



AGROFORESTRY RESEARCH PROGRAMME

YEAR STRATEGIC PLAN

2016 - 2026

Agroforestry Research Programme
National Forestry Resources Research Institute (NaFORRI)
National Agricultural Research Organization (NARO)
P. O. Box 1752, Kampala, Uganda
Tel: +256712-161161

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TABLE OF CONTENTS

TABLE OF CONTENTS	I
LIST OF ACRONYMS	III
FOREWORD	IV
PREFACE	V
ACKNOWLEDGEMENTS	VI
EXECUTIVE SUMMARY	VII
1.0 INTRODUCTION	1
1.1 ROLE OF AGROFORESTRY RESEARCH PROGRAMME	1
1.2 RATIONALE	1
1.3 MANDATE	1
2.0 PROGRAMME CONTRIBUTION TO NATIONAL DEVELOPMENT AGENDA	2
2.1 UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS (SDGs)	2
2.2 THE EAST AFRICAN COMMUNITY TREATY	2
2.3 THE CONSTITUTION OF UGANDA 1995	2
2.4 UGANDA VISION 2040	2
2.5 NATIONAL DEVELOPMENT PLAN (NDP)	3
2.6 AGRICULTURAL SECTOR SUPPORT PROGRAMME (ASSP) 2016/2017 – 2020/2021	3
2.7 NARO STRATEGIC PLAN (2010 – 2019)	3
2.8 THE NATIONAL FORESTRY AND TREE PLANTING ACT (2003)	3
3.0 THE STRATEGIC PLANNING PROCESS	4
3.1 INITIAL IDEAS ABOUT NARO RESEARCH PROGRAMMES STRATEGIC PLANS	4
3.2 DEVELOPMENT OF THE AGROFORESTRY RESEARCH PROGRAMME STRATEGIC PLAN	4
4.0 SITUATIONAL ANALYSIS OF THE AGROFORESTRY RESEARCH PROGRAMME	5
4.1 STRENGTHS AND OPPORTUNITIES	5
4.2 WEAKNESSES AND THREATS	5
5.0 THE AGROFORESTRY RESEARCH PROGRAMME STRATEGIC PLAN 2015-2025	6
5.1 ASPIRATIONS OF THE AGROFORESTRY RESEARCH PROGRAMME	6
5.2 VISION, MISSION AND CORE VALUES	6
5.3 PROGRAMME FOCUS AREAS	7
5.5 IMPLEMENTATION MATRIX	11
6.0 RESEARCH AND MANAGEMENT CAPACITY	14
6.1 HUMAN RESOURCE	14
6.2 FINANCIAL RESOURCES	15
6.3 PROJECTED FUNDING	15
6.4 STRATEGIES FOR RESOURCE MOBILIZATION	15
6.5 INFRASTRUCTURE AND FACILITIES OF THE PROGRAMME	16
7.0 STRATEGY MONITORING AND PERFORMANCE EVALUATION FRAMEWORK	17
7.1 RATIONALE FOR MONITORING AND EVALUATING THE STRATEGIC PLAN	17
7.2 AGROFORESTRY STRATEGIC PLAN MONITORING AND EVALUATION TOOLS	17
7.3 M&E IMPLEMENTATION RESPONSIBILITIES	17

8.0	RISK MANAGEMENT STRATEGY	19
9.0	COORDINATION AND MANAGEMENT OF THE STRATEGIC PLAN	20
	REFERENCES	21

ACRONYMS

AF	-	Agroforestry
AFRP	-	Agroforestry Research Programme
ASSP	-	Agricultural Sector Support Programme
EAC	-	East African Community
FY	-	Financial Year
ICRAF	-	International Centre for Agroforestry / World Agroforestry Centre
MbaZARDI	-	Mbarara Zonal Agricultural Research Organisation
MoU	-	Memorandum of Understanding
NaFORRI	-	National Forestry Resources Research Institute
NARO	-	National Agricultural Research Organisation
NDP	-	National Development Plan
NFTPA	-	National Forestry and Tree Planting Act
NgeZARDI	-	Ngetta Zonal Agricultural Research Organisation
PARIs	-	Public Agricultural Research Institutes
SDGs	-	Sustainable Development Goals
SLM	-	Sustainable Land Management
SO	-	Strategic Objective
SOPs	-	Standard Operating Procedures
UPOs	-	Uptake Pathway Organisations
ZARDI	-	Zonal Agricultural Research and Development Institute

FOREWORD

Agroforestry has major potential for increasing household access to a wide array of tree products including food, fuel wood, building materials, medicine and fodder, as well as increasing farm incomes. It also contributes to sustained productivity by enhancing soil fertility, controlling erosion, enhancing microclimates of cropping and grazing landscapes. There is huge emphasis on sustainable development through preservation of natural resources such as forests and wetlands.

This plan will focus for the next decade on “increasing on-farm trees and economic productivity of forests” by increasing afforestation and reforestation. In paragraph 522, the NDP points out that the environment and natural resources sub-sector targets, in the short run, to increase forest cover in the country from 14% in 2013/2014 to 18% in 2019/2020. Forestry research and development has been identified in NDP II as one of the avenues to achieve these targets. AFRP contribution will be enhancing adoption of tree-based enterprises on farm, determining incentives and disincentives for tree growing as well as understanding tree-crop interactions.

NaFORRI through the Agroforestry research programme will conduct and undertake diagnosis of farming systems in different agro-ecologies of Uganda and design appropriate interventions for enhancing sustainability of agricultural production. This strategic plan is geared towards directing research schedule of the programme for the decade ahead.

On behalf of management, I wish to extend my sincere gratitude to the team who participated in developing this strategic plan and I commit to offer full support in its implementation. May I therefore, appeal to the general staff of the Institute to adhere to the strategic plan as a guide for NaFORRI to take agroforestry research to the next level.

Hillary Agaba (PhD)
Director, NaFORRI

PREFACE

I am greatly honored to present to you the strategic plan for the Agroforestry Research programme (AFRP) of the National Forestry Resources Research Institute (NaFORRI) for the period 2016/2017-2025/2026. This strategic plan articulates the aspirations of the AFRP, points out the focus areas upon which programme operations are to be centered and the strategies to enable NaFORRI achieve what it has set out to do in the next decade.

The Agroforestry Research Programme will generate and disseminate technologies for growing trees on farms in order to optimize crop and livestock productivity, provide multiple tree products and conserve natural resources. Integration of tree on farm increases land productivity through soil fertility improvement, soil erosion control and biological nitrogen fixation and household income through the sale of forest products. In delivering this promise, NaFORRI's efforts will contribute to several national and global development frameworks like NDP II, the United Nation's Sustainable Development Goals (SDGs), Uganda's Vision 2040 and others.

Indeed, NaFORRI would have admired to do more but opted to remain within the realities of our operational context. In this plan, –NaFORRI draws views of our stakeholders to earmark four priority focal areas on which to exert efforts and resources. These focal areas are:-

- 1) Tree-based options for enhancing land productivity
- 2) Trees for food security and improved household nutrition
- 3) Options for enhancing on-farm wood and energy security
- 4) Strengthening resilience of farming systems to climate change

It is our hope and prayer that during this planning period, the AFRP will be in position to generate high-impact agroforestry technologies and strategies developed in each of the above focal areas. Besides, NaFORRI strive to strengthen NaFORRI's capacity to articulate the contribution of our outputs to national development and to inform policy on any institutional and regulatory adjustments necessary for agroforestry to deliver better as a means to national economic development.

NaFORRI felt a need to work as a family and included in this plan strong elements of networking, knowledge sharing and strengthening of stakeholder capacities to interface with agroforestry interventions. From time to time, NaFORRI will be appreciative of any suggestions that will enable the programme attain the heights that it has set out to achieve.

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Jude Sekatuba

Acting Programme Leader, Agroforestry Research

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Compilation of this strategic plan was spearheaded by a team from the Agroforestry Research Programme of NaFORRI, that comprised Jude Sekatuba, Nansereko Susan, Joel Buyinza, Kenneth Eryau, Phiona Kwaga, Gerald Ongodia, Scovia Mudondo, Vincent Opolot and Richard Akellem, assisted by Geoffrey Kimenya and Isaac Hakiza. The contributions of other NaFORRI staff are also hereby acknowledged.

EXECUTIVE SUMMARY

This strategic plan depicts the direction that the Agroforestry Research Programme (AFRP) of the National Forestry Resources Research Institute (NaFORRI) is going to take from 2016/2017 to 2025/2026. This programme was instituted to unlock the vast potential for agroforestry to increase productivity, profitability and diversity of farm production in Uganda. Therefore, it will generate and disseminate technologies for growing trees on farms in order to optimize crop and livestock productivity, provide multiple tree products and conserve natural resources. Integration of tree on farm increases land productivity through soil fertility improvement, soil erosion control and biological nitrogen fixation and household income through the sale of forest products. In doing this, the programme is contributing to several national and global development frameworks like the United Nations Sustainable Development Goals (SDGs), The East African Community Treaty, The Constitution of Uganda 1995, Uganda Vision 2040, the second National Development Plan (NDPII), Agricultural Sector Support Programme (ASSP) 2016/2017 – 2020/2021, NARO Strategic Plan (2010 – 2019) and The National Forestry and Tree Planting Act (2003).

Initial ideas about development of this programme strategic plan arose out of deliberations from the 2015 Annual Review and Planning Meetings held by NaFORRI, whereby stakeholders noted the need for research programmes to align their activities to well thought through strategic plans. NARO's Standard Operating Procedures under development also require that such plans be a prerequisite for all NARO programmes.

The process of developing this plan was informed by a situational analysis of the agroforestry research programme. This plan therefore aims to build on the strengths and tap into opportunities the programme is endowed with, while at the same time addressing the weaknesses and threats that may hinder the programme's success.

In developing its strategic plan for 2016/2017-2025/2026, the programme drew inspiration from the desire to become a topnotch, nationally felt, internationally recognized research and development facility in the field of agroforestry. The plan states the AFRP's vision as being: *"A leading research programme generating high-impact agroforestry technologies, practices and strategies for national development"*. The mission is *"To generate and disseminate technologies for growing trees on farms to optimize crop and livestock productivity, provide multiple tree products and conserve natural resources"*. These aspirations are driven by excellence, innovativeness, inclusivity, accountability and integrity as the programme's core values.

During this period, operations of the AFRP will cover four focus areas, namely: (i) Tree-based options for enhancing land productivity; (ii) Trees for food security and improved household nutrition; (iii) Options for enhancing on-farm wood and energy security; and (iv) Strengthening resilience of farming systems to climate change. Through this plan, programme strives to achieve five Strategic Objectives (SO):-

SO 1: Design appropriate agroforestry interventions for boosting productivity and sustainability of farming systems in different AEZs of Uganda;

SO 2: Develop practical technological options and approaches for enabling farmers and other

- stakeholders to realize optimum benefits from integration of trees on farms;
- SO 3: Develop strategies for wide scale adoption of agroforestry technologies and tracking their impacts on people's livelihoods and the environment;
 - SO 4: Institute mechanisms for enabling robust knowledge sharing and strengthening of stakeholder capacities to interface with agroforestry interventions; and
 - SO 5: Develop and maintain a sustainable means of mobilizing financial resources for facilitating agroforestry research and development.

The plan further outlines strategic outputs to be achieved under each strategic objective as well as the indicators, milestones, strategic activities and timeframe within which milestones are to be delivered.

In order to achieve the aspirations of this strategic plan, the AFRP intends to reinforce its current staffing through recruitment, use of interns and volunteers, consultants (i.e. contracted staff on short-term assignments), as well as short and long-term training, to equip existing staff with relevant skills, knowledge and attitudes. The plan also includes strategies for realizing an estimated 52 billion Uganda shillings required to fund its planned activities. These funds will be obtained from Government of Uganda support, supplemented by those generated from Non-tax Revenue (NTR), Development donors, Public-Private Partnerships and Competitive Grants Schemes.

Progress towards set targets will be guided by the plan's Strategy Monitoring and Performance Evaluation Framework. This spells out the rationale behind, tools and responsibilities to be undertaken in tracking progress in implementation of this strategic plan. In the risk management strategy, a number of risks are noted caution against which is required. Lastly, the plan articulates how different aspects of its implementation are to be coordinated and managed to arrive at a harmonized goal.

1.0 INTRODUCTION

1.1 Role of the Agroforestry Research Programme

The Agroforestry Research Programme (AFRP) is one of the four research programmes of the National Forestry Resources Research Institute (NaFORRI) under the National Agricultural Research Organisation (NARO). The core business of this research programme is agroforestry, which in this context, refers to land uses based on deliberate integration of trees and shrubs in agricultural production systems, with benefits accruing to different components. Agroforestry has vast potential for increasing household access to a range of tree products including food, fuel wood, building materials, medicine and fodder, as well as increasing farm incomes. It also contributes to sustained productivity by enhancing soil fertility, controlling erosion, enhancing microclimates of cropping and grazing landscapes.

Therefore, AFRP was conceived to unlock the vast potential for agroforestry to increase productivity, profitability and diversity of farm production in Uganda. This is especially important today, when high and ever-increasing population (3.2% per year), and reducing farm sizes, dictate that more intensive and innovative land use strategies have to be pursued for the country's food security and environment conservation goals to be met concurrently.

1.2 Rationale

Agroforestry systems comprise multiple components, which are constantly undergoing ecological and economic interactions. These interactions take many forms, resulting in both positive and negative outcomes to the farmer (Nair, 1993). Agroforestry systems seek to optimize the positive outcomes by increasing, diversifying and sustaining production beyond what is possible with other systems of land use (Huxley, 1984). Besides the positives, agroforestry systems also involve costs and risks that have to be minimized. The essence of scientific research in agroforestry therefore, lies in the quest for science-based evidence to demonstrate to farmers the range of trade-offs associated with pursuing alternative courses of action in adopting one agroforestry system over the other or none at all.

1.3 Mandate

The AFRP is mandated to generate and disseminate technologies for growing trees on farms in order to optimize crop and livestock productivity, provide multiple tree products and conserve natural resources. In pursuit of this, the programme includes diagnosis of farming systems in different agro-ecologies of Uganda and there after design appropriate interventions for enhancing sustainability of agricultural production. This mandate involves working closely with farmers and other stakeholders in developing options and approaches for maximising benefits from integration of trees on farms. The programme is also responsible for developing strategies wide scale adoption of agroforestry technologies for impact, as well as strengthening stakeholder capacities to interface with agroforestry interventions at different levels.

2.0 PROGRAMME CONTRIBUTION TO NATIONAL DEVELOPMENT AGENDA

2.1 United Nations Sustainable Development Goals (SDGs)

Uganda as a member of United Nations has an obligation to contribute to the attainment of the recently passed sustainable development goals for the next 30 years. The AFRP will contribute to these in the next 10 years by focusing its research to provide knowledge and technologies in areas such as food security, fuel wood, soil fertility, fodder while being fully gender responsive, thereby contributing to Goal 2 on ending hunger and achieving food security and improved nutrition, Goal 1 (on ending poverty), Goal 7 (on energy). The generated technologies and knowledge will specifically contribute to subgoals 2.2 (malnutrition), 2.3 (doubling agricultural productivity and incomes) and 2.4 (sustainable food production and resiliency).

2.2 The East African Community Treaty

Sustainable management of natural resources is an issue in the EAC treaty provided and the EAC parliament subsequently adopted a Protocol on Environment and Natural Resources Management. This protocol provides, inter alia, for the "protection and promotion of the use of indigenous knowledge that is compatible with conservation or sustainable use of biological resources". In conducting research, especially for food security, nutrition and land productivity, AFRP will contribute by documenting traditional knowledge and practices (contributing to the provisions of Article 11 (2h and j) of the EAC Protocol).

2.3 The Constitution of Uganda 1995

The 1995 Uganda Constitution aims at "*sustainable national development that takes into account environmental conservation, social development and economic growth*". This AFRP strategic plan lays ground to contribute technologies and public awareness as stipulated in National Objective XXVII sections (i) and (iv) that "promote sustainable development and public awareness" and "ensure conservation and promote rational use and protect Uganda's biodiversity". These objectives are further articulated in Chapter 15 that deals with Land and the Environment and Article 245 (Protection and preservation of the environment from degradation).

2.4 Uganda's Vision 2040

Uganda's Vision 2040 presents the country's development strategy that is anchored on achieving the vision of "*a transformed Ugandan society from a peasant to a modern and prosperous country*" by 2040. This Vision sets a target of increasing forest cover of this country from 14% in 2013 to 24% in 2040. The AFRP strategic plan is premised on the Uganda Vision 2040 and will contribute to this country's strategic development agenda by:

- i). Enhancing on farm tree growing by understanding tree-crop-livestock interactions thereby reducing pressure on natural ecosystems particularly forests and rangelands
- ii). Developing and promoting sound tree-based technologies for fuel wood, food, fodder, soil fertility and fibre production, income generation on farm to restore and add value to ecosystems including forests
- iii). Effectively responding to today's and future challenges in agroforestry including climate change, tree-crop-livestock interactions to maximize yield as well as on-farm tree growing constraints.

2.5 National Development Plan (NDPII)

The NDP emphasizes “...sustainable development through preservation of natural resources such as forests and wetlands ...”. This Plan also focuses for the next 10 years on “increasing on-farm tree cover, national forest cover and economic productivity of forests” by increasing “afforestation, reforestation, adaptation and mitigation of deforestation for sustainable forestry”. In paragraph 522, the NDP points out that the environment and natural resources sub-sector targets, in the short run, to increase forest cover in the country from 14% in 2013/2014 to 18% in 2019/2020. Forestry research and development has been identified in NDP II as one of the avenues to achieve these targets. AFRP contribution will be enhancing adoption of tree-based enterprises on farm, determining incentives and disincentives for tree growing as well as understanding tree-crop interactions.

2.6 Agricultural Sector Support Programme (ASSP) 2016/2017 – 2020/2021

For agriculture to perform as required, the environment has to function well. Forest loss and land degradation are specific environmental issues known to have a bearing on the performance of the agricultural sector. AFRP will contribute to this through development and dissemination of technologies for enhancing soil fertility and climate change adaptation and mitigation.

2.7 NARO Strategic Plan (2010 – 2019)

Natural resource management is one of the five themes in the organization's research and development hierarchy. As such projects in forestry, soil and water have been implemented. The AFRP will contribute to NARO's strategic plan through the development of projects and resource mobilization to attain the five strategic objectives in this plan

2.8 The National Forestry and Tree Planting Act (2003)

The legislative framework for the forestry sub-sector is the National Forestry and Tree Planting Act (NFTA) and was enacted with a goal of guiding and causing the people of Uganda to plant trees to meet the needs of the present generation without compromising the rights of future generations. The AFRP will contribute to this act by generating and disseminating various tree-crop technologies for massive adoption on farm.

3.0 THE STRATEGIC PLANNING PROCESS

3.1 Initial ideas about NARO Research Programmes Strategic Plans

In 2013, the organisation of research activities at NARO PARIs changed from thematic to programme mode. As such, the Agroforestry Research Program was re-born as one of four programmes of NaFORRI. Like all NARO programmes and institutes, this programme is required to hold annual review and planning meetings with key stakeholders to check progress towards set targets and revise plans accordingly. During recent years, the need for strategic thinking has become apparent at such meetings. Research programmes have been urged therefore to develop strategic plans in order for their activities and outputs to fit better into institute and organizational aspirations.

In addition, in a move to maintain high quality standards in research for development, NARO is undertaking initiatives to develop technical and administrative Standard Operating Procedures (SOPs). These are intended to guide refinement of current processes as an effective way to address code of good practices and high quality service. At a workshop on SOPs held at Colline Hotel, Mukono on 20th to 22nd July 2015, consensus was reached over the need for NARO to set minimal standards for its various research programmes. A follow-up workshop held at Mukono ZARDI from 9th to 11th September 2015, recommended that all activities of NARO research programmes be guided by well thought through programme strategic plans. It is in line with these developments that this strategic plan was conceived.

3.2 Development of the Agroforestry Research Programme strategic plan

The process of developing this strategic plan was kick started by the agroforestry programme team at NaFORRI with guidance from the Director of research, and involved a series of brainstorming sessions. At different stages of the plan's development, drafts were shared with other institute staff for critique, and adjustments made thereafter. *[A fairly comprehensive draft was then circulated to selected experts for review and input, before the final version was produced].*

4.0 SITUATIONAL ANALYSIS OF THE AGROFORESTRY RESEARCH PROGRAMME

Efforts to enhance agroforestry research at NaFORRI have clear strengths and opportunities that if well harnessed, can lead to success. However, agroforestry research is also beset with a number of weaknesses and threats that may impede its contribution to national economic development. These factors are outlined in the following sections.

4.1 Strengths and opportunities

1. Availability of government policies (e.g. National Forestry Policy, National Forestry Plan, National Forestry and Tree Growing Act, Draft of National agroforestry policy) and National development strategies e.g. Vision 2040 that support promotion of agroforestry research.
2. Willingness of existing local and international partners (e.g. ICRAF, Makerere University; Civil society organisations, District local government departments) to collaborate with NaFORRI in undertaking agroforestry research
3. Presence of Agroforestry Scientists at all ZARDIs such can be used whenever a need for additional expertise and work force arises.
4. Availability of satellite stations such as Mbale and Bugongi for agroforestry technology generation and dissemination
5. Farmers' realization of salient concerns such as the role of on-farm trees/in landscapes in mitigating problems identified (e.g. soil degradation, climate change).

4.2 Weaknesses and threats

1. Failure to implement activities in time due to insufficient and delayed funds. Untimely release of funds further presents a setback especially for season dependent field activities.
2. Limited collaborative (strategic partnerships) arrangements with relevant institutions (e.g. universities and local governments). This has led to duplication of research activities as well as limited information sharing.
3. Limited staff: the numbers as well as level of qualification of research scientists and assistants are prohibitive in executing this programme's research activities. For instance, there is Lack of PIs at PhD level in the programme.
4. Lack of training opportunities to enhance the skills, knowledge and attitudes of the staff on this programme.

5.0 THE AGROFORESTRY RESEARCH PROGRAMME STRATEGIC PLAN 2015-2025

5.1 Aspirations of the Agroforestry Research Programme

The overarching aspiration of the AFRP is to become an internationally recognized research and development facility in the field of agroforestry. This will be accomplished through:

- i) Building a robust highly trained and multi-skilled team to carry out agroforestry research, dissemination and impact analysis. The programme also aspires to develop and sustain strategic partnerships as a way of extending its breadth and reinforcing its competences.
- ii) Generating agroforestry technologies and best practices relevant to farming context in different agro-ecologies of Uganda. The aim in this is enabling farming communities to tap into the latent potential of agroforestry as a catalyst to improved land productivity, increased incomes, food security and sustainable environment.
- iii) Addressing non-technological bottlenecks to agroforestry development in order to complement the programme's core objective of technology generation. This involves developing strategies for enhancing effectiveness of agroforestry technology uptake pathways, and seeking solutions to inefficiencies along multiple segments of the agroforestry commodity value chains.

It is thus envisaged that during the period between FY 2016/17 and end of FY 2026/27, the AFRP will be in position to outline high-impact agroforestry technologies and strategies developed, articulate their contribution to national development and inform policy on any institutional and regulatory adjustments necessary for agroforestry to deliver better as a means to national economic development.

5.2 Vision, Mission and Core values

Vision	:	A leading research programme generating high-impact agroforestry technologies, practices and strategies for national development.
Mission	:	To generate and disseminate technologies for growing trees on farms to optimize crop and livestock productivity, provide multiple tree products and conserve natural resources.
Core values	:	1. Excellence 2. Innovativeness 3. Inclusivity 4. Accountability 5. Integrity

5.3 Programme focal areas

5.3.1 Tree-based options for enhancing land productivity

The productive capacity of land refers to the sustainable crop or pasture yields realizable per unit area. In Uganda today, high population growth and consequent reduction in family land holdings are leading to over cropping/grazing, shortening fallow periods and degradation of land through nutrient depletion. Farmers yields are typically less than one third of potential yields found on research stations, and yields of most major crops have been stagnant or declining since the early 1990's (Deininger and Okidi 2001; Pender et al, 2003). In most farming systems, these processes are translating not only in food insecurity, but also income poverty and inability of agriculture-dependent households to afford necessities of life.

A number of agroforestry technologies and practices have been proven to increase land productivity and enhancing diversity and sustainability of farming systems. Improved fallow shrubs like *Crotalaria grahamiana*, *Tephrosia vogelii* and *Sesbania sesban* for instance provide affordable options to resource-poor farmers for enhancing N, P and K endowment of their croplands, elements that are critical for improved crop performance. Tree species like *Faidherbia albida* have been referred to as "fertilizer factories on the farm" given their potential to boost land productivity in farming systems where they occur. A host of multi-purpose trees (MPTs) e.g. *Grevillea robusta*, *Ficus natalensis*, *Albizia chinensis* etc. can be integrated with crops on farm to enhance soil fertility. When grown in strategic locations on farm, trees and shrubs have also demonstrated capacity to reduce soil erosion and slow down land degradation especially in hilly regions. In view of the foregoing, the AFRP intends to undertake activities aimed at maximizing the benefits that accrue to farmers, communities and entire landscapes as the result of utilizing these and other tree-based land management options.

5.3.2 Trees for improved household food and nutrition security

Food production in Uganda has for long lagged behind population increase. Over the last half century, the population has grown almost five times the level it was at in the early 1960s, while food production only increased by a factor three during the same period. This happens even as a doubling (100% growth) of food cropping area only brought about 50% growth in yield levels (Leliveld et al, 2013). Inevitably, most parts of the country experience food deficits. Evidently, for Uganda to meet her food security and environment conservation goals concurrently, more intensive and innovative land use strategies have to be pursued.

Growing of trees on farm can contribute to household food security and nutrition, through provision of fruits, nuts, fodder and other edibles. In many regions of Uganda, tree fruits provide a buffer to households against starvation during hunger periods. The sale of tree products also creates "food security through the market" by providing additional income sources to farming households. Adaptive research on integration of both tropical and temperate fruits into farming systems is at different stages across the country. Additional fruit species and varieties are to be explored to increase the range of options available to farmers. Mechanisms will be sought for maximizing the contribution of tree fodder resources to Uganda's dairy systems. Less direct linkages between household food security and other dimensions of agroforestry technology development (e.g. soil fertility enhancement, energy provision etc.) are to be better articulated for different regions.

5.3.3 Options for enhancing on-farm wood and energy security

Wood fuels are the most common source of fuel for cooking in Uganda. According to the National Household Survey 2010, up to 95% of households use wood fuels (wood and charcoal) as the main source of energy for cooking (UBOS, 2010). However, with high levels of deforestation, access to such resources is becoming increasingly difficult. In many parts of Uganda, wood resources have been commercialized, and claim a sizeable share (16%) of household expenditure. The search for fuel wood usually creates additional workload for rural women and compromises on the time available for them to engage in productive agricultural activities.

Agroforestry as a land use increases farmers' access to wood and energy resources by enhancing availability of tree products on farm. This not only offsets the economic costs that would otherwise be incurred by households, but also the inconvenience involved in accessing and transporting them from source to point of use, which is usually the farm-household. In this regard, the AFRP is to evaluate a variety of prospective fast growing indigenous and exotic tree species to assess their suitability for integration into different farming contexts. Innovative spatial arrangements and tree management techniques will also be tested to arrive at ways of optimizing productivity of wood energy resources without necessarily compromising other farm enterprises.

5.3.4 Strengthening resilience of farming systems to climate change

Climate change is one of the most critical challenges facing humanity today. Its negative impacts are threatening to reverse decades of agricultural, environmental and infrastructural advancement, especially in developing countries (Okonya et al, 2013). In Uganda, weather-related events such as prolonged dry spells, floods, storms, mudslides, extreme rainfall, and delayed or early rains have become more frequent and intense. This usually leaves resource-constrained rural farmers food insecure and their livelihoods threatened.

Agroforestry practices, however, can slow down land degradation, sequester carbon from the atmosphere and secure rural livelihoods through provision of ecological and economic benefits. This facet of the AFRP therefore aims at using agroforestry innovations to develop ecosystem-based strategies for enabling farming communities in the different agro-ecologies of Uganda to cope with, adapt to and ultimately reverse the disastrous effects of climate change.

5.4 Strategic Objectives (SO) of the Agroforestry Research Programme

5.4.1 Design appropriate agroforestry interventions for boosting productivity and sustainability of farming systems in different AEZs of Uganda (SO1)

For agroforestry to impact on people's livelihoods and the environment, it ought to unravel felt problems or unlock farmers' blockage to new opportunities. Strategic Objective 1 of the AFRP therefore, focuses on iterative diagnosis of farming contexts, with the aim of exploring entry points for agroforestry innovations. Tree-based options for addressing critical opportunities/constraints will then be evaluated for their biophysical suitability, economic viability and social acceptability, and specifications thereafter made for their application in the agro-ecological zones in question.

The desired outcome of this plan is to enhance availability of appropriate agroforestry technologies for improved land productivity and resilience of farming systems towards the impact of climate change

SO1 has the following Strategic outputs:

- 1.1 Tree-based technologies for improving land health developed
- 1.2 Technologies for safeguarding household wood and energy security developed
- 1.3 Tree fodder options for increasing productivity of livestock systems developed
- 1.4 Tree-based options for improving household nutrition and food security developed.

5.4.2 Develop practical technological options and approaches for enabling farmers and other stakeholders to realize optimum benefits from integration of trees on farms (SO2)

In Uganda, over 70% of tree cover is on private farms. The fate of these tree resources therefore, lies largely, in the hands of individual farmers who control decisions over use of the trees on their farms. When presented with alternative land use options, farmers may trade-off agroforestry practices, especially those that do not fit well into their broader livelihood strategies. Strategic Objective 2 aims at generating empirical evidence to guide farmers' decisions, on ways of minimizing competition between trees, crops and livestock, and/or maximizing benefits from interactions between these components on farms.

SO2 has the following Strategic outputs:

- 2.1 Performance of technological innovations under farm conditions established
- 2.2 Profitability and acceptability of agroforestry innovations determined
- 2.3 Recommendation domains for agroforestry innovations defined.

5.4.3 Develop strategies for wide scale adoption of agroforestry technologies and tracking their impacts on people's livelihoods and the environment (SO3)

NARO, ICRAF and partners have, since 1992, developed and tested a variety of agroforestry technologies, a number of which have been recommended for wide-scale dissemination to farmers. Many public, private and civil society agencies have served as uptake pathways through which these technologies are channeled to intended end users. This notwithstanding, the impact of these efforts remains patchy and difficult to quantify given the short-term and localized manner in which individual programmes/projects have operated. Strategic Objective 3 seeks to scale up adoption of agroforestry and address bottlenecks constraining its effective contribution to people's livelihoods and the environment.

SO3 has the following Strategic outputs:

- 3.1 Strategies for enhancing exposure and access to on-shelf agroforestry technologies developed
- 3.2 Strategies for addressing issues at larger scales beyond the farm (e.g. catchment/landscape approach) developed
- 3.3 Strategies addressing issues at multiple segments of agroforestry commodity value chains developed.

5.4.4 Institute mechanisms for enabling robust knowledge sharing and strengthening of

stakeholder capacities to interface with agroforestry interventions (SO4)

Information and knowledge sharing is a vital part for any technology development and dissemination endeavor. It is especially important for agroforestry, given its multi-stakeholder and dynamic nature. Strategic Objective 4 of the AFRP, seeks to develop and operationalize multiple platforms for information sharing between stakeholders in the agroforestry sub-sector as a way of enhancing their capacities to interface with cutting-edge agroforestry innovations and interventions.

SO4 has the following Strategic outputs:

- 4.1 Staff capacity in agroforestry research and development enhanced
- 4.2 Farmers' and extension agents' capacity to interface with agroforestry innovations developed
- 4.4 Regular platforms for enabling agroforestry stakeholders' interaction held
- 4.3 Information to support agroforestry-related policy and advocacy generated.

5.4.5 Develop and maintain a sustainable means of mobilizing financial resources for facilitating agroforestry research and development (SO5)

Current research infrastructure and funding will not suffice if the aspirations of this strategic plan are to be realized. Given ever-increasing demands, it is apparent that government funding is seldom sufficient to deliver the mandate of the AFRP as earlier articulated. There is therefore need for concerted effort in mobilization of additional funds from diverse funding sources to enhance agroforestry research and capital investments in infrastructural outfits and refurbishment of existing ones.

SO5 has the following Strategic outputs:

- 5.1 Off-budget projects by the AFRP designed and implemented
- 5.2 Strategic partnerships for development of funding proposals formed and sustained
- 5.3 Adequate funds for training scientists in cutting-edge science (MSc and PhD) obtained.

5.5 Implementation matrix

SO	Indicators	Milestones	Strategic initiatives	Years									
				1	2	3	4	5	6	7	8	9	10
1. Design appropriate agroforestry interventions for boosting productivity and sustainability of farming systems in different agro-ecologies of Uganda	No. of AF innovations identified and developed	- 1 entry point for AF identified for each of 6 AEZs of Uganda by Yr 5	- Diagnosis and design studies										
	No. of AF innovations taken up by farmers	- 2 new practices developed and promoted in 3 AEZs of Uganda by Yr 10	- Participatory on-farm experiments										
	% change in agricultural production attributable to AF interventions	- 50% of farmers attributing over 25% increase in yields to AF interventions by Yr 10	- Conducting comprehensive adoption studies										
2. Develop practical technological options and approaches for enabling farmers and other stakeholders to realize optimum benefits from integration of trees on farms	No. of technologies and practices for integrating trees on farm adopted by farmers	- 1 inventory of AF technologies developed for each of 12 AEZs of Uganda by Y3	- Conducting comprehensive adoption studies										
	No. of farmers adopting new practices of enhancing benefits from trees on farm	- 2 new practices of enhancing benefits from on-farm trees recommended by Y7.	- Cost-benefit analyses of AF options										
	% change in proportion of household income spent on AF commodities.	- 5% farmers in 6 AEZs attributing at least 10% reduction in household expenditure to AF	- Household partial budget analyses										

		interventions by Yr 10.												
3. Develop strategies for wide scale adoption of agroforestry technologies and tracking their impacts on people's livelihoods and the environment	No. of innovative approaches for scaling up adoption of AF technologies & practices	- 200 illustrative agroforestry farms in place by Yr 5	- Close collaboration with AF technology UPOs.											
	No. of innovative approaches for determining impacts of AF technologies & practices	- Economic contribution of at least 2 AF technologies quantified in each of 6 AEZs by Yr 7	- Adoption and impact studies											
	No. of AF technologies & practices for which adoption and impacts are determined	- Adoption rates and impacts of at least 10 AF technologies determined in 12 AEZs by Y 9.	- Adoption studies											
4. Institute mechanisms for enabling robust information sharing and strengthening of stakeholder capacities to interface with agroforestry interventions	No. of platforms for enabling AF stakeholders' interaction put in place	- 3 forums for enabling AF stakeholders' interaction operationalized by Y 4	- Drawing lessons from elsewhere and previous efforts in bringing together AF stakeholders											
	No. of National Agroforestry Workshops held	- 1 National Agroforestry Workshop held annually.	- Establishment of a secretariat for coordinating this event											
	No. of members to AF-related social	- 2,000 members registered to AF-related social media	- Engaging ICT & Development Communication											

	media groups	groups by Y 5.	units in AF R&D										
	No. of farmers reachable electronic media	- 1 million farmers contacted through AF-related messages by Y 5.	- Engaging ICT & Development Communication units in AF R&D.										
5. Develop and maintain a sustainable means of mobilizing financial resources for facilitating agroforestry research and development	No. of running off-budget projects	20% increase in number of off-budget running projects by Yr5	- Establishing an AF proposal development focal point and repository - Effective communication with donor agencies - Improve visibility through documentaries on AF research outputs and impacts.										
	No. of existing strategic partnerships established	20 MoUs signed with strategic partners by Y 5.	- Improve visibility through media and conferences.										
	No. of scholarships for staff to undertake PhD & MSc training	5 PhD and 5 MSc scholarships obtained by Y 6	- Development of research funding proposals with staff capacity building components.										

6.0 RESEARCH AND MANAGEMENT CAPACITY

6.1 Human resource

How many staff does the programme require? What is the current staff strength (%) and what is the shortfall (%)? The Agroforestry Research Programme has twelve (12) fulltime staff comprising 4 research scientists, 4 technicians, 2 research assistants and 2 volunteers (Table 1). The programme, however, can outsource personnel from within NaFORRI, other NARO institutes as well as relevant partner agencies as the situation may require.

Table 1: Current and required staffing for the Agroforestry Research Programme

Discipline	Scientists		Research assistants		Technicians	
	Available	Required	Available	Required	Available	Required
Agroforestry	2	2	2	-	4	
Socio-economics	1	1	-	-	-	1
Soil science	1	1	-	-	-	
Biometrics	-	1	-	-	-	
Agronomy	-	1	-	-	-	1
Agricultural extension	1	1	-	-	-	1
General tree nursery	-	-	-	-	-	2
Total	4	7	2	0	4	4

Currently, the highest level of training for staff on the AFRP are master's degrees. This reflects a limitation of high caliber scientific personnel that are necessary, not only to drive the research agenda of the programme but also provide mentorship to young scientists.

Table 2: Current and required staffing for the AFRP by level of training

Discipline	Level of Training			
	PhD		MSc	
	Available	Required	Available	Required
Agroforestry	2	2	2	4
Socio-economics	-	1	1	-
Soil science	-	1	1	1
Biometrics	-	-	-	1
Agronomy	-	1	-	-
Agricultural extension	-	-	-	1
General tree nursery	-	-	-	1
Total	-	5	4	8

In order to deliver effectively on the aspirations of this strategic plan, the AFRP intends to reinforce its current staffing through the following measures:

1. Recruitment
2. Use of interns and volunteers
3. Consultants i.e. contracted staff like for ATAAS projects or short-term assignments

4. Short and long-term training to equip existing staff with relevant skills, knowledge and attitudes.

6.2 Financial resources

Agroforestry Research Programme's funding requirements for the planned period 2015 – 2025 is estimated to be 52 billion Uganda shillings (Table 2).

Table 2: Agroforestry Research Programme budget forecast for the period 2015–2025

Year	Budget by sources (UGX '000)		
	GoU	Dev. Partners	NTR
2015	560,471	1,369,493	134,764
2016	680,867	1,589,700	287,900
2017	700 900	1,985,465	300,980
2018	793,588	2,482,799	389,643
2019	811,303	2,517,918	417,912
2020	897,111	2,770,324	450,369
2021	989,371	3,980,132	558,918
2022	1,241,556	4,264,000	731,035
2023	1,421,888	4,582,909	776,946
2024	1,444,802	4,789,423	796,335
2025	1,572,202	5,799,821	818,945
TOTAL	10,413,159	36,131,984	5,663,747

6.3 Projected funding

Projected funding for the period 2015–2025 is estimated at UGX 52,208,890,000.

6.4 Strategies for resource mobilization

The main sources of funding for the AFRP are GoU Development Fund and Development Donor support. To supplement these main sources of funding for this research programme, NTR generation will also be improved. AFRP shall use the following strategies to mobilize additional financial resources.

i) Internally generated Non-tax Revenue

Until now, internal non-tax revenue (NTR) generation for this programme has only been dismal, with focus predominantly put on research and technology dissemination. During this planning period, internal revenue generation comprise one of the core preoccupations of the AFRP, with set targets met through sale of elite agroforestry tree/shrub planting material, offering client-demanded trainings and consultancies.

ii) Support from Development Partners

AFRP will identify research and development priority areas to match with available funding opportunities from international development partners such as USAID, Bill and Melinda Gates Foundation, UNDP, EU, World Bank, Australian Center for International

Agricultural Research amongst others. Strengthening linkages with World Agroforestry Centre/ICRAF in developing joint proposals seen as one way of enhancing the programme's competitiveness in this regard.

iii) *Public-Private Partnerships*

The programme will adopt Public-Private-Partnerships (PPPs) that entail linking agroforestry research to stakeholders' needs; value chain analysis for agroforestry products and services; innovation platforms for value addition and marketing of agroforestry products and services. Corporate social responsibility funding will also be explored targeting insurance companies, beverage bottling companies, financial institutions, construction and transport companies.

iv) *Competitive Grants Schemes*

The programme is currently running one research project under NARO'S Competitive Grants Schemes (CGS), in collaboration with Makerere University, ICRAF, MbaZARDI, NgeZARDI and the district local governments of Lira, Nakasongola and Kiruhura. During the life span of this strategic plan, the programme intends to tap into its repository of research proposals to respond even more competitively to requests for proposals under this facility.

6.5 Infrastructure and facilities for the programme

During this planning period, AFRP will revamp physical infrastructure at its satellite stations like Mbale and Bugongi for better technology generation and outreach. This will involve establishing and operationalizing of the Agroforestry Resource Centers in different regions of the country. The programme will also increase its coverage and enhance in-field mobility through procurement of new vehicles and motor cycles.

7.0 STRATEGY MONITORING AND PERFORMANCE EVALUATION FRAMEWORK

7.1 Rationale for monitoring and evaluating the strategic plan

Monitoring and evaluation (M&E) aims at providing a regular review of the progress of implementation of programme activities in terms of input delivery, work schedules and planned outputs/targets as well as quality of outputs. It will involve routine information gathering, analysis and reporting to the institute management and advisory committees, partners and stakeholders. The Programme's Monitoring and Evaluation Framework focuses on promoting:

1. Accountability for the achievement of Strategic Plan objectives through the assessment of Outputs, Outcomes and impacts; and
2. Learning, feedback, and sharing of research outputs and lessons learned during Strategic Plan implementation among staff, partners and stakeholders.

The specific objectives for developing and applying the Monitoring and Evaluation Framework are to:

1. Provide the Institute management with the information needed to guide the Strategic Plan implementation towards achieving its goals and objectives;
2. Provide early contingency plan for the likely problematic activities and processes that need corrective action;
3. Provide a basis for systematically collecting and analyzing information on the changes arising from Strategic Plan activities; and
4. Ensure accountability and value for money (upward accountability to the Donors, and, downward accountability to the stakeholders).

M&E will be used to measure accomplishments and alert the programme on any deviation in time for corrective action to be taken. This process will take into account emergent issues, and changes in the operating environment that may affect this strategic plan. The M&E Framework provides for a compulsory midterm review of the plan in 2021 and a similar exercise and the end of the plan's timeframe in 2026.

7.2 Agroforestry Strategic plan Monitoring and Evaluation Tools

Monitoring will focus on performance indicators for each research output, impact created and the over-all outcome of the strategic plan. In carrying out M&E, the following tools will be adopted:

- a) Implementation matrix
- b) Annual work plans
- c) Annual budget and quarterly expenditure
- d) Annual and quarterly reports
- e) Annual technical reports
- f) Annual review and planning meetings
- g) Annual staff appraisal
- h) Back to office reports

7.3 M&E implementation responsibilities

The responsibility for implementing the AFRP M&E Framework will be undertaken by the Institute

Management Committee. The respective project leaders will guide the committee during execution of this task. The Committee will be meeting quarterly and report to the institute advisory committee on the progress made towards the implementation of the programme Strategic Plan. The nature and scope of the reporting will include:

1. Progress made against the Strategic Plan;
2. Causes of deviation from the Plan, if any;
3. Challenges that may adversely affect implementation of the Plan; and
4. Suggested solutions to these challenges.

8.0 RISK MANAGEMENT STRATEGY

Risk	Risk Level	Risk Rating	Control measure	Mitigation action	Responsibility	Time Frame
Inadequate finances	Program	Medium	Increased resource mobilization and proper funds allocation	Review of projects detailed budget allocation. Increase the mobilization of off-budget projects.	Programme leader and project heads	Continuous
High staff turnover	Program and Institute	High	Increase staff incentives and welfare	Train and recruit project staff	Director, HRO and Programme leader.	Annually
Extremely high expectations	Program	Medium	Deliver promised items to community	Offer free training services to community at institute or resource centres	Programme and project heads	Quarterly
Inability to attribute impacts to AF innovations	Program	Low	Undertake rigorous diagnosis and design (D&D) & track impact continuously.	Implement projects that are demand-driven.	Programme and project heads	Continuous
Adverse impacts of Climate change	Program and institute	High	Sensitize community on climate change impacts and mitigation measures	Include climate change as a priority area during project development	Project leaders	Continuous

9.0 COORDINATION AND MANAGEMENT OF THE STRATEGIC PLAN

The Programme Leader will provide overall leadership and guidance to the program, and in that capacity coordinate the implementation of the strategic plan. He/She will be assisted by a core team at the institute that will be directly responsible for achieving the goal and objectives of the strategic plan. On this team, directly next to the Programme Leader will be the Project Leaders who will take lead in planning and budgeting, implementing and reporting on progress for the respective projects under the programme. The Project Leaders will work with project teams comprised of Scientists, Technicians and any relevant staff at the institute as will be deemed necessary by the Programme Leader. As a matter of principle, however, membership to teams will be dependent upon individual value addition to the task at hand.

The programme strategic plan will also be implemented with the assistance of virtual program staff distributed within NARO institutes and strategic partner institutions. Within NARO, Agroforestry scientists operating at each of the ZARDIs will provide a focal point linking the programme to the agro-ecological zones. The programme will initiate and operationalise different platforms to support NARI-ZARDI collaborations in order maintain this virtual team.

Implementation of program all activities will be guided by this strategy, and will be done in conformity to the programme's core values (i.e. excellence, integrity, accountability, innovativeness, inclusivity and transparency). These will be held as enduring tenets influencing the way the program will go about its business. In spite an apparent hierarchical organizational structure, the program will adopt an open-minded, inclusive and participatory leadership approach to espouse diverse viewpoints. Progress on program activities will be availed through quarterly/periodic reporting.

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