Horizon Europe
Cluster 6 'Food, Bioeconomy, Natural Resources, Agriculture and Environment'

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This document contains the first draft orientations for the 2025 Work Programme (WP) of Cluster 6 'Food, Bioeconomy, Natural Resources, Agriculture and Environment', for the purpose of starting the co-creation process both inside Commission services and with the delegates of the configuration 'Food, Bioeconomy, Natural Resources, Agriculture and Environment' of Horizon Europe Programme Committee.

These orientations are neither conclusive nor exhaustive. Thus, the expected outcomes included in this document will be subject to further prioritisation, while new expected outcomes may still take priority during the preparation of the 2025 WP. The objective at this stage is to focus from a general perspective on how to start implementing the Strategic Plan 2025-2027, taking into account the evolution of the context including the new Green Deal initiatives.

At least 35% of Horizon Europe resources are committed to be used on climate action and 10% on biodiversity in the period 2025 to 2027. Cluster 6 is expected to be a significant contributor to achieve both targets with the next Work Programmes.

In order to maximize the impact of R&I activities and speed up innovation, the multi-actor approach will be adopted, where appropriate, in the relevant topics of the work programme of this cluster.

In all topics under this cluster, where relevant, advantage will be taken of the use of advanced digital technologies, such as artificial intelligence, to accelerate and maximise the impact of policies dealing with climate change and environment protection, as stated in the European Green Deal.

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Destination: Biodiversity and ecosystem services

Draft expected impacts

Strategic Plan 2025-2027 – Expected Impact 28: Putting biodiversity on a path to recovery, and protecting and restoring ecosystems and their services.

Proposals for topics under this destination should set out a credible pathway contributing to "**putting biodiversity on a path to recovery, and protecting and restoring ecosystems and their services**", and more specifically to one or more of the following impacts:

- Improved knowledge, innovations, methods, and pathways are available to protect healthy ecosystems and to restore degraded ones, including in urban and densely populated areas, ensuring the provision of ecosystem services to society, including for adaptation and/or mitigation to climate change.
- The ongoing biodiversity crisis and of its consequences and the benefits of ecosystem services and the need to protect and restore them are better understood. Policy-makers and society are aware and well informed thereof, and fully grasp opportunities of biodiversity protection and restoration. Society is on a path of transformative change.
- Farmers, foresters, fishers and aquaculture producers rely on biodiversity-friendly practices while safeguarding long-term sustainability and food security.
- Progress towards reaching the goals and targets of the Global Biodiversity Framework contributes to reduce the pressure on biodiversity and to ensure sustainable development worldwide.

Main expected outcomes

To achieve the above-mentioned impacts, the following **expected outcomes** will be pursued:

- The taxonomic community (biodiversity identification from molecules to ecosystems, including genomes and e-dna) and its capacity to engage with and support policy-making are strengthened. Strategic approaches for a systematic reinforcement of taxonomic expertise in the EU are built.
- In situ biodiversity observations are scaled up and made available with a view to support applied research and innovation, policy development and implementation, business actions and applications, and other use cases across various sectors. Systematic biodiversity observation is established (including citizen science and environmental observations), covering also little-known taxonomic groups and going beyond what the current policy is covering.

- The establishment of species populations satisfactory levels (as required for certain species groups under the Nature Restoration Law and for reaching the species improvement target under the EU Biodiversity Strategy), favourable reference values and ecological needs of species, including quantity and quality of their habitats, are based on latest available knowledge, inter alia through appropriate modelling approaches. The links between habitats restoration and species conservation, including as regards connectivity, and competing needs of species are better understood.

- The management of resources and use of spatial and temporal measures to improve, and ultimately protect key areas for the maintenance of biodiversity and ecosystem services are improved.

- Additional activities under the European Biodiversity Partnership Biodiversa+ will continue to support excellent research on biodiversity with an impact for society and policy and will focus on the flagship programmes 2023-2027 according to the partnership's co-created strategic research and innovation agenda for seven years, which includes calls for research projects, biodiversity- and ecosystems monitoring and science-based policy advisory activities.

- Socio-economic impacts including estimated benefits of nature restoration are better known, including with improved modelling of trends and integrated scenarios for biodiversity, ecosystem services and good quality of life.

- Better knowledge and methodology are applied to identify and map areas needing restoration, to benefit habitats and species.

- Activities and initiatives that align with the non-deterioration principle are put into effect, along with methods to achieve satisfactory levels of intensity.

- Methods to restore and protect key marine and coastal ecosystems (e.g. coral reefs and associated ecosystems) are elaborated.

- Actors implementing the EU Nature Restoration Law benefit from updated knowledge.

- Practices in agriculture, forestry, fisheries, and aquaculture to support and make sustainable use of biodiversity and ecosystem functions are developed, tested and improved.

- Mixed production systems (crop-livestock, agroforestry and grasslands) are developed and fostered to enhance agrobiodiversity and the delivery of added ecosystem services.

- Access to a wider range of crops and breeds with a rich genetic base is encouraged, supporting biodiversity in agroecosystems and contributing to a low-input and resilient agriculture.

- Alternative governance and socio-economic models (including the benefits) that better integrate all values of biodiversity and nature (including economic) are built. These models will contribute to biodiversity protection and restoration, including as regards the non-deterioration principle, as well as innovative market instruments. This will include the development of business models and economic incentives based on nature restoration, including the economic valuation of resilience benefits and potential deployment of nature restoration certification and/or biodiversity credits.

- Transformative change is steered by better understanding the perception of the biodiversity crisis by civil society. Strategies, methods and tools to improve communication, increase people's awareness, stakeholder involvement and citizen engagement and to better value the economic, social and cultural benefits that nature protection, restoration and sustainable use bring are developed.

- Knowledge, knowledge management and innovative solutions to achieve global biodiversity commitments in Europe and beyond are improved. Europe's leadership to reach an ambitious global biodiversity agenda, including the support for the forthcoming Global Knowledge Support Service for Biodiversity and regional support centres, is consolidated.

- Benefits from urban forests and trees for human wellbeing and health are better understood.

- The assessment and monitoring of relationships between forest management types and biodiversity are improved.

Addressing main policy priorities

R&I under Destination "Biodiversity and ecosystem services" will mostly deliver under Key Strategic Orientation (KSO) 1 of Horizon Europe Strategic Plan 2025-2027: Green transition and to a lesser extent KSO 3: A more resilient, competitive, inclusive and democratic Europe.

Spending under this destination counts 100% against the target for biodiversity expenditure under HE. In addition, most of the activities, especially in the area of ecosystem restoration, contribute to the target for climate expenditure.

Under destination "Biodiversity and ecosystem services", Work Programme 2025 will support R&I to provide scientific support to the development and implementation of EU environmental legislation and of the EU Green Deal initiatives. This destination is based on the vision developed in the EU biodiversity strategy for 2030 and will support its implementation, pursuing

the orientations of the Work Programmes 2021-2022 and 2023-2024 and will notably focus on the upcoming EU Nature Restoration Law and other new EU Green Deal initiatives: the EU soil monitoring and resilience law, the EU forest monitoring law and the EU Taxonomy for Sustainable Activities (specifically the Environmental Delegated Act) and the EU action plan: protecting and restoring marine ecosystems for sustainable and resilient fisheries. R&I activities will also reflect the strong interconnections between the biodiversity strategy and the Farm to Fork strategy, including the pollinators initiative.

R&I on biodiversity and ecosystems services will contribute to a clean environment for the EU, including water, soil, air, health, climate adaptation and disaster risk reduction, sustainable bioeconomy and blue economy policies.

This destination will also contribute to the twin green and digital transition. Where relevant, advantage will be taken of the use of advanced digital technologies.

This destination will continue to support the EU leadership in the relevant international fora in line with the Commission priority 'A stronger Europe in the world' and will notably develop analysis and tools for the implementation of the Kunming-Montreal Global Biodiversity Framework. Its activities will serve the objectives of the intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) and of the International Panel for Ocean Sustainability (IPOS).

Addressing implementation issues

The WP 2025 will support additional activities of the European Biodiversity Partnership "Biodiversa+". Complementarity of actions with other instruments will be ensured.

Coordination will be ensured with:

- EU missions, in particular "Soil Deal for Europe", "Adaptation to Climate Change", "Restoring our ocean and waters by 2030", "Climate-neutral and smart cities", together with the Destination "New European Bauhaus".
- Other partnerships: Water4All, sustainable blue economy, Agroecology, sustainable food systems, Forests and Forestry for a Sustainable Future, agriculture of data.
- Cluster 5 (climate, energy and mobility).
- JRC activities, notably the EC Knowledge Centre for Biodiversity (KCBD) and its Science Service for Biodiversity (SSBD), the EU Soil Observatory and the EU Forest Observatory and the EC Knowledge Centre for Earth Observation, the European regional centre for biodiversity and the Global Knowledge Support Service for Biodiversity (GKSSB).
- International cooperation, in particular support to IPBES, implementation of the Kunming-Montreal Global Biodiversity Framework, the Sustainable Development Goals, the Paris Agreement and related international agreements such as BBNJ.

Under this destination there is a substantial need for more fundamental research and therefore it is expected that there will be a majority of RIAs.

R&I under this destination will seek to support policies and processes at EU and global levels, making use of advanced digital technologies and environmental/earth observations where appropriate.

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

Draft expected impacts

Strategic Plan 2025-2025 – Expected Impact 30: Ensuring healthy food and nutrition security by making agriculture, fisheries, aquaculture and food systems sustainable, resilient, inclusive and within planetary boundaries.

Topic proposals under this destination should set out credible paths to "**ensuring healthy food and nutrition security by making agriculture, fisheries, aquaculture and food systems sustainable, resilient, inclusive and within planetary boundaries**". More specifically, proposed topics should contribute to one or more of the following impacts:

- Farmers are enabled to manage sustainable, efficient, circular, low greenhouse gas-emitting, climate-neutral and climate-resilient farming systems that contribute to food and nutrition security with a one health approach by new knowledge and upscaling sustainable farming approaches at farm and landscape levels while making farming a professionally attractive and remunerative life choice.

- Sustainable farming practices contribute to ecosystems´ health, and their related ecosystem services, while minimising pollution, including groundwaters and the marine environment, and restoring and protecting biodiversity.

- Sustainable fisheries and aquaculture contribute to fair, healthy, climate-resilient and environment-friendly food systems, promote low-impact and diverse aquatic food production. Healthy aquatic ecosystems with thriving diversity of species and habitats provide ecosystem services and triggering growth and jobs' creation in coastal, and rural areas.

- Technological knowledge on the reduction of negative impacts of fishing is improved, in particular through the creation of innovative, more selective, energy-efficient and environmentally sustainable fishing techniques.

- The transition to overall sustainable, healthy and inclusive food systems is accelerated. Co-benefits for climate change mitigation and adaptation, environmental sustainability and circularity, sustainable healthy nutrition, malnutrition and hunger reduction are delivered. Citizens and communities are empowered, food businesses are able to flourish, while ensuring sustainability and food safety.

Main expected outcomes

To achieve the above-mentioned impacts, the following **expected outcomes** will be pursued:

- The European Partnership on ‘Accelerating farming systems transition: agroecology living labs and research infrastructures’ fosters the potential of agroecology for environmentally friendly agri-food systems, which are climate-neutral, inclusive, place-sensitive, productive and resilient. It will enable farmers and value chain actors to successfully apply agroecology principles thanks to a stronger R&I ecosystem for agroecology, increased knowledge on the benefits, challenges and potential of agroecology for farming, food and society, improved sharing of and access to knowledge, place-based innovations and improved governance and policies.

- The European Partnership on ‘Animal health and welfare’ equips farmers and other actors to protect animals against infectious diseases and improve animal welfare, while reducing the need for antimicrobials and enhancing food safety, quality and public health with a One health approach.

- Social and technological innovations in mitigation and adaptation to climate change are developed. Farmers are enabled with tools, innovations and practices to sustainably manage natural resources (e.g., soil, water, nutrients, biodiversity) and to improve circularity at farm and landscape levels in innovative, sustainable ways, including by boosting agroecology, organic farming, mixed farming and agroforestry.

- Sustainable, resilient, productive and healthy cropping systems are fostered through early detection, prevention and integrated approaches to tackle plant pests, including low-input practices and new technologies.

- Farmers have access to digital tools and are interconnected through the use of advanced digital and data technologies that support sustainable farming approaches.

- Aquaculture production is diversified based on new knowledge on species biology and pathology as well as on new production methods. Wild fish stocks within safe biological limits are maintained. At the same time, the integrity and functioning of marine ecosystems is safeguarded, while also relieving pressure on land resources.

- Production and harvesting of low-trophic edible aquatic species within limits is promoted in a way that allows biodiversity conservation and restoration in aquatic ecosystems, while literacy of consumers on the nutritional, environmental and health benefits of such aquatic food is fostered.

- Innovative technologies for more precise and efficient systems for monitoring, control and surveillance of fish stocks are developed, to ensure both the quality

and the good status of seafood products, but also that the stocks are in a healthy state and of accurately estimated quantity.

- The partnership for 'Sustainable food systems for people, planet and climate' is expected to start its activities in the first semester of 2024, building on the Food 2030 policy framework. Via this EU-wide targeted R&I partnership the transition towards healthy and low greenhouse gas-intensive diets that are safe and sustainably produced in resilient EU and global food systems will be accelerated. The partnership will help close knowledge gaps, and identify and deliver innovative solutions, including social innovation, which provide co-benefits for nutrition, climate, environment, circularity and communities. It will also leverage investments and align multiple actors towards common goals and targets, and also contribute to the further build-up of the European Research Area in support of sustainable food systems transformation at various scales.

- Food businesses and industries, including processing, wholesale, retail and food services are provided with opportunities and incentives to stimulate sustainable practices and production that are low greenhouse gas-emitting and relying more on the use of sustainable biomass and less on fossil fuels.

- Consumers/citizens and communities' behaviour/needs are better understood and equipped with capacity and tools that empower them and facilitate the shift to healthy, sustainable diets, enhanced also by social innovation, technology, behavioural change and marketing standards.

- Improved knowledge and innovative solutions are used to contribute to eradicating all forms of malnutrition for the prevention of non-communicable diseases and death by developing new healthy and sustainable food products, healthy diets for all citizens in particular for the vulnerable ones.

- The shift to sustainable and healthy diets is accelerated and innovative foods, macro and micronutrients including alternatives sources of proteins are explored.

- Food loss and waste are prevented and reduced through the development of alternative markets and better collaboration between countries inside and outside Europe, and improve resource efficiency along the food value chains, including making use of non-food sustainable value generating additional income while reducing un-used biomass streams and contributing to environmental and climate goals.

- The environmental footprint and pollution from the food value chains are reduced.

- The potential of the microbiome is further unlocked and used, for example to fight food waste, to reduce environmental pollution, and to develop alternative sources of proteins.
- Transparency and consumers trust is improved, for instance, through the use of new technologies, and provide the benefits of such new technologies including traceability through monitoring, control and surveillance.
- Knowledge between food system actors on food safety and food fraud is better shared and exchanged. The prediction, identification, assessment and management of existing and emerging food safety issues across food systems and their interconnectedness is enhanced, including the effects of climate change on food safety and implementing one health approaches.
- Innovative tools and approaches to improve resilience and sustainability of agriculture and food systems in Africa are developed.

Addressing main policy issues

R&I under destination 2 “Fair, healthy and environment-friendly food systems from primary production to consumption” will mostly deliver under Key Strategic Orientation (KSO) 1 of Horizon Europe Strategic Plan 2025-2027 “Green transition”, and to a lesser extent to KSO2 “Digital transition” and KSO 3 “A more resilient, competitive, inclusive, and democratic Europe”.

Food systems are to be understood as covering, 'from farm to fork', all the sectors, actors, stakeholders, organisations and disciplines relevant to and connecting natural resources, primary production from land and sea, food processing, food distribution and retailing, food services, food consumption, food safety, nutrition and public health, and food waste streams. Food system related policies cover an array of diverse areas. While those policy areas are connected, they cover specific sectors and actors along the food system that have distinct research and innovation needs to be addressed through this destination.

Sustainable, efficient, circular, low greenhouse gas-emitting, climate-neutral, climate-resilient farming systems provide economic, environmental, and social and health benefits, and are the main prerequisite for food and nutrition security and safety. For farmers, who are the backbone of food systems and the immediate managers of natural resources, the common agricultural policy (CAP) and the European Green Deal set ambitious targets and objectives with respect to the sustainability and safety of feed, food and non-food production. These targets and objectives are included in the core Green Deal policy initiatives, in particular the farm to fork strategy, the biodiversity strategy, the soil strategy, zero pollution efforts and climate action. R&I in line with the strategic approach to EU agricultural research and innovation will be key enablers for

achieving these ambitious targets and objectives. More specifically, they will contribute to the following policy priorities: nine specific objectives of the CAP; action plan on the development of organic production; food safety regulations; sustainable use of pesticides directive and regulations under the plant protection products framework; animal health and welfare legislations; regulation on feed additives; legislative and non-legislative initiatives to enhance cooperation of primary producers and support their position in the food chain; protein strategy; contingency plan for ensuring food supply and food security and communications on food security and fertilisers.

As mentioned in the Common Fisheries Policy Communication, published in February 2023, both fisheries and aquaculture contribute to securing a wide variety of food and provide employment in many coastal communities. On top, the goal of the farm to fork strategy is ensuring a neutral or positive environmental impact of all sectors involved in the food system, calling for an acceleration of the shift to sustainable fish and seafood production. The CFP of the future is a policy that enables and supports: (i) fisheries and aquaculture in synergy with nature; (ii) fishing vessels and aquaculture farms that operate with less impact and fewer resources; (iii) the contribution of seafood to safeguarding food security and reinforcing the resilience and sustainability of food systems in the EU; as well as (iv) fishers and aquaculture farmers who can find fulfilment, recognition and economic well-being in their profession. Additionally, Control Regulation clearly mentions that traceability is important not only for food safety purposes but also to allow control, ensure the protection of consumers' interests, combat IUU fishing and contribute to ensuring fair competition. R&I will also support the "strategic guidelines for a more sustainable and competitive EU aquaculture for the period 2021 to 2030", that propose specific actions including access to space and water, human and animal health, environmental performance, climate change, animal welfare, regulatory and administrative framework, and communicating on EU aquaculture.

Sustainable, healthy and inclusive food systems rely on systemic, cross-sectoral and participatory, multi-actor approaches and the integration between policy areas at all levels of governance. The European Green Deal flagship initiative – farm to fork strategy – supports a shift to more resilient and environmentally, socially and economically sustainable food systems, as required to deliver safe, healthy, low greenhouse gas-intensive, accessible and affordable food and diets for all, sourced from land and sea, while respecting planetary boundaries. An important driving force of food systems transformation should be the integration of sectors, actors and policies. This will involve a better understanding of the multiple interactions between the components of current food systems, to foster solutions that maximise co-benefits with respect to the four priorities of the food 2030 R&I initiative on 1) nutrition and health, including food safety; 2) climate and environmental sustainability; 3) circularity and resource efficiency; and 4) innovation and empowering communities. The farm to fork strategy and Food 2030 initiative put in focus all food system actors, especially the SMEs and consumers, and highlight their crucial role to play in improving food systems. Furthermore, this destination will help build ecosystems of innovation to bring together relevant private and public sectors, researchers and society. It will take advantage, where relevant, of advanced digital technologies. Sustainable, healthy and

inclusive food systems are an inherent part of a sustainable and circular bioeconomy in Europe, as defined in the EU bioeconomy strategy.

Implementation issues

To unlock the full potential of R&I and maximise impacts of the expected outcomes, multi-actor and socially innovative approaches (involving the engagement of researchers, policy makers, technology providers, primary producers, the food, drink and hospitality industry, retailers, local authorities, NGO and civil society, etc.), regional innovation ecosystems such as regional innovation valleys for bioeconomy and food systems and open innovation ecosystems, such as living labs, will be promoted with a view to co-creating innovative systemic place-based solutions in support of food system sustainability. Activities will benefit from the implementation of unifying approaches through R&I, including the One Health approach where relevant.

The Work Programme will place a greater emphasis than previous Work Programmes on innovation actions that will demonstrate and exploit knowledge created under previous Work Programmes with the objective to deliver impact on the farm to fork strategy objectives and targets that are to be achieved by 2030. Topics under this destination should be balanced in terms of high as well as low Technological Readiness Levels (TRLs).

R&I actions under this destination will seek also complementarities and synergies with the EU Missions 'A Soil Deal for Europe' and 'Restore our Ocean and Waters by 2030' as well as with the European partnerships on Agroecology, Animal Health and Welfare, Sustainable Food Systems for people, planet and climate as well as Agriculture of Data (forthcoming).

The EU will seek to increase the efforts on innovation actions for food systems sustainability in widening countries, reaching out to countries in Central and Eastern Europe, also in preparation for the next EU enlargement.

The EU will aim to promote a global transition to sustainable agri-food systems. Hence, targeted R&I activities in the WP25, in particular under the EU-Africa Partnership on Food and Nutrition Security and Sustainable Agriculture (FNSSA) and global initiatives involving international research consortia, will contribute to this ambition.

Coordination will be ensured with the JRC activities under the EC Knowledge Centre for Bioeconomy and the EC Knowledge Centre for Earth Observation.

To be more effective in achieving impact, the Work Programme will maximise synergies with relevant Union financial programmes and initiatives including the Knowledge and Innovation Communities (KICs) of the European Institute of Innovation and Technology (EIT), in particular EIT Food, and international cooperation programmes (e.g., DeSIRA).

Destination: Circular economy and bioeconomy sectors

Draft expected impacts

Strategic Plan 2025-2027 – Expected Impact 29: Achieving healthy soils and forests, as well as clean air, fresh and marine water, whilst ensuring water resilience and the transition to a clean, competitive and circular economy and sustainable bioeconomy.

Proposals for topics under this destination should set out a credible pathway contributing to "**achieving healthy soils and forests, as well as clean air, fresh and marine water, whilst ensuring water resilience and the transition to a clean, competitive and circular economy and sustainable bioeconomy**", and more specifically to one or more of the following impacts:

- Innovative circular and bio-based materials, products, processes and value chains are developed for the consumers and bio-based industry, to replace unsustainable alternatives and lead to new and more sustainable approaches for managing waste materials and by-products, aiming at pollution avoidance and remediation, and the promotion of industrial symbiosis. Emphasis on the product/materials/waste interface, resource efficiency and economic value chains, shifting towards sustainable alternatives.

- All economic operators implement practices that upgrade and upcycle waste, enhance secondary resource valorisation and the optimised use of bio-based resources for greater efficiency. Further support will be given to circular and zero-waste production systems with minimised land/sea use.

- Business and governance models, such as product-as-a-service systems and second-hand markets, are advanced and coupled with R&I efforts to foster safe and sustainable product design to help reach the Green Deal objectives of lower resource consumption and less environmental impact. This includes durability, reliability, reusability, reparability, recyclability, and circularity with a comprehensive approach addressing environmental impacts also at a territorial level, and involving civil society in fostering a circular economy.

- Innovative climate-neutral circular, bioeconomy and nature-based solutions foster social and technological innovation across sectors within planetary boundaries.

- Forests and the entire forest-based value chains enhance significantly their contribution to a climate-neutral economy and society, while ensuring that all ecosystems are restored, resilient, and adequately protected.

- The full potential marine and freshwater biological resources and blue biotechnology is leveraged to deliver societal benefits such as greener industrial products and processes, support public health or environmental conservation.

Main expected outcomes

To achieve the above-mentioned impacts, the following **expected outcomes** will be pursued:

- New value chains using upcycled or recycled resources, with minimal loss of value and material quality while increasing the uptake of recycled material are established.
- Industry and consumers benefit from new opportunities for more upcycling to new high-value products while increasing recycling rates for material streams of high economic and environmental relevance.
- The increase in resource efficiency along and across value chains through circular interventions and the related reduction in GHG emissions and other environmental pollution, are measured as well as the expected increase of carbon removals.
- New circular business practices, including the uptake of repair, reuse and remanufacturing but also practices that form part of the sharing economy, are developed, established and spread.
- Ecodesign elements and Extended Producer Responsability schemes are tested.
- The impact of the transition to circular economy for society, also with reference to Product Environmental Footprint methods and civil society-oriented actions, is analysed.
- Key circular economy stakeholders (citizens, businesses, investors) are engaged in circular, climate-neutral and resilient practices and the transfer of circularity knowledge between cities, regions and their partners is facilitated.
- Improved knowledge and innovative solutions lead to long-term viability, increased replicability and scalability of circular systemic solutions at territorial level.
- Innovative circular governance and business practices are established to increase resource valorization, support resilience, create job opportunities, and develop macro-economic models focusing on circular economy's labor market, skills, and social impacts.
- Innovative solutions are developed to tackle the decontamination of complex waste streams, with a specific focus on municipal solid waste while also developing technologies and systems to prevent waste through refurbishment, upgrade, repair, and re-use.

- Supporting tools (including digital solutions) are developed to facilitate the adoption of circular business practices, especially for businesses like SMEs, while also demonstrating advanced digital solutions (e.g., through AI, robotics, IoT, and blockchain) for waste management and recycling.
- The opportunities under the concept of Regional Innovation Valleys in bioeconomy are assessed and demonstrated.
- Standards, criteria and sustainability assessment methods of bio-based value chains are assessed, and the biomass provision for industrial bio-based value chains, is demonstrated, including from marginal lands.
- High value compounds are obtained by bioprospecting terrestrial ecosystems.
- Full potential of bio-based activities non-harmful to biodiversity and able to support nature restoration in conflict areas is assessed and seized.
- Cultivation of paludicrops is optimised for high value bio-based applications.
- Territorial planning is improved to guide sustainable bioeconomy development with a view to improve climate change mitigation and adaptation, biodiversity protection and the protection of fertile land.
- Farmers leverage the sustainability opportunities offered by the integration of cultivate (land-based) microalgae into the agricultural systems in a circular manner (use as biofertilizer, bio-materials, bioremediation).
- Life-cycles of bio-based products is measured and improved.
- The potential of IT/digitalization/AI is developed for the bio-based sector.
- Composting conditions/performances of composting plants are harmonized in EU.
- The EU Biotechnology and Biomanufacturing Initiative is supported.
- Knowledge about synthetic biology and its impacts on bio-based innovation is advanced and of bio-inspired materials and bio-based construction materials are developed.
- The discovery pipeline of marine natural products which find applications such as industrial products (biocatalysts) and public health (pharma, bioinspired materials) is broadened with optimised environmental footprint.
- A forest research facility for the support of Ukraine/EU candidate countries is established.

- The partnership Forests and Forestry for a Sustainable Future equips forests managers and other key actors with the necessary knowledge and skills to choose the most appropriate management strategies for a successful green transition towards a sustainable and circular bioeconomy.

Addressing main policy issues

R&I under Destination "Circular economy and bioeconomy sectors" will mainly deliver on Key Strategic Orientation (KSO) 1: Green transition and, to a lesser extent, on KSO 2: Digital Transition and KSO 3: A more resilient, competitive, inclusive and democratic Europe.

The Destination supports the European Green Deal, and a wide range of EU initiatives such as the circular economy action plan, the New European Bauhaus, the EU bioeconomy strategy, the forest Strategy for 2030, the Common Agriculture Policy. The bioeconomy strategy strives at sustainability in all three dimensions: environmental (management of land/water and biological resources within ecologic boundaries), economic (sustainable value chains and consumption, competitiveness) and social (social fairness and just and inclusive transition[1]) to deliver i.e. food, materials, and energy.

In addition, it contributes to the industrial strategy, the chemicals strategy for sustainability, the SME strategy, the communication on safe and sustainable by design framework, the sustainable blue economy and its offshoot initiatives, the EU biodiversity strategy for 2030 and the upcoming Nature Restoration Law, the upcoming EU forest monitoring and EU soil monitoring and resilience laws, as well as the EU farm to fork strategy.

The Destination also upholds the plastics strategy, the textile strategy, the upcoming working plan for the implementation of Ecodesign for Sustainable Products Regulation, advanced materials for industrial leadership and the action plan on critical raw materials. In addition, this destination contributes to the transition pathways of the energy intensive industries, textiles, construction and agri-food industrial ecosystems.

Furthermore, it will support the upcoming EU Biotechnology and Biomanufacturing Initiative covering and underpinning bio-based innovation systems. Also, it will support the capacity of bio-based systems to enable a sustainable carbon management and the better understanding of the carbon removal potential of bio-based economies. Finally, it will support the Global Biodiversity Framework and promote the new approach for the Sustainable Blue Economy and contribute to the EU algae initiative.

Addressing implementation issues

The indicated expected outcomes will be addressed with different types of action: CSAs, RIAs, IAs, ensuring a balance in terms of high as well as low Technological Readiness Levels (TRLs).

Outcomes will ensure synergies Horizon Europe Cluster 4 – 'Digital, industry and Space', and its partnerships (including an upcoming Partnership on Textiles, synergies on Systemic transition to a digital economy, and new circular and bio-based business models across different life cycles of products and value chains. Links with food packaging, sustainability of food packaging materials (bio-based or recycled), quality standards, advanced materials will also be ensured.

Also, there will be a link to Horizon Europe Cluster 5 – 'Climate, Energy and Mobility', and its partnerships (synergies on Carbon sequestration, including through carbon farming. Biodiversity-bioeconomy-energy-water nexus. Mapping of marine and freshwater ecosystems. Synergies between renewable energy production, sustainable agricultural land management and sustainable food production).

Full synergy and complementarity with the fully operational EU partnership on 'Circular Bio-based Europe' (CBE Joint Undertaking), under Horizon Europe Cluster 6 will be ensured, especially as related to the size of actions – IAs and RIAs, and Technology Readiness Level and the industrial-focus of activities, including with the parallel annual 2025 call.

Synergy will be maximised with the EU partnership for a climate neutral, sustainable and productive blue economy and with the EU mission 'Restore our Ocean and Waters by 2030', as well as with the Soil mission.

Furthermore, there will be a link to Circular Cities and Regions Initiative (CCRI). Furthermore, there will be a link to Circular Cities and Regions Initiative (CCRI). Coordination will be ensured with the long-standing EC Knowledge Centre for Bioeconomy.

The destination will ensure synergies and complementarities with the future European Partnership "Forests and forestry for a sustainable future", which will be the main instrument of public organisations from EU countries and beyond to join forces in the forest-based sectors through concerted research and innovation.

Destination: Clean environment and zero pollution

Draft expected impacts

Strategic Plan 2025-2027 – Expected Impact 29: Achieving healthy soils and forests, as well as clean air, fresh and marine waters, whilst ensuring water resilience and the transition to a clean, competitive and circular economy and sustainable bioeconomy.

Proposals for topics under this destination should set out a credible pathway to **achieve a clean environment, ensure water resilience, and enable the transformative change necessary to reduce air, water and soil pollution to levels no longer considered harmful to health and natural ecosystems and planetary boundaries are respected**. More specifically, they should contribute to one or several of the following impacts:

- Science-based policy measures are underpinned by enhanced knowledge and improved environmental observation systems, detecting and characterising pollution sources, pathways and impacts, including for emerging pollutants and pollutants of great concern, with benefits for human health and environmental protection.
- The scientific capacity and innovative solutions to better understand and monitor the sources, pathways, distribution and impacts of marine pollution are reinforced, leading to cleaner and less polluted ocean and seas.
- Safe and sustainable by design bio-based solutions are developed for the bio-based industries, including through innovative biotechnology and biomanufacturing techniques, and replace harmful chemicals in industrial processes and in products, leading to decreased environmental pollution.
- Sustainable bio-based and nature-based solutions will be developed and tested to remediate and regenerate polluted environment.
- Food systems are transformed towards zero pollution, preventing and reducing pollution in water, air, and soil.
- Farmers are empowered to make informed management decision on water, carbon, nutrients and greenhouse gas balances for environmental and economic sustainability, leading to reduced pollution from agriculture.

Main expected outcomes

To achieve the above-mentioned impacts, the following **expected outcomes** will be pursued:

- The efficiency of science-based air quality measures and planning processes is increased through new and improved cost-effective monitoring and modelling tools, techniques and approaches for characterization and source apportionment of air pollution, including pollutants of emerging concern, directly supporting the revised EU air quality legislation.
- The understanding of the cumulative effects and risks of marine pollution on marine organisms and ecosystems, through new analytical tools, methods and sensors is improved as well as the assessment of ecotoxicological effects and risks including through bioaccumulation processes.
- A pan-European strategy for monitoring litter including plastic and microplastics in freshwater, coastal and marine waters is developed.
- Standards, criteria and evaluation methods of the environmental sustainability of biomass supply to bio-based industries as well as of bio-based systems - from the supply chain and along the value chain - are developed and assessed, to prevent the release of pollutants to air, water and soil.
- The remediation and regeneration of polluted environments, through bio-based and nature-based solutions, including in the international context and towards disaster relief, also enabled by biotechnological solutions, are supported.
- Hazardous substances of concern and of new concern (e.g., PFAS and ECD) are mapped and assessed in industrial releases (sources, quantify the releases and assess risks for environment) from bio-based systems and from bio-based products.
- More effective methods are analysed, developed and deployed to track and reduce pollution from the food and drink industries.
- Advanced water-nutrient-soil management tools that integrate multidimensional data from sampling, remote sensing and other data sources to enable context-specific decision making at farm level, thus enhancing the monitoring of water, nutrients and greenhouse gas balances to reduce pollution are developed.
- Quality from alternative water sources is tested in order to improve water quality for irrigation. Long-term effect on soil quality, crop productivity and quality and food safety and security is assessed.

Addressing main policy issues

R&I under Destination "Clean environment and zero pollution" will mainly deliver on Key Strategic Orientation (KSO) 1: Green transition and, to a lesser extent, on KSO 2: Digital Transition and KSO 3: A more resilient, competitive, inclusive and democratic Europe.

This destination will serve the zero-pollution ambition for a toxic-free environment that is anchored in the EU action plan towards zero pollution for air, water and soil and the EU's chemicals strategy for sustainability, which encourage climate-neutral and less polluting industry, circular economy, protection and restoration of biodiversity and ecosystems, as well as healthy and environmentally friendly food systems, in line with the One Health approach.

R&I under this destination will contribute to reach the 2030 reduction targets that will help to prevent pollution at the source, notably in relation to air pollution, plastic and micro-plastic pollution, nutrient loss, pesticides use and sales of antimicrobials, waste generation.

The EU is, in particular, revising the Ambient Air Quality Directives which include a long-term 'zero pollution' objective for 2050. This includes clear and precise intermediate EU air quality standards for 12 air pollutants to be attained by the year 2030. R&I will improve air quality monitoring and modelling, thanks to better environmental observations, to ensure an easier implementation of the revised rules.

R&I activities related to ocean and seas will support the implementation of the Zero Pollution Action Plan, the Marine Strategy Framework Directive and Water Framework Directive, which require the reaching of good status of the seas and waters, which are clean and healthy. They will also feed into the revision of the Single Use Plastics Directive.

R&I in this destination will serve the objectives not only of the zero pollution action plan, but also of the EU biodiversity strategy for 2030 by addressing pollution as one of the key drivers of biodiversity loss and the farm to fork strategy by supporting sustainable agriculture and food systems. They further support the EU's circular economy action plan, minimizing the resource use and environmental footprint of products and materials, addressing the conditions to achieve a circular economy where natural systems are protected and regenerated.

This destination will support the zero-pollution ambition in the bio-based and bioeconomy sectors in complementarity with the bioeconomy strategy, the communication on the sustainable blue economy and the climate law, also form the overarching policy framework of this destination's actions. Furthermore, the actions under this destination will foster the development of innovative solutions for a transformative change, also in line with the recent initiative on biotechnology and biomanufacturing and the communication on industrial carbon management.

The destination will contribute to advancing the knowledge on hazardous substances, including pollutants of emerging concern, released in all environments, thus directly contributing to revised legislation on environmental protection, addressing water, air, and soil quality.

Addressing implementation issues

The topics under Destination 4 will make use of all available types of actions to cover a broad range of research and innovation activities, ensuring a balance between lower and higher TRLs. Integrated approaches in research and innovation will be fostered, including the One Health approach where relevant.

The expected impacts from actions under Destination 4 will also be maximised by the complementarities and synergies with other instruments within Horizon Europe and other programmes. In particular, the cooperation with partnerships may bring in the research activities for a clean environment the challenges and solutions from the civil society, i.e., local communities, regional governments, consumers, etc., as is the case of the co-funded partnerships Water security for the planet (Water4All) and Safe and sustainable food systems for people, planet and climate. Other partnerships are closer to the deployment of industrial capacity, as in the case of the institutionalized Circular Bio-based Europe Joint Undertaking, supporting industrial bio-based systems that aim at replacing harmful processes and substances, while fostering the use of sustainable natural resources and their restoration. Especially on Destination 4 expected outcomes on the environmental sustainability of biomass supply to bio-based (industrial) systems, the cooperation with partnerships Sustainable Blue Economy and Agroecology may complement. For the overall objectives of the Destination on biodiversity protection, restoration and enhancement, synergies with the Biodiversa+ partnerships are key.

The deployment of solutions into different contexts, delivered under Destination 4 should be facilitated by the connection with the Horizon Europe Missions ‘A Soil Deal for Europe’, ‘Restore our Ocean and Waters by 2030’ and ‘Climate-Neutral Smart Cities’.

A better understanding of how ecosystems adapt, and scarce resources are managed under changing climate conditions through synergies with destination 5 (Climate, Energy and Mobility) will also contribute to improve the understanding of climate impact on pollution of ecosystems and natural resources.

Synergies will be sought with Cluster 4 (Digital, Industry and Space) on pollution prevention and control from industrial releases, particularly through sustainable production processes avoiding substances of concern and lowering pollutant emissions fit for SSbD framework. Furthermore, the destination will seek synergies with Cluster 1 (Health) to increase understanding of impacts of environmental pollution on human health, as well as with Cluster 5 (Climate, Energy and Mobility) in relation to human health impacts of transport-related air and noise emissions.

Destination: Land, ocean and water for climate action

Draft expected impacts

Strategic Plan 2025-2027 – Expected Impact 27: Fostering mitigation of and adaptation to climate change in areas and sectors covered by Cluster 6.

Proposals for topics under this destination should set out a credible pathway contributing to "**Fostering mitigation of and adaptation to climate change in areas and sectors covered by Cluster 6"**, and more specifically to one or more of the following impacts:

- Safe operating spaces for the global ocean are unlocked by considering the limits to ocean integrity at different emission scenarios and climate overshoot, current and emerging threats and the passing the planetary boundaries for ocean acidification.
- Responsible research on ocean-based climate interventions and reliable measurement, reporting and verification (MRV) of carbon flows are advanced.
- Medium and longer-term risks and opportunities for agriculture and forestry from shifting climatic zones are understood and managed.
- Adaptation and mitigation of water systems in the context of climate change are fostered to help build a water resilient society.

Main expected outcomes

To achieve the above-mentioned impacts, the following **expected outcomes** will be pursued:

- The understanding of the ocean's role in the climate system is furthered and better understanding and characterisation of safe operating spaces for the global ocean are fostered to inform policymaking.
- Robust, cooperative environmental monitoring, reporting, and verification of new and emerging ocean-based carbon dioxide removal strategies are implemented to ensure measurable progress towards net-negative emissions while also protecting critical ocean ecosystems.
- Greenhouse gas emissions from the land-use sector, in particular non-CO2 emissions (methane and nitrous oxide), are better monitored and more effectively reduced, and CO_2 removals from the atmosphere are increased.
- The capacity of the land-use sector and of relevant public authorities to anticipate impacts of climate change, including in the medium and longer term, is enhanced.

- The resilience of agricultural production is fostered in the face of direct and indirect climate change impacts, including through more effective public policies.
- The socioeconomic resilience of agriculture is improved by co-creating with farmers new farming methods, technologies and business models while supporting sustainable agricultural policies.
- Transition scenarios for sustainable livestock systems for climate change resilience are developed and improved, including tools for greenhouse gas footprint assessment and animal breeding.
- Better management of the changing hydrological cycle to reduce water risks related to climate change impacts, foster water resilient land use and planning, enhance cross-sectoral cooperation between various water related policies and between different water use sectors. This is done while increasing water use efficiency, balancing better water demand and supply, helping transforming the economics and restructuring the governance of water.
- The fragmentation between EU, national and regional R&I funding on water is overcome and related policies are integrated and aligned with a shared strategic research and innovation agenda thanks to the additional activities of the Water4All Partnership ('Water Security for the Planet'), for increased protection and resilience of water resources.

Addressing main policy issues

R&I under Destination "Land, ocean and water for climate action" will deliver mainly under Key Strategic Orientation (KSO) 1 of Horizon Europe Strategic Plan 2025-2027: Green transition. It will also deliver under KSO 2: Digital Transition and KSO 3: A more resilient, competitive, inclusive and democratic Europe.

This Destination is expected to foster mitigation of and adaptation to climate change on land, in the ocean and water, and therefore helps Cluster 6 to support the ambition of Europe becoming the first climate-neutral and climate-resilient continent by 2050, in line with the European Green Deal, the European Climate Law, the amended Regulation on land use, land use change and forestry (LULUCF) and the amended Effort Sharing Regulation, which establishes binding annual greenhouse gas emission targets for Member States in sectors which include agriculture.

In continuation with the orientations of previous Cluster 6 Work Programmes, and in line with the Horizon Europe Strategic Plan 2025-2027, R&I actions under this Destination for Work Programme 2025 will be aligned with the Communication on sustainable carbon cycles, will support the implementation of the proposed Regulation establishing a Union certification framework for carbon removals and will deliver on climate adaptation in line with the EU

Strategy on Adaptation to Climate Change. R&I activities in the areas of agriculture and forestry under this Destination will also contribute to the implementation of the EU Methane Strategy, the EU Forest Strategy for 2030 as well as the proposal for a Forest Monitoring Law.

R&I actions under this Destination will help achieve international commitments concerning land, water and ocean, notably the goals of the Paris Agreement on climate change and of the Kunming-Montreal Global Biodiversity Framework.

Strengthening the nexus between the ocean and climate change will continue to be a priority for the EU as well as the integrity and resilience of ocean and polar regions as part of the climate system. R&I will support and close key knowledge gaps related to the ocean-climate nexus by contributing substantially to key international treaties, assessments and other initiatives (such as the High Seas Treaty (BBNJ), the Intergovernmental Panel on Climate Change (IPCC), World Ocean Assessment (WOA), UNFCCC Ocean-Climate Dialogue, United Nations Decade for Ocean Science and the United Nations Decade for Ecosystem Restoration, the International Panel for Ocean Sustainability (IPOS), the WMO Greenhouse Gas Watch (G3W), and the Arctic Council).

The Destination will also support the proposed Water Resilience Initiative, which aims to reinforce our society's ability to secure the availability and affordability of clean water despite the current uncertainty on long-term trends and the increased variability of water availability. This requires adapting our water facilities, our water use and water management to changing economic, societal and environmental factors including climate change. R&I will be necessary to support the science-based implementation of this initiative, ensuring in particular that key innovative approaches, solutions and technologies developed by EU funded projects, are successfully taken up by policy makers, water managers and water consuming economic sectors.

Implementation issues

To maximise the impacts of R&I under this Destination, a systemic multidisciplinary approach, strong international cooperation as well as the integration of indigenous and local knowledge need to be ensured. Social innovation also needs to be encouraged to involve all stakeholders, with a view to triggering the ownership of new practices and the uptake of solutions.

R&I under the destination will be complementary with activities of the Mission "Adaptation to climate change", the Mission "Restore our ocean and waters by 2030" (in particular with the establishment of the Digital Twin of the Ocean) and the Mission "A Soil Deal for Europe". Synergies will also be established with European partnerships (e.g., Sustainable Blue Economy Partnership, Agroecology and Agriculture of Data) and with Destination Earth and its Digital Twins (Climate Adaptation, Extremes). Synergies and complementarities with Cluster 5 (Climate, Energy and Mobility) on climate science will also be ensured. Digital technologies, such as AI, robotics, 5G, cloud computing as well as Earth Observation, will be exploited in the activities given their enabling role and potential contribution to the objectives of the cluster.

The Destination will ensure a balance in terms of lower and higher Technological Readiness Levels (TRLs). R&I actions will take advantage of, contribute to, coordinate with, and involve relevant Copernicus services.

Destination: Resilient, inclusive, healthy and green rural, coastal and urban communities

Draft expected impacts

Strategic Plan 2025-2027 – Expected Impact 27: Sustainably developing rural, urban and coastal areas.

Proposals for topics under this destination should set out a credible pathway to contributing to **sustainably developing rural, urban and coastal areas**, and more specifically one or several of the following expected impacts:

- Rural, coastal and urban communities are empowered to act for a transformative change, and are better prepared to achieve climate neutrality, to adapt to climate change, and to become socially, economically and environmentally resilient.
- Rural and coastal communities dwellers are equipped with upgraded innovation ecosystems and smart solutions that increase access to inclusive services and job opportunities for all, improve their attractiveness and reduce the feeling of being left behind, even in the most remote locations like mountains and outermost regions and islands. Particular attention is paid to reduce gender gaps and to an inclusive development that ensures access to services and job opportunities also to the people in vulnerable situations.
- Rural and coastal areas are prepared to mitigate the social, economic and environmental impacts of demographic trends or reverse depopulation through enhanced territorial governance.
- The sustainable development of coastal areas, including their protection and resilience, is boosted and coastal communities are supported in tackling extreme weather events and reducing uncertainty. Coastal communities can reap the benefits of social, digital and community-led innovations that deliver nature-based and other scientifically validated solutions to existing coastal socio-economic and environmental threats.
- Communities in natural and coastal areas are empowered to offer sustainable, quality, environmentally and socially friendly tourism as well as recreational and leisure activities and new tools (including digital ones) for the sustainable management of coastal and rural areas.
- Communities have access to knowledge, data, tools, training and can develop skills that support them to take evidence-based decisions to respond to climate change with socially acceptable measures in their territories.

- Urban and peri-urban communities – including the individuals in most vulnerable situations – can access, afford and choose healthier, nutritious and environmental-friendly food, and benefit from synergies across the urban-rural interface as well as from enhanced food systems governance.

Main expected outcomes

To achieve the above-mentioned impacts, the following **expected outcomes** will be pursued:

- Innovative solutions to tackle rural depopulation are developed, rural areas are equipped to manage an ageing population, and there are new inclusive job opportunities.
- There is an improved understanding of housing and commuting options in rural areas. Solutions for energy efficiency targeted renovation and insulation of rural buildings and houses are found.
- The adequacy of policy instruments for rural development is improved, ensuring that tailored policies are in place to respond to rural communities' needs.
- Rural dwellers are engaged in decision-making processes to advance democratic and participatory processes at the local level.
- Rural, coastal and urban communities are provided with solutions to access to sustainable, viable and resilient ways of living through biodiversity-friendly and local actions, healthy diets, and community practices.
- Connections, strategies, and governance arrangements are strengthened to foster both synergistic development of rural, coastal and urban areas and more integrated territorial policies and interventions.
- New social, economic and governance frameworks are developed. These respond to rural and coastal pressures, including adaptive measures to reinforce ecological mitigation and restoration, as well as adaptation corridors are in place taking into account sufficient distance from the coast.
- Communities – including the individuals in most vulnerable situations and indigenous people – are provided with solutions that allow them to access, afford and choose healthier, nutritious and environmental-friendly food. These solutions help communities to benefit from synergies across the coastal urban-rural interface as well as from enhanced food systems governance.
- More diverse and systemic approaches and innovative solutions (digital, nature-based, social and community-led) with and for local communities are developed, and there is an increased number of local actors with improved capacity to sustain

innovative processes in the long-term and facilitate the uptake of sustainable solutions.

- The green transition in small islands is enhanced and island and coastal communities are more resilient thanks to the better understanding of the factors impacting socio-economic aspects and human-Ocean interactions. This will involve community-led innovations.
- Enhanced food systems transformation is visible in the places where people live and work, together with the use of nature-based solutions.
- Generational renewal is enabled in rural and costal professions thanks to better access to training that allow for the development of skills that protect and valorise the environment, natural resources, and cultural heritage.
- Rural and coastal areas could benefit from sustainable and inclusive tourism driven by evidence-based strategies that include the use of tools, including digital ones, and strengthen the economic resilience and attractiveness of these territories while safeguarding and protecting the natural and cultural heritage and ecosystems.

Addressing main policy issues

R&I under destination "Resilient, inclusive, healthy and green rural, coastal and urban communities" will contribute to the implementation of the Horizon Europe Strategic Plan 2025-2027. In particular, it will deliver under the Key Strategic Orientation (KSO) 1: The Green transition, the KSO 3: A more resilient, competitive, inclusive and democratic Europe, and to a lesser extent to KSO 2: The digital transition.

Places and people, as well as their culture, matter to the achievement of a more sustainable Europe. Article 174 of the Treaty on the Functioning of the European Union emphasizes the importance of economic, social, and territorial cohesion, highlighting the need to address disparities between different regions and the challenges posed by less-favoured areas.

The Sustainable Development Goals (SDGs) in particular SDGs 10 and 11 as well as the European Green Deal ecological and digital transitions and induced spatial and socio-economic, behavioural and cultural implications, especially its just transition component, bring challenges and opportunities that differ for different places and people. Rural (including mountains) and coastal areas, play a key role in managing and protecting the environment, as well as natural and cultural heritage. The provision of both private and public goods from these areas depends on the resilience and attractiveness of rural and coastal areas and the capacity of people who live and work there to access a sufficient level of well-being.

This destination will make a key contribution to the action plan flagship initiative "R&I for rural communities" and to the four areas of work of the long-term vision for EU's rural areas: stronger, connected, resilient, prosperous.

This destination will as well contribute to the EU territorial agenda for 2030 promoting a future for all places, the farm to fork strategy and the ambitions of food 2030 R&I initiative as well as the EU bioeconomy strategy and the circular economy action plan.

On social related research and innovation, this destination contributes to the implementation of the Pillar of Social Rights and its action plan and the implementation of the gender equality strategy 2020-2025.

On an international level, the destination supports the objectives of the joint communication on the Arctic, to the 4th Arctic Science Ministerial Joint Statement and to the All- Atlantic Ocean Research Alliance.

Implementation issues

Under Destination "Resilient, inclusive, healthy and green rural, coastal and urban communities", Work Programme 2025 will fill the knowledge gaps in domains that were not tackled in Horizon 2020 or Horizon Work Programmes 2021-2022 and 2023-2024, as indicated in the new Strategic Plan. The Destination will place emphasis on actions that will demonstrate, and exploit knowledge created under previous Work Programmes with the objective to deliver impact and increase sustainability, resilience and competitiveness. The focus will be on tackling the impacts of demographic changes and environmental extreme events which cause uncertainty, by engaging communities in decision-making processes, improving policy instruments for policy responses that are evidence based and considering local needs. This Work Programme will also contribute to improving access to services, job opportunities, good environmental conditions, and energy-efficient housing in rural areas.

The multi-actor approach may be used in a significant number of topics. Relevant topics under this destination should include Social Sciences and Humanities (SSH) to apply a human-centered approach, as well as make use of social and regional innovation to meet local needs by co-creating place-based solutions.

Coordination will be ensured with the use of the EC Knowledge Centre for Bioeconomy, the EU Rural Observatory and the Mission Soil.

Destination: Innovative governance, environmental observations and digital solutions in support of the Green Deal

Draft expected impacts

Strategic Plan 2025-2027 – Expected Impact 32: Developing innovative governance models and tools enabling sustainability and resilience.

Proposals for topic under this destination should set out credible pathways to **developing innovative governance models and tools enabling sustainability and resilience**, and more specifically to one or several of the following **impacts**:

- societal transformation and community empowerment from enhanced knowledge and tools supporting better, evidence-informed policy and decision-making processes accelerating the green transition;
- sustainability and resilience of the economy are increased by more accessible and interoperable environmental observations and digital and data technologies;
- enhanced knowledge flows and skills for key actors and communities that facilitate the transformative changes required by the European Green Deal.

Main expected outcomes

To achieve the above-mentioned impacts, the following **expected outcomes** will be pursued:

- Farmers and society at large benefit from public and/or private support targeted towards the delivery of agri-environment-climate public goods thanks to new knowledge and innovations that will support development of the result-based and collective payments for environmental services on the ground.
- The EU input industry-farmers-food value chains are more sustainable and resilient due to better understanding and improved analytical capacity of the relationships across them and the impact of major trade disruptions.
- Farmers are better prepared and better manage risks thanks to improved understanding and innovative solutions.
- Policy and decision-making processes are better informed owing to improved analytical capacity in measuring and assessing the sustainability-adjusted productivity of the EU agricultural and forestry sector.
- The attractiveness of jobs in agriculture and forestry and the links between farming community and society are enhanced through improved understanding and unlocked potential of media, arts and marketing.

- The governance of food systems and bioeconomy is improved through robust organisational and institutional design, social transformation, community empowerment at local and regional levels, and strengthened science-policy interfaces.

- Collaboration among universities, cities, and rural areas of different scales is fostered and partnerships between policymakers, industries, businesses, financial institutions, researchers, educators, and citizens are facilitated to achieve sustainable food systems.

- Awareness of the need to transition towards sustainable food systems and bioeconomy is raised and buy-in from all relevant actors, also involving disadvantaged communities, vulnerable people, women, youth and youth-led initiatives and organisations ensured through multi-actor approach, public engagement, education and training.

- Understanding and awareness of bioeconomy and its bio-based sector on territorial, local and regional level is improved based on the scientific evidence, underpinned by the sustainability, circularity, fairness and inclusiveness principles.

- Decision-making is future-proofed through sectorial Digital Twin Ocean applications, supporting the implementation of EU or national legislations (Marine Framework Strategy Directive, Marine Spatial Planning, Common Fishery Policy, Nature Restoration Law), policies (Marine Protected Areas, sea level rise coastal resilience) and the development of a sustainable blue economy.

- The EU and international science-policy interfaces are strengthened to help achieve the Sustainable Development Goals through Earth Intelligence as defined in the GEO post 2025 strategy.

- The green and digital transitions in various sectors are facilitated by EO based services in Europe with a pathway to upscale in global markets, through GEO initiatives.

- Environmental observing systems, e.g. for ocean, polar regions, or greenhouse gases, are optimised and their governance and interoperability are improved, making them more comprehensive, cost-effective and user-friendly to support policies at European and international level.

- International collaboration for better coordinating observing systems and sharing environmental data and knowledge is enhanced in support of the implementation of multi-later environmental agreements, in particular: Paris Agreement, SDGs,

and also the Kunming-Montreal Global Biodiversity Framework and Early Warnings for All initiative.

- Sustainable agriculture practices are enabled by innovative big data, AI and machine learning based solutions.
- Farmers and rural actors are equipped with better knowledge and skills to exploit the potential of agricultural data and digital technologies.
- Food systems become more inclusive, sustainable and healthy due to innovative and open datasets, data sharing and open science in food system research.
- Food processing, food environments, home cooking are enhanced through developing human-centric AI solutions.
- Future generations of farmers and advisors are prepared for the future of farming by providing them with the right knowledge and skills at the right time and place, including by improved agricultural education and training systems.
- The practitioners better use the R&I results ready for practice from successful Horizon projects and EIP-AGRI OGs is boosted, including via improved implementation of multi-actor projects.
- Knowledge and skills of farmers and advisors are strengthened via thematic and advisory networks, in particular to harness the potential of EU plant protein production.

Addressing main policy issues

R&I under destination "Innovative governance, environmental observations and digital solutions in support of the Green Deal" will mainly deliver under Key Strategic Orientation (KSO) 1 of Horizon Europe Strategic Plan 2025-2027: Green transition, while also contributing to KSO 2 (Digital transition) and KSO3 (A more resilient, competitive, inclusive and democratic Europe).

Achieving the targets and objectives of the European Green Deal and related policy initiatives in a fast-changing context requires innovative and agile governance models and tools that enable sustainability and resilience. To this end, it is crucial to invest in R&I that delivers evidence-based knowledge and tools supporting policy design and decision-making processes in the sustainability transition.

This concerns the development of sustainable, circular and inclusive bioeconomy solutions, in line with the Bioeconomy Strategy, reflecting its local and regional character and particularities,

advancing bio-based sectors (e.g., underpinned by biotechnology and biomanufacturing principles) and supporting biosphere stewardship).

Moreover, data and intelligence provided by environmental observations are key for assessing the state of the planet, including its biodiversity and the pollution of its air, soils and waters, thus supporting the biodiversity strategy and the zero pollution action plan. R&I and related coordinating activities under this destination will build targeted and actionable environmental knowledge and insights that will support policymakers, society and economy in navigating the transformative changes required by the European Green Deal. Towards these ends, technological solutions and data governance models need to be advanced in order to make environmental data more available, accessible, usable an inter-operable at European and global level.

The Group on Earth Observations (GEO) is an international partnership that, with the support of this destination, aims at delivering Earth Intelligence to decision makers at all levels. It offers a unique forum for international cooperation and the opportunity to scale-up solutions developed in Europe in other regions of the globe, advancing the implementation of the Paris Climate Change Agreement, the Sendai Framework for Disaster Risk Reduction, the 2030 Agenda for Sustainable Development, and the New Urban Agenda, as well as endeavors like the Kunming-Montreal Global Biodiversity Framework and Early Warnings for All.

EuroGEO is the regional initiative in GEO Implementing a user-driven research and innovation agenda to maximise uptake and engagement of EO applications that are addressing the above mentioned GEO priorities. EuroGEO will be enabled to provide Earth Intelligence to local administrations or businesses with targeted decision support to increase the resilience and environmental performance of their operations.

There is a need to unlock the potential of applied digital and data technologies to support sectors covered by this Cluster in becoming more sustainable, resilient, competitive and inclusive in line with the evolving legal frameworks in the fields of cyber, data and data technologies and digital services (e.g., European Data Strategy, Europe's Digital Decade and the AI innovation package). This destination will contribute to the development, support and take up of innovative digital and data-based solutions to support economic sectors relevant for Cluster 6 and society at large to achieve the European Green Deal targets and objectives. Focus will be on improving the use of data in agriculture to drive effectiveness, efficiency and sustainability considering private interests.

Knowledge and advice to all actors relevant to this cluster are key to improving sustainability and resilience. For instance, primary producers have a particular need for impartial and tailored advice on sustainable management choices. Agriculture Knowledge and Innovation Systems (AKIS), which are at the heart of the 2023-2027 CAP's cross-cutting objective, refer to the organisation and knowledge flows between persons, organisations and institutions who use and produce knowledge for agriculture and interrelated fields. AKIS go beyond agriculture, farming

and rural activities and cover environment, climate, biodiversity, landscape, bioeconomy, consumers and citizens, i.e. all food and bio-based systems including value chains up to the consumer. R&I actions under this destination will support effective AKIS as a key driver to bridge the gap between science and practice and to enhance co-creation. This will speed up innovation and the take-up of results needed to achieve the European Green Deal objectives and targets.

Implementation issues

The indicated expected outcomes will be addressed with different type of action: CSAs, RIAs, IAs, ensuring a balance between lower and higher Technological Readiness Levels (TRLs).

This destination will support R&I activities in synergy and complementarity with the European Partnership on Agriculture of Data and those that continue for the Sustainable Blue Economy Partnership.

To ensure coordination at European and global levels and effective dissemination, support will be continued for the annual subscription of the GEO secretariat. Continuation of the successful collaboration with the European Environmental Agency and the Joint Research Centre on environmental observations will also need to be ensured.

The R&I activities supporting digital and data-based innovation under Cluster 6 will complement activities supported by Cluster 4 (Digital, Industry and Space) and the Digital Europe Programme, bringing benefits for citizens, businesses, researchers, the environment, society at large and policymakers.

Note that the expected outcomes related to Agricultural Knowledge and Innovation Systems (AKIS) focus on fostering knowledge flows and skills to support the actors to use (not produce) the new knowledge and innovative solutions generated by the R&I activities across the Cluster 6 destinations. Therefore, the CSA type of activities will prevail as they are most suitable for strengthening AKIS. As part of strengthening AKIS, the interactive innovation model will be also supported via reinforced multi-actor approach mainstreamed across the Cluster 6.