African Forum for Agricultural and Advisory Services
Knowledge & Novelty for Africa's Livelihoods

BIO4AFRICA

Facilitating a Transition to a Circular Bio-Economy in Africa

Knowledge Guide – Policy Brief from Bio4Africa Project

THE TRADITIONAL ECONOMIC SYSTEM HAS FAILED TO VALUE NATURE:

A Circular Knowledge-based Bio-Economy offers a Feasible and Sustainable Development Solution for Socio-economic Transformation of Africa

Corresponding Author: Ssemwanga Mohammed (PhD) **E-mail:** ssemwangaali@gmail.com
Contributing authors: Max Olupot **E-mail:** molupot@afaas-africa.org
Morris Egesa **E-mail:** megesa@afaas-africa.org

Policy Brief #1 December 2023

Executive summary

Who is this aimed at:

- Policy makers and planners in public and private sector
- Government Ministries, Departments and Agencies (MDAs).
- Academia (e.g., Universities), and national and international research institutes engaged in agriculture and environment.
- The donor community, investors and venture capitalists.
- Private sector and non-governmental organisations (NGOs).
- Civil Society Organizations (CSOs), and farmer groups.
- Private actors and individuals along the different nodes of the bioeconomy value chain.

Objectives

1. To create a favourable environment and an enabling a legal and regulatory framework for the commercial production and management of national biological resources.
2. Promote the public funding, investment and private sector involvement in applied bioscience research, innovation and industry for a sustainable transformation from traditional to a knowledge-based bioeconomy.
3. To build and strengthen technical and operational capacities of institutions and stakeholders along the different nodes of the bioeconomy value chains.

Policy Options and Recommendations

Policy option 1: The African governments should develop and implement laws bylaws and related regulations that support optimal production, use and sustainable management of their national natural and biological resources.

Recommendation 1: The policy makers should develop laws, bylaws and regulations to address the institutional bottlenecks, technological challenges and investment barriers for use and management of biological resources.

Policy option 2: Promote both public and private investments in bioscience research, innovation and industry for a sustainable transformation from the traditional economy into a modern Knowledge-based Bioeconomy (KBB).

Recommendation 2: African governments should increase public funding and investments in bioscience research, stimulate growth and participation of the public and private sector in the bioeconomy development.

Policy option 3: The African governments and policy makers should build or strengthen capacity (operational, technical, and infrastructure) of institutions and stakeholders along the different nodes of the bioeconomy value chains.

Recommendation 3: African governments should put in place the tailored training programs to build/strengthen capacity (technical and operational) of key institutions and stakeholders along the different nodes of the bioeconomy value chain. In addition, the governments should establish and operationalize multi-stakeholder platforms (MSP) as the functional mechanisms for bringing together different institutions and private actors in bioeconomy for training and policy dialogues and also leverage their capabilities and competencies.

KEY MESSAGES

In Africa, many professionals and stakeholders, namely local farmers, politicians and policymakers are unable to distinguish between bioeconomy and the regular economy. In other words, bioeconomy is the use of scientific knowledge to optimize productivity of biological resources in a manner which is more eco-friendly, economical and socially valuable to societies. AFAAS perceives knowledge-based bioeconomy as a scientific research-based and innovative way of resource recovery, recycling and adding value to the primary resources to produce novel marketable products.

This policy brief serves to increase knowledge and awareness about the current state of bioeconomy, institutional bottlenecks, development challenges, policy issues and landscape in Africa. For the first time in Africa, through Bio4Africa project, provides sustainable business models, strategies and policy options driven by biosciences and innovation to fast-track the transition from traditional to the knowledge-based bioeconomy.

In this regard, this policy brief serves to inform bioeconomy strategies that will definitely create a supportive legal and regulatory environment for multidisciplinary teams and multi-sectoral players, including farmers, the private sector, NGOs and CBOs, government line ministries, departments and agencies (MDAs). The policy brief identifies key areas for improvement in the existing public policies and incentive creation that will promote biosciences, innovation and coordination among stakeholders and institutions for efficient use and management of biological resources in Africa.

1. INTRODUCTION

1.1 Background and context

In Africa, over 85% of the population(1.42 billion) depend on subsistence farming for livelihood [1], thus making most of the national economies solely based on agriculture without the support of the advanced manufacturing sector. The African food system is off-track, and climate is changing profoundly, making climate change and food insecurity one of the leading development challenges for the continent.

As the climate changes rapidly, it brings major new risks for the African economies. Across rural communities, farmers are at the forefront of responding to and coping with shocks, using local networks, traditional knowledge and capacities to build resilience against adverse climate change effects. But scale and unpredictability of future risks, rising inequalities, and low capacities mean that new support is required to sustain a people-centred approach to climate resilience, including more frequent and severe weather episodes, mainly dry spells, heat waves, erratic rainfall, floods and droughts [3].

By 2020, at least 35% of the African population (1.3 billion) faced hunger—more than double the proportion of hungry people in any other region globally; and over 282 million of Africa's population are undernourished [4]. Yet by 2050, Africa will have more than two billion people to feed whilst coping with the adverse environmental, climate and health changes, and the food-energy poverty, among others [5]. Therefore, it is now urgent to adopt drastic measures that will ensure food security and climate change mitigation/adaptation in Africa, and the bioeconomy is set to play a starring role.

The Bioeconomy concept is a result of revolutionary advances in biosciences that provide an increasingly powerful engine for innovations. Therefore, developing or advancing an African Bioeconomy is important for several socio-economic reasons, including:

1) the development of a resource-efficient and productive agricultural system which better adapts to climate change;
2) decreasing dependence on fossil fuels for energy, thereby decreasing greenhouse gas pollution;
3) increase capacity for food production base and create new opportunities for food processing and value addition, and
4) increase capacities for recycling waste into energy, material flows and marketable products and services for bioeconomy trade, sustainable development and environmental actions.

Africa, therefore, needs advanced

bioeconomy food systems and policy framework that increases agricultural productivity, incomes and food security whilst fostering inclusive and sustainable rural development. As such, a model Bioeconomy project dubbed: ***'Diversifying revenue in rural Africa through circular, sustainable and replicable biobased solutions and business models (Bio4Africa)'*** is being piloted across Africa. For the first time in Africa, Bio4Africa is a ***'knowledge-based bioeconomy (KBB)'*** project that exploits the art and science of transforming agriculture-based biological resources into local sustainable, eco-efficient and value-added products.

1.2 About AFAAS

The African Forum for Agricultural Advisory Services (AFAAS) goal is "Enhanced utilization of improved knowledge and technologies by the agricultural value chain actors to catalyze sustainable, all-inclusive agricultural development to feed and create prosperity for Africa".

Mission: Promote lesson learning and professionalism, and add value to national agricultural extension and advisory service systems; and

Vision: Agricultural Advisory Services that effectively and efficiently contribute to sustained productivity, profitability and growth of African agriculture for poverty reduction". AFAAS' three strategic pillars are;

i) Strengthening and expanding network and knowledge management capacities;

ii) Developing capacities for scaling out technologies and Innovations; and

iii) Facilitating advancement of Agricultural Extension and Advisory Services (AEAS).

AFAAS (www.afaas-africa.org/) works closely with GFRAS, Regional and Country Fora in Africa. AFAAS upholds the 2014 Malabo Declaration and the Comprehensive Africa Agriculture Development Programme (CAADP), the Science Agenda for Agriculture in Africa (S3A), among key Agricultural Research and Development frameworks in the African continent. It is against this background that African public and private players need to develop all-inclusive and contextually-relevant solutions towards climate change mitigation and sustainable food production systems. In this regard, bioscience presents an exclusive opportunity for Africa to transit from a traditional to a knowledge-based economy through the adoption and use of climate-smart technologies and practices in agriculture.

1.3 Brief about the Bio4Africa project

Bio4Africa is a four-year, EU-funded project supported under the prestigious European H2020 Research Innovation Action program ***(Grant Agreement: 101000762).*** Bio4Africa project is a knowledge-based bioeconomy project being piloted in four African countries, namely Senegal, Cote d'Ivoire, Ghana and Uganda. The Bio4Africa project seeks to deliver contextually-relevant bioeconomy solutions to increase incomes, food and nutritional security of the rural farmers whilst propelling agro-industrialization and green growth in rural Africa. Bio4Africa contributes to Africa's food and nutritional security while at the same combat poverty and further advancing the sustainable development agenda for Africa.

In other words, the Bio4Africa project supports the deployment of the bioeconomy in rural Africa via the development of bio-based solutions and value chains with a circular approach to drive the cascading use of local resources and diversify the income of farmers. The project focus is to transfer simple, small-scale, and robust bio-based techs adapted to biomass needs and contexts, including green biorefinery, pyrolysis, hydrothermal carbonization (HTC), bio-briquetting, pelletizing, and the bio-composites, bio-plastics production.

In doing so, the project empowers the farmers to sustainably produce a wide variety of the novel high-value and marketable bio-based products and energy, namely nutritious animal feeds, fertilizers, pollutant absorbents, construction materials, packaging, solid biofuel, and biochar, as ingredients for the efficient biogas production.

1.4 Approach and methodology

AFAAS employed a mixed methods approach, combining qualitative and quantitative procedures, focusing on field trials but also including literature reviews, bioscience modelling and hypothetical work for the bio-products and services developed under the Bio4Africa project. The findings presented in this policy brief are based primarily on reviews of bioeconomy, production processes, market surveys and business models for the novel technologies and innovations and the resultant bio-based products being piloted across Africa under the Bio4Africa project. Data for the novel bio-based products are drawn from the four Bio4Africa project pilot countries and case studies, namely Senegal, Cote d'Ivoire, Ghana and Uganda. Of particular interest are persistent economic challenges and institutional bottlenecks that often influence policies related to industrialization, biosciences and bioeconomy in Africa.

2. SITUATION ANALYSIS – STATE OF BIOECONOMY

2.1 Limited documentation of biological resources

Most African countries have not surveyed and profiled their national biological resources and hence have no accurate and updated national inventories for their biological resources. There are no realistic monitoring and evaluation frameworks to help guide decision-making in policy formulation and planning for the efficient use and management of biological resources.

As a result, the national biological resources ranging from the fisheries, forestry, tourism, agriculture and energy sectors, are always estimated during the planning process and decision-making in natural management.

2.2 Weak coordination between stakeholder institutions

There is inherent weak coordination between the stakeholders and their institutions, including the academia (e.g., universities and technical institutes), processing companies (e.g., food or feed factories), the government ministries, departments and agencies (MDA), research institutions, and primary producers, among others. Each of these local institutions and stakeholder clusters works independently, usually resulting in competition over biological resources and duplication of efforts.

Lack of inter-agency collaboration has hindered the flow of technical skills, knowledge, capacity building, training and innovations among key stakeholders and institutions, thereby widening the capacity gaps and increasing inefficiencies in harnessing and management of biological resources.

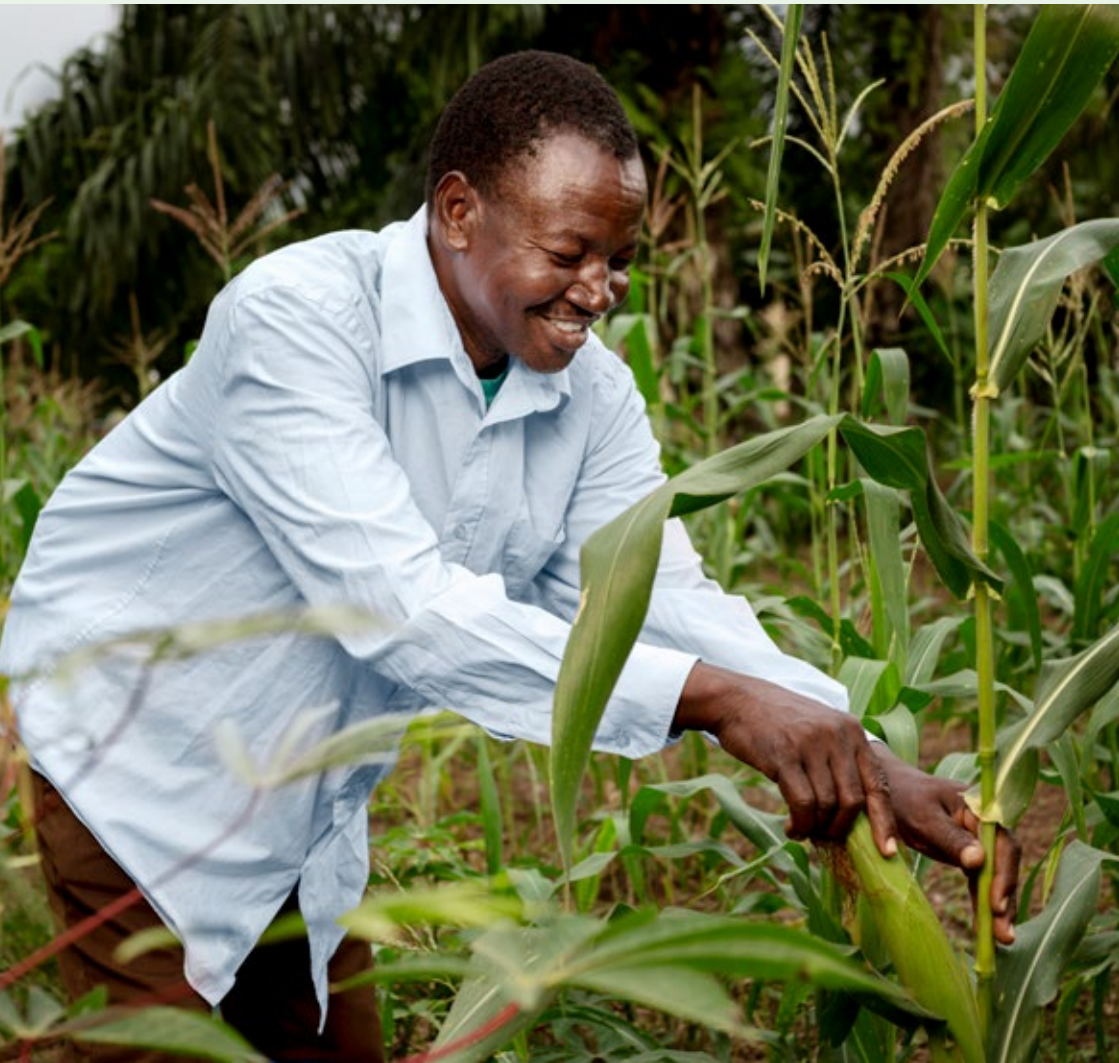
2.3 Competing interests and emerging conflicts over the use of limited and fragile natural and biological resources

African countries are challenged by increasing inter-agency competition and conflicts over the access to, control and use of state biological resources. Competition and conflicts often emerge because different institutions and stakeholders have different uncoordinated mandates and use resources such as forests, water and arable lands. Most rural communities are exclusively dependent on biological resources for agriculture, energy and related livelihood activities, which escalated the tensions between the grass root communities and government agencies which are mandated to manage these resources.

2.4 Limited investments and capacities

Most African states have a wealth of biological resources, yet they also have limited capacities (technical, infrastructural and technological), including financial investment and physical infrastructures; and often fail to support the production of their key biological resources.

The inadequate capacities are attributed to limited training and human resource capacity in biosciences and technological innovations by the public and private sectors. Most countries depend on traditional methods such as hoes and manual labour to harvest and use precious biological resources, which compromises production and productivity and further widens the poverty traps.



3. RESULTS AND DISCUSSION

3.1 Key findings and observations

AFAAS strengthens the capacity and addresses institutional bottlenecks and socio-economic barriers that influence the bioeconomy and industrialization in Africa. The main goal is to develop all-inclusive, contextually-relevant policy options and recommendations for moving towards the knowledge-based bioeconomy society beyond the Bio4Africa interventions.

Results from the Bio4Africa case studies, including the green biorefinery, pyrolysis, hydrothermal carbonization, briquetting, pelletizing, bio-composites, bio-plastics production, present an exclusive bioeconomy opportunity for Africa such as better use and recycling of secondary biological/raw materials to delivering socio-economic and environmental gains for sustainable development and green growth. The Bio4Africa project produces high-value marketable bio-products such as animal bio-feeds, fertilizers, pollutant absorbents, construction materials, packaging, solid biofuel and biochar. As such, the bio-products and services confirm the exclusive capacity of the knowledge-based bioeconomy to nurture the eco-friendly, efficient and sustainable systems for production, processing and consumption of feed, food and energy.

Most African countries have vast biological resources that are currently unutilized and under-utilized and could hence spur economic growth if they are properly harnessed. Only a few African countries have policies and formalized approaches towards harnessing national biological resources. For the bioeconomy, a few existing legal frameworks are fragmented and permit limited value addition. Yet new opportunities are emerging for agriculture and industries in the bioeconomy sector. But the conflicting policies and development strategies are limiting the capacities of institutions and the private sector to advance the commercialization of bioscience innovations, products and services for industrialization, food and energy security, and green growth.

The cross-cutting nature of bioeconomy, therefore, offers Africa a unique opportunity to address institutional capacity gaps and the inter-connected societal challenges such as diseases, air pollution, health risks, poverty, food insecurity, waste disposal, unemployment, natural resource scarcity, over-use of fossil fuels, and greenhouse gases and climate change in a comprehensive manner and, thus achieve green growth.

In this regard, Africa needs holistic, interdisciplinary and multi-sectoral policies and strategic approaches to

shift from a traditional to a knowledge-based development mechanism, with the bioeconomy enterprises as the flagship initiatives. This policy brief provides a long-term strategic direction for developing a knowledge-based bioeconomy so as to advance the traditional economic sectors that depend on a conducive climate and vast wealth of biological resources across Africa.

3.2 The policy question and its origins

Biological resources play a fundamental role in the national development of Africa, and key bio-based industries, namely agriculture, forestry and fisheries, account for 77% of the total average gross domestic product (GDP) [6]. In response, several policies that promote the growth of the bioeconomy have been developed only in a few African countries, including S/Africa, Namibia, Mozambique, Mali, Kenya and Uganda.

Despite Africa having vast biological resources that are of strategic importance to the socio-economic growth, there is unsustainable and under-utilization of these resources due to limited investment into bioeconomy. African governments and, essentially, the policymakers continually face the challenge of lack of awareness, technical knowledge and guidance so that they make informed decisions in policy-making and identify contextually-relevant investment options in bioscience actions and innovations. As a result, Africa has consistently failed to exploit the bioscience opportunities that sustainably enhance agricultural productivity and link the local farmers to agro-processing and value-addition opportunities, as well as niche input-output markets. Africa is a continent with agriculture as its mainstay; the high population growth also increases the demand for high quality feeds, food and bio-based products, thereby signaling the necessity for the development of the bio-resources and diversified value-added bio-products, services and supportive policies and other legal frameworks.

In the context of the Bio4Africa agenda, the development of the bioresources and legal frameworks is impeded by multi-dimensional economic and institutional bottlenecks, including lack of scientific data to inform policy options and practices, limited exposure, awareness and the cultural barriers, climate change vagaries, unfavourable input-output markets, weak coordination among the institutions and actors, limited political will, limited technology and innovations leading to the sub-optimal productivity of the bio-based enterprises, as well as lack of the contextually-relevant enabling policies, legal and regulatory environment, among others [7;8].

As a result, Africa is also challenged by extreme poverty and declining food

production levels that coincide with increasing food demand from the growing population estimated at 1.4 billion and is projected to hit 4.4 billion by the year 2100 [9]. Other development challenges, primarily the low foreign exchange earnings; low levels of local agro-industrialization; increased unemployment; bio-resources depletion; loss of biodiversity; high post-harvest losses; over-dependence on imported bio-products; conflicts over the use of bio-resources; environmental degradation; and increased pest and disease burden for agriculture and humans [10;11].

In light of the above, the core thrust of this policy brief is to ascertain whether the provision of policy options shall create an enabling environment for developing a vibrant knowledge-based bio-economy in Africa, with the potential to reverse recurrent market failures and transforming bio-resources that require well-coordinated and sustained public and private investments. This policy question that arises from overlapping and competing claims are whether advancing the knowledge-based bioeconomy technologies and innovations is cognizant of foremost cross-cutting issues for sustainable development agenda, mainly climate change, gender and environment, and how best the development issues are incorporated into the policy and bioeconomy implementation.

3.3 Rationale and objectives

Case studies from developed nations such as USA, Denmark and Sweden show that a new knowledge-based bioeconomy backed by supportive policies and enabling frameworks is central in commercializing technologies and innovations in biosciences (12;13). African states need robust and holistic bioeconomy policies that are focused on translating novel products and services from research and innovations into commercial enterprises, with a greater engagement of the key stakeholders, public institutions and the private sector. The failure to appreciate centrality of bioscience and knowledge bioeconomy in the economic transformation of rural African communities, as evidenced by the fragmented regulatory frameworks coupled with weak collaboration and capacity among institutions and stakeholders, provides a compelling case for urgent policy interventions.

The main goal of this policy brief is to identify the institutional bottlenecks and provide key insight and guidance that inform regulatory frameworks for the use and optimization production of biological resources, their bio-based products and services for bioeconomy and sustainable development.

This policy brief, therefore, provides key insights and guidance to inform policy and provide a paradigm shift from traditional policy development

mechanisms to knowledge-based policies and economy fuelled by research and innovations. It informs policy and mechanisms for creating an enabling environment for optimizing the productivity of national biological resources, promoting research and innovations; strengthening the institutional and stakeholder coordination and capacities, leveraging products and services; and awareness creation.

3.4 Policy context and alignment

In the context of the Bio4Africa project, the development of the knowledge-based bioeconomy policies should provide a legal framework for addressing the United Nations Development Agenda for 2030, thus UN Sustainable Development Goals (SDGs), mainly the poverty alleviation (SDG 1), improved food security and nutrition (SDGs 2 & 3), inclusive and sustainable economic growth (SDG 8), affordable energy for all (SDG 11), combatting climate change and its impacts (SDG 13), and the functional ecosystems, environment and maintain biodiversity (SDG 15).

The knowledge-based bioeconomy policies should further address Africa's Development Agenda for 2063, which is also underpinned by the Science and Technology Strategy for Africa (STISA) 2024, and the key priorities on the eradication of hunger and ensuring food and nutritional security (priority 1), development of infrastructures (priority 3), environmental protection and climate change (priority 4), and wealth creation (priority 6).

The development of knowledge-based bioeconomy policies is, therefore, timely in ensuring that African countries optimize the productivity of their natural resources and take advantage of the enormous bioeconomy opportunities for accelerating agro-industrialization and green growth. Objectives of the knowledge-based bioeconomy (KBB) policies should reflect a nationwide consensus that must be generated through all-inclusive and highly interactive consultations and policy dialogues with stakeholder clusters, including the Government Ministries, Departments and Agencies (MDAs); academia and research institutes; donor community, investors and venture capitalists; private actors; non-governmental organizations (NGOs), the civil society organizations (CSOs), and farmer groups and associations; private actors and individuals along the different nodes of the bioeconomy value chain.

4. POLICY OPTIONS AND STRATEGIC ACTION AREAS

Policy option 1: Development and implementation of gender-responsive, inclusive and contextually relevant laws, bylaws and related regulations to support optimal production, use and sustainable management of national biological resources.

Strategic action areas 1: African governments should:

(i) Profile existing national biological resources and develop up-to-date inventories to inform decision-making in policy, utilization and management of the resources. In addition, the governments should also review and harmonize the existing institutional regulatory framework (thus, inter-agency policies, laws and regulations) for the coordinated use and management of natural resources.

(ii) Develop a knowledge-based Bioscience Research and Development Act to advance technological innovations and accelerated investments into the knowledge-based bio-economy for in-country industrialization, green growth and import substitution. This new intervention will further inform and guide investment decisions and strengthen regulatory mechanisms to support commercial production and marketing of bio-based products and services.

(iii) Develop and implement contextually-relevant laws and regulations for public institutions and the private sector that foster coordinated use and management of biological resources, as well as equitable access, benefit sharing, intellectual property, bio-security, and bio-ethics between the stakeholder and their institutions.

(iv) Create national policy and incentives (e.g., tax holidays) to attract investments and commercialization of the bio-based industries such as processing and food industries, papers, wood industries, cottage industries, bioenergy, biorefinery, eco-tourism, textiles, bioplastics, etc.

(v) Develop and implement national laws and policies that foster consumption of locally-produced bio-products and services (e.g., tax waivers to domestic producers, import higher taxes on imports that compete with domestic products, etc.).

(vi) Create independent government ministries, departments, and agencies (MDAs); for the Science, Technology and Innovations (STI) as lead institutions for coordinated use and management of biological resources, promotion of investment into knowledge-based bioeconomy and development of biosciences.

Policy option 2: Increase both private and public investments in applied bioscience research, innovation and industry.

Strategic action areas 2: African governments should:

a) Establish essential bioscience reference infrastructures and facilities such as laboratories, ICT and experimental facilities for quality assurance, diagnostics, training and research at public universities and research institutions; to enhance biosciences research and development.

b) Develop and promote mechanisms for the conservation of biological resources.

c) Establish bioscience technology and innovation research funds to increase the flow of funds and investment into multidisciplinary bioscience research and innovation programs and initiatives.

d) Create more favourable taxation regimes for informal bio-innovators and also provide tax holidays, incentives and subsidies to private sector institutions and multinational agencies; who are engaged in the commercialization of bioscience technologies, innovations and bio-products.

e) Explore and promote the region and international markets for locally-produced bio-based products and services.

Policy option 3: Building and strengthening the capacity of key institutions and stakeholders along the different nodes of the bioeconomy value chains.

Strategic action areas 3: African governments should:

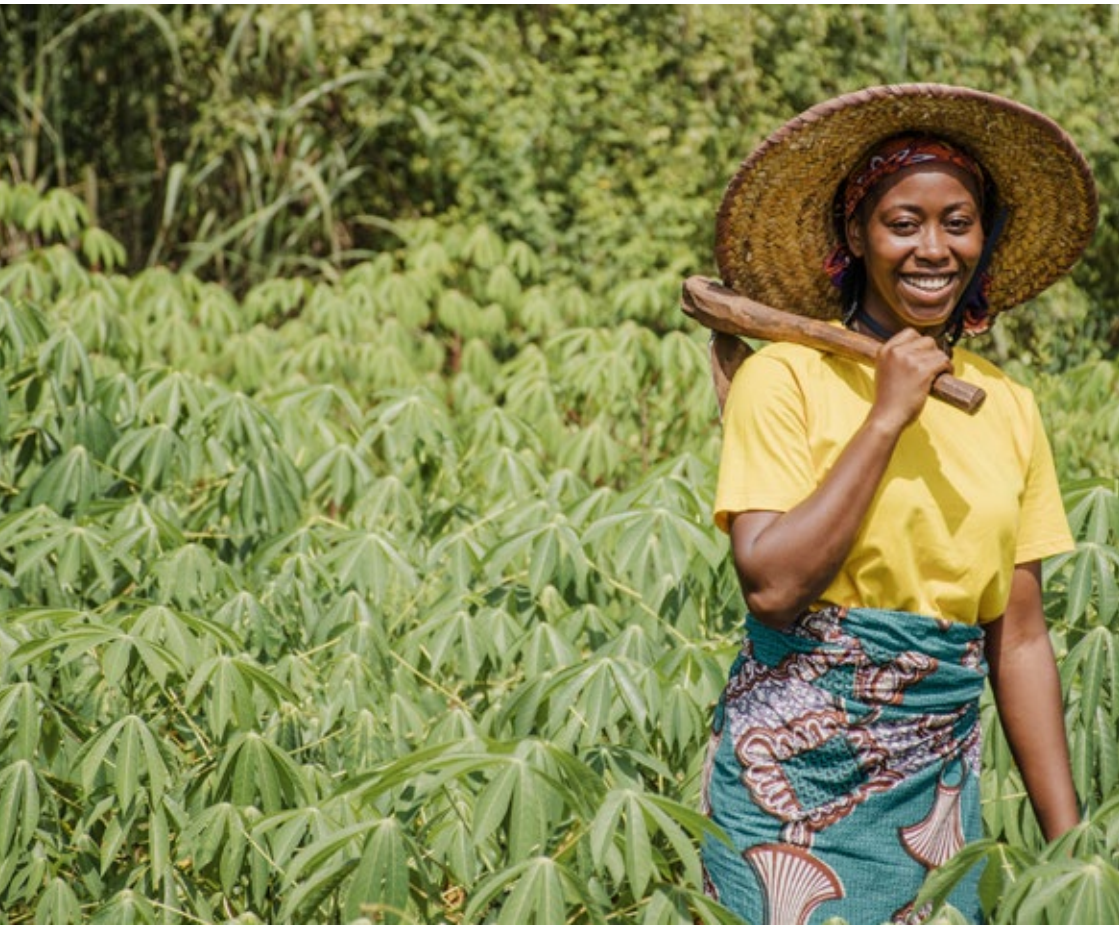
i) Create a functional national multi-stakeholder platform (MSP) for biosciences and bioeconomy.

ii) Employ the functional national MSP as the suitable structure to coordinate private institutions, government ministries, departments and agencies (MDAs) and other actors to facilitate effective utilization and management of biological resources and implementation of bioeconomy programs. The MSPs should be the national apex entity mandated to harmonize and strengthen linkages among institutions and stakeholders at the different nodes of the bioeconomy value chain.

iii) Support tailored training initiatives and capacity-building programs at public and private universities and research institutions that promote biosciences and bioeconomy, including organizing the national Annual Biosciences and Bioeconomy conferences, mainstreaming and efficient use and management of biological resources.

iv) Develop bioscience curricula and training programs for public institutions (universities and research institutes) to train the next generation of African scientists with the knowledge/skills that meet the technical requirements of the bioscience research and bioeconomy workforce. In addition, governments should also support international exchange programs for staff and students; at government ministries, departments and agencies (MDAs) for hands-on training and experiential learning in developed nations (e.g., USA, Denmark and Sweden), with more advanced knowledge-based bioeconomy.

v) Identify, profile and support leading bioscience research and bioeconomy projects; so that they are fast-tracked, piloted and commercialized to attract major private sector investment into the knowledge-based bioeconomy (KBB). Governments should create domestic processing and producer agro-industries (e.g., food factories and cottage industries), essentially in the rural communities where the biological resources are largely produced, to create green jobs and boost productivity.



5. CROSS-CUTTING ISSUES

5.1 Environment and climate change

Climate change vagaries, mainly drought and erratic rainfalls, present a major threat bioeconomy in Africa because they compromise the productivity of primary biological resources, including fisheries, forestry, tourism, agriculture and energy sectors. Climate change requires international commitment and drastic mitigation and adaptation measures to reduce the vulnerability of key sectors of the bioeconomy and increase the resilience of communities and agroecosystems. African countries are party to most international treaties, conventions and frameworks for sustainable development and climate change management, including the sustainable development goals (SDG) [14], Paris Agreement or Paris Climate Accord [15], and Kyoto protocol under the United Nations Framework for Climate Change [16].

In response, this policy brief recognizes that climate change affects productivity, utilization and sustainable management of biological resources for the bioeconomy and green growth. Therefore, future policies and legal and regulatory frameworks should promote novel climate-smart production systems and eco-friendly green bio-based technologies and innovations and coordinate institutionalized initiatives to rally efforts that are towards climate change mitigation and adaptation. The policymakers and actors should be cognizant of the fact that misuse and indiscriminate exploitation of biological resources enhance greenhouse gas (GHG) sources and also amplify air pollution.

Therefore, the national bioeconomy policies should create a favourable environment for public institutions and the private sector to advocate and commercialize novel bio-technologies, innovations, bioscience products and services that also exploit sustainable ways of using and managing biological resources whilst enhancing the capacity of ecosystems as a GHG sink, climate regulation and ecological balance. To implement this policy brief, the policymakers and stakeholders should engage and work closely with both state and non-state actors; along the different nodes of the bioeconomy value chain during the formulation of the new policies or upgrading/updating existing ones. Therefore, future bioeconomy policies should align with the climate change and environmental management tenets at the global, regional and national levels.

5.2 Gender inclusivity and equity

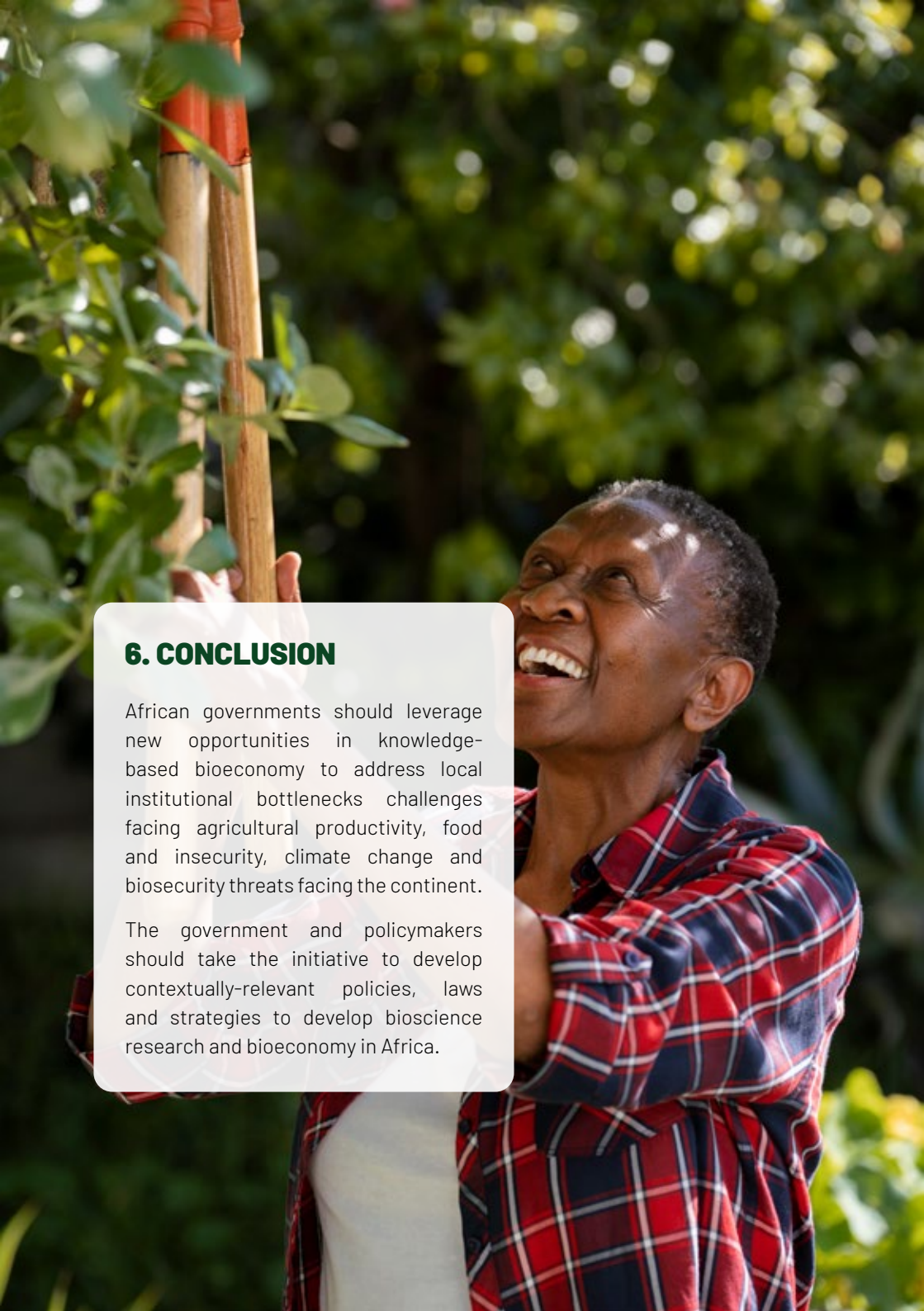
In the context of the Bio4Africa project, AFAAS recognizes the different gender dimensions based on variations in ethnicity, race, religion,

culture, traditions and socio-economic status of communities in Africa. This policy brief further recognizes the exceptional gender relations and needs in applied bioscience research, use and management of biological resources, and generally in the bioeconomy space.

This policy brief also recognizes the difference in both in types and quantities of the key biological resources and their spatial distinctiveness between countries, regions and communities. Therefore, governments should develop contextually-relevant bioeconomy policies that optimize production and productivity of biological resources and will support the commercialization and sustainable utilization of novel bio-products and services that are tailored to the bio-resources potential of the specific countries, regions and communities.

AFAAS recommends that the applied bioscience research and bioeconomy should be gender neutral to the extent that all gender categories, namely the men, women, youths, elderly, marginalized and ethnic minorities, and also equally engage in commercial production and manage business enterprises that leverage the biological resources and novel bio-products.

For gender inclusivity and equity, African governments should further profile, identify and empower special interest groups, such as women and youth groups and build their capacity in the production and sustainable use of the bio-products and services from the bioscience research and knowledge-based bioeconomy. Therefore, future national bioeconomy policies should put in place legally regulatory frameworks that promote training, capacity building, and development of pre-requisite resources, infrastructures and market facilities for equitable participation of the special interest groups and other gender categories in bioeconomy.



6. CONCLUSION

African governments should leverage new opportunities in knowledge-based bioeconomy to address local institutional bottlenecks challenges facing agricultural productivity, food and insecurity, climate change and biosecurity threats facing the continent.

The government and policymakers should take the initiative to develop contextually-relevant policies, laws and strategies to develop bioscience research and bioeconomy in Africa.

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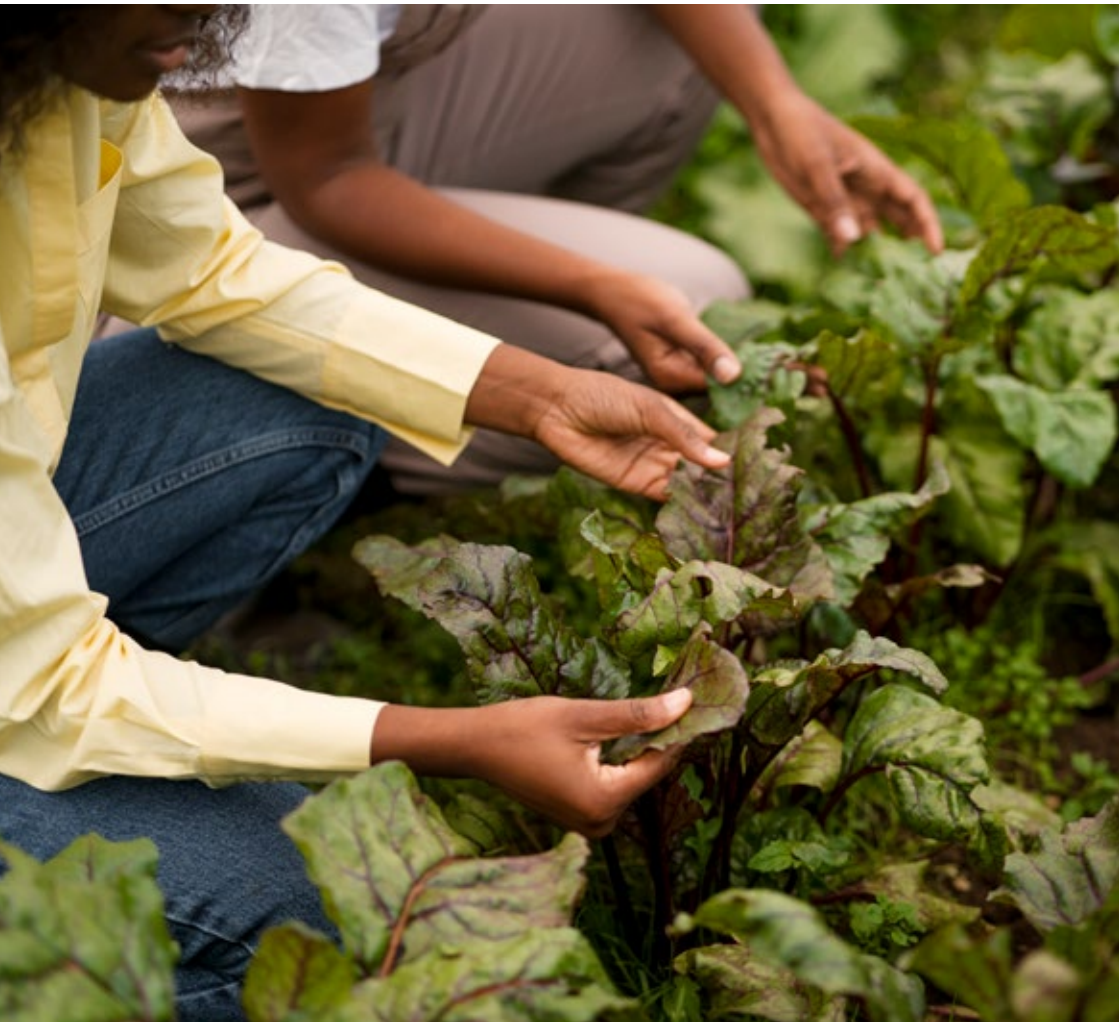
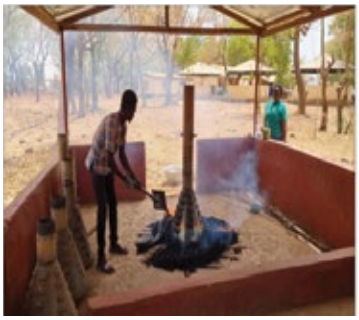


Bio-based technologies and products: Bio4Africa project

i) Pyrolysis for production of biochar as soil amendment product



ii) Pyrolysis for production of biochar as a biofuel product





Hydrothermal Carbonization Technology (HTC)

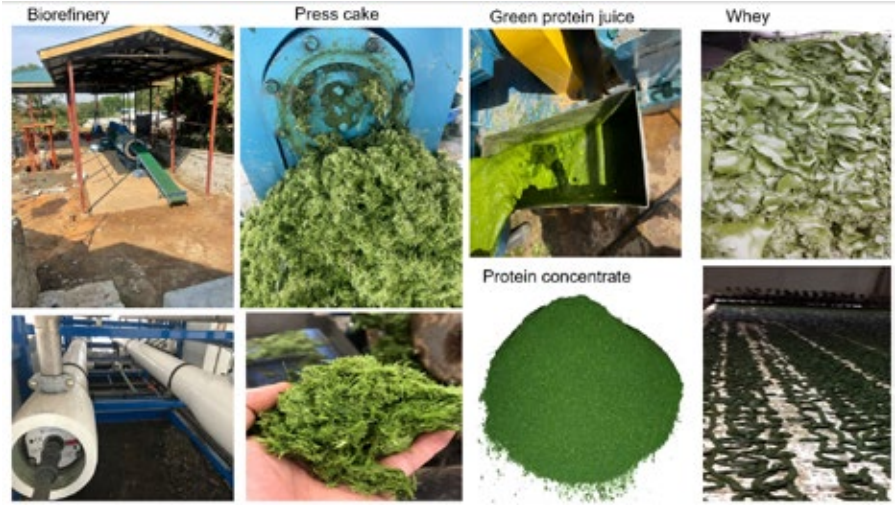
High-quality Biochar Briquettes

Briquetting line

Biomass mixing

iii) Pyrolysis for production of Biochar as a medium for water filtration & biogas yield


iv) Green Biorefinery for production of animal feeds & protein fish feed supplements



This policy brief was produced one of the AFAAS Knowledge Products emanating from Bio4Africa project ***(Task 5.2: Co-design of inclusive and sustainable business models with farmers and rural communities).***

The project: 'Diversifying revenue in rural Africa through circular, sustainable and replicable biobased solutions and business models (Acronym: Bio4Africa)' is an EU-funded Bioeconomy development project in Africa.

The Bio4Africa project delivers contextually-relevant bioeconomy solutions to increase the incomes, food and nutritional security of rural farmers whilst propelling bioeconomy in Africa.

For more information about the project, visit website: https://www.bio4africa.eu or https://www.bio4africa.eu/about-bio4africa/

The African Forum for Agricultural Advisory Services (AFAAS)
Secretariate & Executive Director
P.O. Box 34624 Kampala, Uganda
Telephone: +256-312313400.
Email: secretariat@afaas-africa.org
Website: www.afaas-africa.org/