

HORIZON EUROPE NIGERIA FOCAL AREAS

GREEN TRANSITION:

CLUSTER 6 - Green Transition: Food, Bioeconomy, Natural Resources, Agriculture and Environment – a brief outline.

Introduction

The Horizon Europe mandate for Cluster 6 is to provide opportunities to enhance and balance environmental, social and economic goals and to set human economic activities on a path towards sustainability. The underlying paradigm of Cluster 6 is therefore the need for a transformative change of the EU economy and society in order to reduce environmental degradation, halt and reverse the decline of biodiversity and better manage natural resources while meeting the EU's climate objectives and ensuring food and nutrition security and accelerate the transition to a low carbon, resource efficient circular economy and sustainable bioeconomy including forestry. Research and innovation activities under this cluster will contribute to the objectives of the European Green Deal related to biodiversity strategy 2030, the Farm to Fork strategy, the European Climate Pact and initiatives under sustainable industry and eliminating pollution as well as the long- term vision for rural areas and the Sustainable Development Goals.

Cluster 6 activities will sustain the EU's ambition in international fora in areas of paramount importance such as biodiversity, climate change, the management of natural resources, seas and ocean, zero pollution, sustainable agriculture, food safety and food and nutrition security. It will deliver on six expected impacts:

1. Climate neutrality is achieved,
2. Biodiversity is back on the path to recovery,
3. Sustainable and circular management and use of natural resources, prevention and removal of pollution are mainstreamed,
4. Food and nutrition security for all (within planetary boundaries),
5. Sustainable and inclusive development of rural and coastal areas,
6. Innovative government models enabling sustainability and resilience.

In line with the EU's Global Approach to Research and Innovation, and as for work programme 2021-2022, this one will remain almost completely open to the participation of non-associated Third countries to all topics.

The various destinations under this cluster are:

1. Biodiversity and ecosystem services.
2. Destination – Fair, healthy and environment-friendly food systems from primary production to consumption.
3. Circular economy and Bioeconomy sectors
4. Environment and zero pollution.
5. Destination – Land, ocean and water for climate action

Destination 1 - Biodiversity and ecosystem services

Biodiversity is on the path to recovery by 2030, in this cluster. It aims to achieve agricultural production that fosters both climate change mitigation and adaptation and biodiversity preservation and enhancement. Avoiding loss of biodiversity (from genes to species and ecosystems) is fundamental to achieving the European Green Deal objectives. It also has the potential to avoid threats to human health in the future. This destination will improve knowledge on the causes of biodiversity decline, the role of ecosystems and their services are preserved and sustainably restored on land, inland water and at sea. Biodiversity plays a crucial role in human nutrition through its influence on world food production, as it ensures the sustainable productivity of soils and provides genetic resources for all crops, livestock, and marine species harvested for food. It is applied in ecology in the restoration of species and ecosystems, phyto- and microbial remediation of polluted soils and water, making cleaner more efficient and recyclable environmental works at molecular and cellular levels. Agroforestry can enhance environmental benefits through reduction in nutrient losses from agricultural land, increasing carbon sequestration, enhancing biodiversity and reducing soil losses.

Part of the expected outcome also, is to develop and improve practices in agriculture, forestry, fisheries, aquaculture to support and make sustainable the use of biodiversity and a wide range of ecosystem services.

Calls for this destination include:

- 1 Better understanding of routes of exposure and toxicological and ecological impacts of chemical of chemical pollution on biodiversity.
- 2 Nature protection: better methods to and knowledge to improve the conservation status of EU – protected species.
- 3 Restoration of deep-sea habitats
- 4 Addressing biodiversity decline and promoting Nature-based solutions in higher education
- 5 Biodiversity loss and enhancing ecosystem services in urban and peri- urban areas.
- 6 Crop wild relatives for sustainable agriculture.
- 7 Biodiversity friendly practices in agriculture- breeding for Integrated Pest Management (IPM)
- 8 Integrative forest management for multiple ecosystem services and enhanced biodiversity
- 9 Valorisation of ecosystem services provided by legume crops.
- 10 Interlinkages between biodiversity loss and degradation of ecosystems and emergence of zoonotic diseases.
- 11 Invasive alien species.
- 12 Digital for nature.
- 13 Promoting pollinator friendly farming systems
- 14 Conservation and protection of carbon rich and biodiversity rich forest ecosystems
- 15 Selective breeding programme for organic aquaculture
- 16 Demonstrating Nature-based solutions for the sustainable management of water resources in a changing climate, with special attention to reducing the impacts of extreme drought
- 17 Promoting minor crops in farming systems.

Destination 2 – Fair, healthy and environment-friendly food systems from primary production to consumption

Global food systems are facing sustainability challenges, from primary production to consumption which could jeopardize food and nutrition security. The Farm to Fork strategy, and its follow up initiatives aim to address these challenges to more resilient and environmentally, socially and economically sustainable food systems on land and at sea. The destination should set out credible pathways to fair, healthy, safe, climate- and environment – friendly, resilient food systems from primary production to consumption, ensuring food and nutrition security for all within planetary boundaries in the Eu and globally. The R&I will accelerate the transition to sustainable, healthy and inclusive food systems by eradicating micronutrient deficiency, assessing innovative and novel foods on alternative sources of protein, preventing and reducing food loss etc. the destination includes the following topics:

- Sustainable farming
- Sustainable fisheries and aquaculture
- Transforming food systems for health, sustainability, and inclusion
- Global transition to sustainable food systems

Calls for this destination include:

1. European partnership on accelerating farming systems transition- agroecology living labs and research infrastructures.
2. European partnership on animal health and welfare.
3. Improving yields in organic cropping systems.
4. European partnership on sustainable food systems for people, planet and climate.
5. Providing marketing solutions to prevent and reduce the food waste related to marketing standards.
6. Microbiomes fighting food waste through applicable solutions in food processing, packaging and shelf life.
7. Innovations in plant protection: alternatives to reduce the use of pesticides focusing on candidates for substitution.
8. Eradicate micronutrient deficiencies.
9. Food safety.
10. Climate change and food safety: effects of climate change on food safety across food systems.
11. EU-African Union cooperation on Agroforestry management for climate change adaptation and mitigation.
12. Increasing the availability and use of non-contentious inputs in organic farming.
13. Tackling outbreaks of plant pests.
14. Sustainable organic food innovation labs: reinforcing the entire value chain.
15. Tackling outbreak of plant pests.
16. Animal nutritional requirements and nutritional value of feed under different production management conditions.
17. Minimizing climate impact on aquaculture: mitigation and adaptation solutions for future climate regimes.
18. Development of innovative food and feed through biotechnology
19. New detection methods on products derived from new genomic techniques for traceability, transparency and innovation in the food system.

Destination – 3 Circular economy and Bioeconomy sectors

This destination targets climate neutrality, zero pollution, Circular and bioeconomy transitions. It covers product value chains, such as textiles, electronics, chemicals, packaging, plastics and construction. It also covers key bioeconomy sectors such as sustainable bio-based systems, sustainable forestry, small scale rural bio-based solutions, environmental services and aquatic value chains. The EU Forest strategy for 2030 research and innovation will be key drivers in achieving the ambitious goals of this strategy.

Bio-based systems is an emerging sector of bioeconomy that is expected to grow rapidly. Bio-based products and processes means switching to using biological resources and biological processing methods in a sustainable way. It would help Europe and Africa reduce dependency on oil, coal and gas and it would help meet its environmental, societal, industrial and climate policy target for 2050. It would accelerate the transition to a green and circular economy.

One of the key aims is to develop new biorefining technologies to sustainably transform renewable natural resources into bio-based products and materials.

Biotechnology is revolutionizing industrial and agricultural practices by improving quantity and quality of products. In the agriculture and agribusiness sector, biotechnology applications play a role in increasing productivity to value addition and product diversification of agriculture produce, while reducing their environmental impact. In the manufacturing sector biotechnology is used to produce a wide range of bulk and fine chemicals; and the biotechnology derived cold water enzymes. An important aspect of biotechnology in the agribusiness sector is the production of biological products for plant growth including biopesticides, biofertilizers and bio stimulants. It also improves postharvest processing thereby optimizing the bioeconomy sector. In the forestry sector biotechnology proposes solutions to reduce lignin content of trees or crops reducing the highly polluting processing of the wood in the paper or biofuel industry.

The production of plastics and fuels from biomass has become established.

The bioeconomy involves the production of renewable biological resources and the conversion of these resources and waste streams into value added products such as food, feed, bio-based products and bioenergy. The modern bioeconomy has its roots in providing both food and non-food products from managed agricultural, aquaculture and forestry ecosystems. Farm production of wood, including timber is increasing and is making significant contributions to improving rural livelihoods through income generation. Based as it is on continuously renewable resources, it provides an ideal platform from which to tackle 21st century challenges.

This destination includes the following topics:

- Circularity including local and regional focus.
- Bio- based innovation
- Multifunctional and sustainable management of European forests
- Aquatic biological resources and blue biotechnology

Calls for this destination include:

1. Innovating for sustainable bio-based systems, biotechnology and the bioeconomy.
2. Land –based bioprospecting and production of bioactive compounds and functional materials for multiple bio-based value chains.
3. Broadening the spectrum of robust enzymes and microbial hosts in industrial biotechnology.
4. Eco- friendly consumer products – low toxicity/zero pollution construction bio-based materials.
5. land use and forest management, including urban planning, SMART cities and Forest accounting and inventory.
6. Optimizing the sustainable production of wood and non- wood products in small forests properties and development of new forest-based value chains.
7. Novel, sustainable and circular bio-based textiles.
8. Demonstrating Nature- Based solutions for the sustainable management of water resources in a changing climate, with special attention to reducing the impacts of extreme drought.
9. Integrative forest management for multiple ecosystem services and enhanced biodiversity.
10. Valorization of ecosystem services provided by legume crops.
11. Conservation and protection of carbon- rich and biodiversity- rich forest ecosystem
12. Bio-based solutions for humanitarian applications.
13. Optimizing the sustainable production of wood and non- wood products in small forest properties and development of new forest - based value chains.
14. Digital information systems for bio-based products.
15. Circular solutions for textile value chains through innovating, sorting, recycling and design for recycling.
16. Increasing the circularity in plastics value chain.
17. Increasing the circularity in electronics value chains
18. New circular solutions and decentralized approaches for water and wastewater management.
19. Circular design for bio-based processes and products.
20. From silos to diversity – small scale bio-based demonstration pilots.
21. Land- based bioprospecting and production of bioactive compounds and functional materials for multiple bio-based value chains.
22. Broadening the spectrum of robust enzymes and microbial hosts in industrial biotechnology.

Destination 4 – Clean Environment and Zero pollution

Anthropogenic pollution undermines the integrity of Earth’s ecosystem and severely affects natural resources essential for human life. This destination seeks to halt and prevent pollution by focusing on removing the pollution of fresh and marine waters, soils, air, including from nitrogen and phosphorus emissions, on substituting harmful chemicals, on improving the environmental sustainability and circularity of bio-based systems as well as on reducing environmental impacts and pollution from food systems. Actions will include showcasing best practices to recover nutrients from secondary raw materials to produce alternative fertilizers and demonstrating pathways for regions to keep their N/P flows within ecological

boundaries. This also includes the prevention and reduction of plastic pollution stemming from plastic food.

Proposals for topics under this destination should set out a credible pathway contributing to halting and eliminating pollution to guarantee clean and healthy soils, air, fresh and marine water for all and ensure a sustainable and circular management and use of natural resources.

To reach this objective, it will be paramount to advance the knowledge of pollution sources and pathways to enable preventive measures, improve sustainability and circularity, apply planetary boundaries in practice and introduce effective remediation methods.

This destination includes the following topics:

- Halting emissions of pollutants to soils and water.
- Protecting drinking water and managing urban water pollution
- Addressing pollution on seas and ocean
- Increasing environmental performances and sustainability processes and product

Calls under this destination include:

1. Knowledge and innovative solutions in agriculture for water availability and quality.
2. Integrated assessment and monitoring of emerging pollutants
3. Environmental sustainability and circularity criteria for industrial bio-based systems
4. Industrial biotechnology approaches for improved sustainability and output of industrial bio-based processes.
5. Biosensors and user –friendly diagnostic tools for environmental services.
6. Strategies to prevent and reduce plastic packaging pollution from the food system.
7. Clean environment and zero pollution.
8. Enhancing coastal protection as well as flood and coastal erosion risk management.
9. Green hydrogen towards near zero Emissions.
10. Developing climate policy including advice on climate strategies and action plans and support for modelling greenhouse gas emissions.
11. Developing nature-based solutions to address heat decarbonisation of electricity systems, including the design of renewable-energy –friendly markets and regulatory frameworks.
12. Enhancing energy efficiency investment.

Destination 5 – Land, ocean and water for climate action

Research in this destination will deliver greater understanding of who or what is exposed and sensitive to certain impacts of climate change. Particularly changing land and marine environments, natural resources, agriculture and food systems. New mitigation options and adaptation pathways will be identified.

This destination includes the following topics:

- Better understanding and enhancing the mitigation potential of ecosystems and sectors based on the sustainable management of natural resources,
- Advanced understanding and science to support adaptation and resilience of natural and managed ecosystems, water and soil systems and economic sectors,
- Efficient monitoring, assessment and projections related to climate change impacts, mitigation and adaptation potential in order to bring out solutions,
- Fostered climate change mitigation in the primary sector, including by the reduction of GHG emissions, maintenance of natural carbon sinks and enhancement of sequestration and storage of carbon in ecosystems,
- Improved adaptive capacity of water and soil systems and sectors including by unlocking the potential of nature-based solutions,
- Better managed scarce resources, in particular soils and water, thus mitigating climate related risks, in particular desertification and erosion, thanks to informed decision-makers and stakeholders and integration of adaptation measures in relevant EU policies.

Calls for this destination include:

1. Improve the reliability and effectiveness of alternative water resources supply systems and technologies.
2. Pilot network of climate-positive organic farms.
3. Enhancing the sustainable production of renewable energy at farm-level.
4. Improving irrigation practices and technologies in agriculture.