and internal control of Bio-Innovate Program's financial resources are adequately carried out by the PMT, through the use of ILRI's financial and administrative systems.

BecA-ILRI Hub

As part of its undertakings in the Africa region and at the invitation of the African Union and its New Partnership for Africa's Development (AU/NEPAD), the International Livestock Research Institute (ILRI) manages the Biosciences eastern and central Africa Hub at ILRI (the BecA-ILRI Hub), which is associated with the Biosciences eastern and central Africa Network (BecANet) as one of four regional networks in biosciences, designated by AU/NEPAD under its Africa Biosciences Initiative (ABI). The BecA-ILRI Hub provides a shared research platform for the African scientific community to promote regional research on priority problems in crop productivity, animal production and animal health; and undertakes capacity building, through both long term, post graduate training and short term training by managing workshops, training courses and visiting scientists at the Hub. The participating nodes on the BecANet are hosted by University of Buea in Cameroon, Sokoine University in Tanzania, National Agricultural Research Organisation (NARO in Uganda) and Kigali Institute of Science and Technology (KIST) in Rwanda and the Ethiopian Agricultural Research Institute (AERI in Ethiopia).

In relation to the Bio-Innovate Programme, the BecA-ILRI Hub will facilitate access to scientific services and technical support available at the BecA-ILRI Hub for the conduct of the Bio-Innovate Program activities, as will be agreed between the BecA-ILRI Hub team and the Bio-Innovate Program Management Team on a case by case basis, depending on the needs. African researchers coming from research institutes and universities in the region who are awarded Bio-Innovate competitive grants on the recommendation of the Bio-Innovate Technical Advisory Committee may elect to conduct all or part of their Bio-Innovate Projects at the Hub. These Bio-Innovate researchers will have access to the use of the Hub facilities, as per the guidelines for Hub use prevailing at the time of their request to the Hub. The 2010 Hub access guidelines are available at <http://hub.africabiosciences.org>. These Hub access guidelines will be updated by ILRI and the BecA-ILRI Hub management annually, after consultation with AU/NEPAD and Hub users, including those coming from Bio-Innovate projects.

There are opportunities for building synergies amongst the complementary initiatives of the Bio-Innovate Programme and the BecA-ILRI Hub and network (BecANet) and other regional biosciences activities, which would contribute towards their mutual sustainability and strengthen their contributions towards regional economic development, through the applications of modern science and technology in Africa.

AU/NEPAD

NEPAD is a socioeconomic development programme of the African Union (AU). The objective of NEPAD is to stimulate Africa's development by filling gaps in agriculture, health, education, infrastructure, science and technology. NEPAD explicitly recognizes that life sciences and biotechnology offer enormous potential for improving Africa's development. Through NEPAD, African countries have committed themselves to establish networks of centers of excellence in biosciences. Four sub-regional networks have been established with the Southern African Network for Biosciences (SANBio) covering southern African countries, the Biosciences eastern and central Africa Network (BecANet) covering countries in eastern and central Africa, the West Africa Biosciences

Network (WABNet) covering West African countries and the North Africa Biosciences Network (NABNet) covering countries in North Africa.

The primary responsibility of AU/NEPAD in relation to Bio-Innovate will be to enhance donor harmonization and to use its best offices in mobilization of other investors to support bioscience based innovations in Africa, including through the Bio-resource Innovation Fund and its associated competitive grants scheme. Also, NEPAD will ensure that the Bio-Innovate projects are addressing issues of priority to CAADP (Comprehensive Africa Agricultural Development Program). NEPAD will take the lead on donor harmonization, securing and development of a strategic plan including a resource mobilization strategy for medium and long term financial sustainability of support to biosciences in Eastern and Central Africa.

Enhancing regional ownership through linkages with other regional entities in Eastern and Central Africa

Regional collaboration in Eastern Africa is being fostered through several regional political, economic and policy bodies such as AU, NEPAD, EAC, SADC, COMESA, and ASARECA in their work in shaping a regional agenda and in promoting regional collaboration. The Program will contribute to this regional agenda, by working with these regional bodies, especially in helping to shape the policy agenda, in areas of science and technology and innovation policy.

The Bio-Innovate Program priorities are in line with the development agenda being articulated by regional economic communities (RECs) and AU/NEPAD. By having a management arrangement that will also enable closer linkages with the operational decision making in the region for promoting appropriate technologies, the results of the Program are more likely to have beneficial impact on the development goals of achieving economic growth, adapting to climate change and conserving the environment for future generations in the countries of Eastern Africa.

5.6 Bio-Innovate Inception Schedule in 2010

Submission of the Bio-Innovate Programme Proposal

As described in Section 3.1 above on the genesis of the Bio-Innovate Programme, the Programme Proposal was developed during 2009 by an Eastern Africa Programme Drafting Team for final submission to Sida for consideration for funding. Following approval of the proposal by Sida, the Director General of the International Livestock Research Institute, the proposed Bio-Innovate management institution, will sign an Agreement with Sida to execute the Bio-Innovate Programme, under the management arrangements described in this current document (January 29 2010).

Bio-Innovate Programme Inception Workshop

Implementation of the Bio-Innovate Program will commence in early 2010. It is proposed to hold a Bio-Innovate inception workshop in the first half of 2010, to plan the first call for proposals, with emphasis on calls for proposals in relation to adaptation to climate change for 2010. It is expected that the newly appointed members of TAC and the designated Bio-Innovate Programme Manger will participate in this workshop.

6.0 PROGRAM FINANCING AND RISK MANAGEMENT

6.1 Program financial requirement and management

This Proposal requests Sida to support the Program with 80 million SEK (approximately 11.5 million USD). The itemized budget is attached separately as Annex 5. The Program budget is distributed as follows: 82% of the total budget supports the innovation and policy projects and 18% Program management. .

6.2 Financial management

6.2.1 Contract agreements

Sida shall contract ILRI as the Bio-Innovate Program host institution and to provide the necessary professional and administrative support to the Program Management Team necessary for the successful financial and technical execution of the Program and offering support in the internal control of Program resources. The Bio-Innovate Program Management Team, with the assistance of the Managing institution, will be responsible for contracting the participating institutions and enter into an agreement with these institutions. . ILRI shall then subcontract the participating institutions.

6.2.2 Audit

The Bio-Innovate Program shall be audited annually by an external, independent and qualified auditor, in accordance with international standards. The selection and terms of reference of the auditor shall be prepared by the PMT, in consultation with ILRI and approved by Sida.

6.2.3 Reporting

The participating institutions will be required to send both technical and financial reports to the PMT at regular intervals as stipulated in the contracts between ILRI as the Bio-Innovate Managing institution and participating institutions. ILRI will make Program reports to Sida as stipulated by overall Agreement between Sida and ILRI.

6.3 Financial sustainability

Section 4.1 describes the Program plans to ensure Financial Sustainability, which will be done in consultation and with support from AU-NEPAD. Moreover, substantial budget support from Eastern Africa Governments will be sought for the Bio-Innovate Program. This support will consist of in kind support to the projects (salaries of researchers, infrastructure etc) and/or direct budget support and dedicated project budgets. The in-kind support will include; staff salaries, administrative costs, working /office space, research/student supervision, access to and use of research facilities at the institutions, utilities and transport facilities. In addition, the Program will through the PMT, Managing Institution and TAC will make contributions by being actively engaged in activities aimed at mobilizing new resources for the Program.

6.4 Risks and Risk management

The Bio-innovate Program faces a number of risks. However, through the proposed management arrangement and lessons learnt through the years from BIO-EARN, the New Program will attempt to address the predicted risks early to minimize the negative consequences. The risks the Program may need to address and the mitigation measures are presented in a Table below.

Table 2: Risks and risk management landscape of the Bio-Innovate Program

Risk	Risk level	Mitigation plan
1. Program delivery: human capital risk		
1. Innovation teams require a multiplicity of partners. Weak team coherence may slow project progress initially.	Low	As a mitigation measure, the Program will support each of the successful teams to develop an implementation manual that clearly defines partner roles and responsibilities, reporting schedules and requirements, M&E framework and funds management during projects inception as part of good project management practice.
2. Development of strong, collaborative network within and outside of the region inefficient. This may lead to that participation in innovation projects decreases rather than increases risk benefits to member organizations which may reduce enthusiasm	Low	Engage a diverse group of collaborators, e.g., foundations, practitioner associations, outside of the region and research institutions. Set clear criteria for collaboration. Maintain clear lines of communication to build strong working relationships, avoid duplication, and take advantage of shared knowledge.
3. There is a risk of turn over of members of the project teams during the life of the Program. This may also influence project progress.	Medium	All projects will be anchored at institutional levels through contracts that commit participating institutions to engage in the project to its end. In the unlikely event that the researcher or Principle Investigator leaves the project, such institution will nominate a new Principle Investigator for approval by the PMO and the research team.
4. Partnerships in knowledge transfer is a critical stage in innovation which may be compounded by limited human capital	Low	Engage external collaborators and contributors as part of innovation teams as well as use the existing networks and relationships with other programs regionally, and globally in knowledge management process
2. Operational: Financial and sustainability risks		
1. The Program is designed as a regional intervention funded mainly by Sida. There is risk in the short term to have only one major funding agency. This may curtail the scope of Program operations especially if Sida reduces budgets and the Program is unable to secure sustainable funding sources.	High	The Program is designed to align to continental Bio-science agenda under AU-NEPAD. It is also hosted at ILRI in conjunction with the BecA-ILRI hub which may provide opportunities for joint resource mobilization. A resource mobilization strategy that engages AU-NEPAD and regional governments to ensure that <i>Bioscience innovation</i> remains a prominent development issue will be developed during year one of Program life
2. Management organization does not provide the necessary enabling environment for the new Program	Medium	Clear management arrangement will be put in place that will keep the Program's identity and visibility in the region, with clear roles and responsibilities for the various parties.

3. Ownership and continuity the BIO-EARN network is lost during the implementation of the new Program	Medium	<p>Ensure buy-in of the new Program by S&T community in the region. Communicate successes and outcomes internally and externally to ensure prominence and knowledge of the program activities, including to alumni and other interested / invested parties.</p> <p>A Biennial Scientific meeting will be held with stake holders to review progress and seek input into program activity thrusts.</p>
4. The multiple thrust nature of the Program requires capture of various technical input (agricultural, environmental and industrial, etc).	Low	<p>i) Deliberate efforts shall made to ensure the TAC is composed of experts from critical Program thematic areas;</p> <p>ii) Program review processes especially for the grants by experts from the respective themes.</p>
Management Risks		
1. Inability to develop and implement efficient monitoring and evaluation (M&E) of Programme	Low	The PMT to ensure a the formulation of a solid and effective M&E plan and that M&E is a high priority for the program management team and for the various projects. Clear rules and efficient sanctions developed for the project not following M&E information in a timely manner
2. Weak financial management of Programme,	Medium	The PMT to ensure adequate and efficient accounting and reporting routines within the PMT and the projects. Projects accountants may be trained by the Program to follow rules and routines
3. Inefficient communication between the TAC, PMT, thematic leaders and project teams	Low	Communication between the various Program levels made to a top priority. Thematic leaders or project PIs failing to communicate and respond to information needs will be replaced. Project failing to report may be fully or partly terminated. Communication between the projects and the PMT a priority task for the Program manager .
4. Communication on efforts made, successes and lessons learned from the Programme to various audiences (policy makers, stakeholders, press etc) in the region inefficient	Low	Communication from the Program to various audiences (policy makers, stakeholders, press etc) a priority task for the Program manager. An efficient communication plan and strategy with clear milestones to be developed and implemented by the PMT.
5. Weak governance and management of the program	Medium	A highly qualified PM appointed. TAC members of high quality and processes ensured that much of the TAC advice and inputs has an effect on the management of the Program. PM to ensure that advice from TAC is fully implemented.

7.0 DIFFERENCES BETWEEN BIO-INNOVATE AND BIO-EARN

The new Bio-Innovate Program is to a large degree building on the infrastructure capacity, experiences and achievements made in the BIO-EARN Program. However there are critical differences that separate them significantly and these are described below. The main differences are that Bio-Innovate Program will;

1. Be based on competitive grants through a regional research fund. This means that there is no guaranteed funding for any institution, which enables a flexible more open funding process ensuring use of best available knowledge, ideas and capacity.
2. In comparison to BIO-EARN, Bio-Innovate Program will be more user-, market- and development oriented in order to make a difference on the ground, supporting poverty alleviation and sustainable economic growth.
3. Fund projects also based on the degree of matching funds or efforts by private sector partners or other practitioners, or donors (apart from Sida) in the region improving sustainability of project activities and investments.
4. In comparison to BIO-EARN, Bio-Innovate Program has a broader and more inclusive network, which will include markets actors, such as private sector and other practitioners (including social scientists and economists).
5. Bio-Innovate Program includes, apart from Ethiopia, Kenya, Tanzania and Uganda also Burundi and Rwanda.
6. Have focus on inter-disciplinarity, and apart from technology and knowledge dissemination also, policy analysis including socioeconomic and environmental analysis of bioscience innovation.
7. Have a governance structure more directly connected to the regional agenda, through the linkages with the BecA-ILRI Hub and through this, link to AU/NEPAD, making Bio-Innovate more closely linked to operational decision making in the region.
8. Have a more effective program management structure, ensuring fast communication to and within the network
9. Have a focus on communicating lessons and experiences generated to a broader public, and in particular policy makers in the region. This will be achieved not least through the work of the new Program Management Office which will have a communication specialist in the team that will focus on external and internal outreach.
10. In comparison to BIO-EARN, Bio-Innovate Program has a much stronger, Monitoring and Evaluation mechanism and an ability to close poor performing projects or parts of projects.

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