Destination - Biodiversity and ecosystem services

The biodiversity and ecosystem services destination of the 2023-2024 Cluster 6 work programme will support R&I for the EU environment and biodiversity protection framework and the European Green Deal. It is based on the vision developed in the EU biodiversity strategy for 2030 and will support its implementation, furthering the orientations of the 2021-2022 work programme. It will also take into account new European Green Deal initiatives, notably i) the EU forest strategy for 2030[18], ii) the EU action plan: "towards zero pollution for air, water and soil", iii) the EU climate adaptation strategy and iv) the EU soil strategy for 2030. Connections are expected to be made with the EU proposal for a nature restoration law[19], which includes binding targets, and environmental reporting, and the new approach for a sustainable blue economy in the EU[20].

It will support R&I activities that help maintain ecosystems in good ecological condition and a clean and healthy environment for the EU, including water, soil and air. This will contribute to the implementation of relevant policies such as health, climate adaptation and mitigation, disaster risk reduction, sustainable circular bioeconomy and blue economy. The R&I activities will also reflect the strong interconnections between, e.g. the EU biodiversity strategy for 2030[21] and the farm to fork strategy[22], as well as the pollinators initiative[23].

R&I supported under this destination will ensure that mainstreaming biodiversity in society and the economy takes into account justice, fairness and global aspects. This is to ensure the "just transition" emphasised in the European Green Deal is achieved.

R&I activities supported by Cluster 6 will complement and ensure synergies with activities supported under several Horizon Europe partnerships, in particular: i) the European biodiversity partnership Biodiversa+; ii) the European partnership water security for the planet "Water4All"; iii) the European partnership on accelerating farming systems transition: agroecology living labs and research infrastructures; iv) the European partnership on animal health and welfare and; v) the European partnership for a climate-neutral, sustainable and productive blue economy. R&I activities should also specifically address the strong interconnections between biodiversity and the emergence of infectious diseases by complementing the activities of with the European partnership for pandemic preparedness and the European Partnership for One Health/AMR Antimicrobial Resistance (AMR).

Synergies will also be ensured with the following Horizon Europe missions: "Restore our ocean, seas and waters by 2030", "A soil deal for Europe" and "Adaptation to climate change".

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18 Communication COM/2021/572: New EU Forest Strategy for 2030

19 Proposal for a Regulation of the European Parliament and of the Council on nature restoration, COM(2022) 304 final, 22.06.2022

20 Communication COM/2021/240: on a new approach for a sustainable blue economy in the EU Transforming the EU's Blue Economy for a Sustainable Future

21 Communication: EU Biodiversity Strategy for 2030

22 Communication: Afarm to fork Strategy for a fair, healthy and environmentally-friendly food system

23 https://ec.europa.eu/environment/nature/conservation/species/pollinators/policy_en.htm

Projects supported under this destination are expected, where appropriate, to provide timely scientific contributions to major science-policy bodies such as the Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services (IPBES)[24], the Intergovernmental Panel on Climate Change (IPCC), and the Convention on Biological Diversity. They are also expected to cooperate with the Science Service project Bio-agora. Where appropriate, the following existing platforms and information-sharing mechanisms should be used for dissemination and exploitation: the EC Knowledge Centre for Biodiversity[25], Biodiversity Information System for Europe (BISE)[26], and Oppla[27].

This destination will also help achieve the twin green and digital transitions. Where relevant, advantage will be taken of the development and 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 international cooperation will be key to addressing global challenges in many topics in this destination. The EU's outermost regions (defined in article 349 TFEU), where biodiversity is high and threats multiply, should be given special consideration.

Expected impact

Proposals for topics under this destination should set out a credible pathway resulting in the strategic plan having the following impact: "*Biodiversity is back on a path to recovery, and ecosystems and their services are preserved and sustainably restored on land, inland water and at sea through improved knowledge and innovation*". More specifically, one or more of the following impacts should materialise:

- **Direct drivers of biodiversity decline** will be understood and addressed – land and sea use change, natural resource use and exploitation, climate change, pollution, invasive alien species – as well as indirect drivers – demographic, socio-economic, technological, etc.

- **Protected areas** and their networks will be planned, managed and expanded and the status of species and habitats will be improved based on up-to-date knowledge and solutions.

- **Biodiversity, ecosystem services and natural capital will be mainstreamed in the society and economy**: e.g. they will be integrated into public and business decision-making; approaches for enabling transformative changes to tackle societal challenges will be built including by deploying nature-based solutions (NBS).

- **Practices in agriculture, forestry, fisheries** and **aquaculture will be developed and improved** to support and make sustainable the use of biodiversity and a wide range of ecosystems services.

24 https://ipbes.net/policy-support
25 https://knowledge4policy.ec.europa.eu/biodiversity_en
26 https://biodiversity.europa.eu/
27 https://oppla.eu/

- **Biodiversity research and support policies and processes will be interconnected** at EU and global levels, making use of advanced digital technologies and societal engagement where appropriate.

- **The biodiversity and health nexus will be understood, in particular at the level of ecosystems**. This will be achieved by using the one-health approach, in the context of climate change and globalisation and by addressing contributions and trade-offs.

The impacts have been revised compared with the 2021-2022 work programme in order to take into account R&I activities included in the 2021-2024 strategic plan, but that are yet to be addressed. This was the case, for instance, for several direct drivers of biodiversity loss. The new drafting of the impacts makes clear that they are within the scope of the work programme.

The following call(s) in this work programme contribute to this destination:

Call	Budgets (EUR million)		Deadline(s)
	2023	2024	
HORIZON-CL6-2023-BIODIV-01	184.00	30.00	28 Mar 2023
HORIZON-CL6-2024-BIODIV-01		76.00	22 Feb 2024
HORIZON-CL6-2024-BIODIV-02		36.00	22 Feb 2024 (First Stage) 17 Sep 2024 (Second Stage)
Overall indicative budget	184.00	142.00	

Call - Biodiversity and ecosystem services

HORIZON-CL6-2023-BIODIV-01

Conditions for the Call

Indicative budget(s)[28]

Topics	Type of Action	Budgets (EUR million)		Expected EU contribution per project (EUR million)[29]	Indicative number of projects expected to be funded
		2023	2024		
Opening: 22 Dec 2022 Deadline(s): 28 Mar 2023					
HORIZON-CL6-2023-BIODIV-01-1	RIA	22.00		Around 5.50	4
HORIZON-CL6-2023-BIODIV-01-10	RIA	5.00		Around 5.00	1
HORIZON-CL6-2023-BIODIV-01-11	RIA	5.00		Around 5.00	1
HORIZON-CL6-2023-BIODIV-01-12	CSA	4.00		Around 4.00	1
HORIZON-CL6-2023-BIODIV-01-13	RIA	12.00		Around 6.00	2
HORIZON-CL6-2023-BIODIV-01-14	RIA	10.00		Around 5.00	2
HORIZON-CL6-2023-BIODIV-01-15	CSA	7.00		Around 7.00	1

[28] The Director-General responsible for the call may decide to open the call up to one month prior to or after the envisaged date(s) of opening.
The Director-General responsible may delay the deadline(s) by up to two months.
All deadlines are at 17.00.00 Brussels local time.
The budget amounts are subject to the availability of the appropriations provided for in the general budget of the Union for years 2023 and 2024.

[29] Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.

HORIZON-CL6-2023-BIODIV-01-16	RIA	10.00		Around 5.00	2
HORIZON-CL6-2023-BIODIV-01-17	RIA	12.00		Around 4.00	3
HORIZON-CL6-2023-BIODIV-01-18	COFUND	30.00	30.00	Around 60.00	1
HORIZON-CL6-2023-BIODIV-01-2	RIA	7.00		Around 3.50	2
HORIZON-CL6-2023-BIODIV-01-3	RIA	6.00		Around 6.00	1
HORIZON-CL6-2023-BIODIV-01-4	RIA	8.00		Around 4.00	2
HORIZON-CL6-2023-BIODIV-01-5	RIA	18.00		Around 9.00	2
HORIZON-CL6-2023-BIODIV-01-6	IA	10.00		Around 10.00	1
HORIZON-CL6-2023-BIODIV-01-7	IA	10.00		Around 5.00	2
HORIZON-CL6-2023-BIODIV-01-8	CSA	3.00		Around 3.00	1
HORIZON-CL6-2023-BIODIV-01-9	RIA	5.00		Around 5.00	1
Overall indicative budget		184.00	30.00		

General conditions relating to this call	
Admissibility conditions	The conditions are described in General Annex A.
Eligibility conditions	The conditions are described in General Annex B.
Financial and operational capacity and exclusion	The criteria are described in General Annex C.
Award criteria	The criteria are described in General Annex D.

Documents	The documents are described in General Annex E.
Procedure	The procedure is described in General Annex F.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G.

Understanding and addressing the main drivers of biodiversity loss

Proposals are invited against the following topic(s):

HORIZON-CL6-2023-BIODIV-01-1: Better understanding of routes of exposure and toxicological and ecological impacts of chemical pollution on terrestrial biodiversity

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 5.50 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 22.00 million.
Type of Action	Research and Innovation Actions
Procedure	The procedure is described in General Annex F. The following exceptions apply: To ensure a balanced portfolio, grants will be awarded to applications not only in order of ranking but at least also to two projects within the area A that is the highest ranked, and two projects highest ranked within the area B, provided that the applications attain all thresholds. Proposals shall clearly indicate the area they are applying to.

Expected Outcome: In line with the European Green Deal and in particular with the objectives of the EU biodiversity strategy for 2030, the EU zero pollution action plan and the EU pollinators initiative, projects results will contribute to the following impact of destination "biodiversity and ecosystem services": "Understand and address direct **drivers of biodiversity decline**…".

Project results are expected to contribute to all of the following expected outcomes:

- Routes of exposure, linked to ecosystem and biodiversity dynamics to chemicals are better understood,
- Issues raised by the contamination of biodiversity in the natural environment are better known, including risks linked to existing contaminations (legacy), chemicals of emerging concern and accumulations in nature,
- Environmental fate of new chemicals of emerging concern is better understood,
- Toxicological and ecological impacts of contaminants are better understood and risk assessments for relevant highly exposed species are strengthened,
- Prevention and mitigation measures are identified and developed.

Scope: According to IPBES global assessment report[30], pollution is one of the five main direct drivers of biodiversity loss. This topic focuses on chemical pollution, which has been increasing in the last decades with key differences by region and by type of pollution. Quantitative assessments include systematically monitored variables with certain emissions into the atmosphere, water bodies and terrestrial systems from industrial activities and households. However, pollution has and is still changing not only in quantitative but also qualitative terms and the monitoring of many dangerous substances, including ones of emerging concern, and knowledge on the way they impact biodiversity and ecosystem services are missing. This topic aims at better understanding the routes of exposure and toxicological and ecological impacts of chemical pollution (excluding industrial contamination) on terrestrial biodiversity and ecosystems[31] (Area A). According to the EU biodiversity strategy for 2030, pressures include the release of nutrients, chemical pesticides, pharmaceuticals, hazardous chemicals, urban and industrial wastewater and other waste including litter and plastics.

The intensification of the loss of biodiversity in the EU is strongly influenced by the intensification of agriculture, through the high application of fertilizers and pesticides, changes in the species and management of crops, as well as mowing and grazing regimes, and the introduction of new production technologies. Currently, the excessive use of pesticides causes a reduction in the population of, among others, pollinating insects. To support the long-term sustainability of both nature and farming, the EU biodiversity strategy for 2030 works in tandem with the farm to fork strategy. The Commission has committed with both strategies to take action to reduce by 50% the overall use of - and the risk from – chemical pesticides by 2030 and reduce by 50% the use of more hazardous pesticides by 2030 in order to reverse the alarming decline of farmland biodiversity.

Successful proposals are expected to assess the effects and impact of chemical pollutants, in particular the most dangerous substances from agriculture, on the condition of the biodiversity and ecosystems in natural environment (this may include environmental and host associated

[30] https://ipbes.net/global-assessment.

[31] Freshwater ecosystems may be also addressed by proposals provided the main focus is on terrestrial biodiversity

microbiomes) and consequently on human health, and identify preventive and mitigation measures. It is important to pay special attention to the fact that the reduction in the population of pollinating insects caused, inter alia, by the excessive use of pesticides in EU agriculture also contributes to reducing the amount of food for birds, reducing the regulation of pests, diseases and invasive alien species. More knowledge is also needed on additional negative impacts from other contaminants of emerging concern, including pharmaceuticals such as hormones and antibiotics, veterinary products and persistent e.g., bio-accumulative substances.

In the context of the EU pollinators' initiative and the pesticide legislative framework[32], the EU has increased efforts in the last decade to address this problem. However, knowledge gaps still hinder development and implementation of essential testing methods for a scientifically robust risk assessment of pesticides on wild bees and other wild pollinating insects. This topic will provide a critical contribution to address those knowledge gaps as identified by the European Food Safety Authority (EFSA) and the Commission (Area B) and thereby support the implementation of the EFSA guidance on the risk assessment of plant protection products on bees (*Apis mellifera, Bombus spp.* and solitary bees) and the efforts on broadening the risk assessment safeguards to other wild pollinator species.

Proposals should address Area A or Area B as follows. The Area should be clearly indicated on the application.

Area A: better understanding the routes of exposure of the wild fauna and flora to chemical pollution

Successful proposals should:

- Choose case studies, based on an analysis of chemical contaminations from an environmental history perspective, with representative species on which analysis will be undertaken. Addressing trophic chains is encouraged,
- Develop a method to establish the routes of contamination with chemicals. Priority should be given to cases with potential contamination with chemical pesticides and their metabolites; contaminants of emerging concern, including pharmaceuticals such as hormones and antibiotics, veterinary products and persistent e.g., bio-accumulative substances, SVHC (Substance of Very High Concern) and emerging pollutants. Other substances in particular micro- and nano-plastics are not excluded. Existing contaminations of the environment (legacy) especially from pesticides should also be considered. However industrial contamination is not in the scope of this topic,
- Establish the routes of contamination of the chosen representative species with chemicals, in the case studies,

[32] https://ec.europa.eu/food/animals/live-animal-movements/honey-bees/pesticides-and-bees_en; https://ec.europa.eu/food/plants/pesticides/sustainable-use-pesticides_en

- Assess the risks resulting from such contaminations for species, for ecosystems and for the local environment, including development of effect-based approach to consider mixture effects and synergies,
- In particular, establish models to link chemical ecotoxicity stress to damages on (a) genetic diversity, (b) functional diversity, and (c) ecosystem services,
- Extrapolate to provide an assessment of risks associated with chemical contaminations of terrestrial wild biodiversity at a larger scale,
- Explore prevention and mitigation measures.

Targets groups for this Area are notably regulatory bodies, farmers and other land managers organisations, civil society, local and regional decision –makers.

Successful proposals are expected to cooperate with relevant projects supported by the mission “A Soil Deal for Europe".

Area B: pollinators and pesticides

Successful proposals should:

- Characterise sources and routes of pesticide exposure in the key pollinator groups (wild bees, butterflies, hoverflies and moths),
- Investigate sensitivity of pollinators to pesticides and identify for each pollinator group sensitive species that: i) are suitable as test organisms in the risk assessment and ii) require safeguards that would indirectly protect other species within the same group (“umbrella effect”),
- Improve prediction of the toxicity endpoints, toxic units for chemicals and data poor compounds (e.g., Quantitative structure-activity relationship (QSAR) models),
- Develop toxicokinetic and toxicodynamic data and models for single and multiple chemicals,
- Generate combined toxicity data (lethal and sublethal effects) of multiple chemicals, improving the availability of data in particular for: i) chronic combined toxicity that would make it possible to identify potential interactions that may lead to deviation from dose addition (potentiation, synergism) and ii) sublethal effects.
- Investigate synergistic effects of typical combinations of pesticides (e.g., based on residue data),
- Devise and test monitoring schemes for establishing the level of contamination of pollen/nectar/water/plant matrices/soil that can support benchmarking in a predictive risk assessment, development of risk indicators and a system-based risk assessment,

- Develop an open source curated database on pollinators and the use of pesticides which would include data and information on: i) exposure and hazard, ii) lethal and sublethal effects, toxicokinetics as well as other stressors (e.g., other chemicals, nutrition, etc.) that could amplify the adverse effects through interaction with pesticides,
- Develop methodologies for risk assessment in open-source tools including toxic units approaches using lethal and sublethal effects as well as validated *in silico* models applying dose addition as the default model or models integrating synergistic effects,
- Develop population models and landscape modelling for the risk assessment of multiple chemicals in pollinators with an aim to integrate hazard and exposure information,
- Develop environmental scenarios for the risk assessment of pollinators that takes into consideration different landscape characteristics and conditions.

Proposals should earmark the necessary resources for cooperation and networking activities. Collaboration with the European partnership on biodiversity Biodiversa+ should be explored, as needed. They should use existing platforms and information sharing mechanisms notably the EC Knowledge Centre for Biodiversity.

This topic should involve the effective contribution of Social Sciences and Humanities (SSH) disciplines.

International cooperation is encouraged.

HORIZON-CL6-2023-BIODIV-01-2: Impact of light and noise pollution on biodiversity

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 3.50 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 7.00 million.
Type of Action	Research and Innovation Actions
Procedure	The procedure is described in General Annex F. The following exceptions apply: To ensure a balanced portfolio, grants will be awarded to applications not only in order of ranking but at least also to one project within the area A that is the highest ranked, and one project highest ranked within the area B, provided that the applications attain all thresholds. Proposals shall

	clearly indicate the area they are applying to.

Expected Outcome: In line with the European Green Deal and in particular with the objectives of the EU biodiversity strategy for 2030, projects will contribute to understand and address direct **drivers of biodiversity decline** in both terrestrial and aquatic environments.

Project results are expected to contribute to all following expected outcomes:

- The impact of light and noise pollution on biodiversity and ecosystem services is better understood and nature restoration activities as planned in the EU biodiversity strategy for 2030 are supported, contributing to the objective of "at least 30% of all protected species and habitats not currently in favourable conservation status should reach favourable status or at least show a strong positive trend by 2030",
- The awareness of private and public stakeholders about the impacts of light and noise on biodiversity is increased,
- Specific measures to assess, prevent and mitigate the negative impacts from light and noise on biodiversity are developed,
- Networking capacity on impacts of light and noise on biodiversity is built.

Scope: **Light pollution** is the alteration of natural lighting levels due to artificial light at night. It has been rapidly increasing, with the illumination level in developed countries increasing tenfold over the last 50 years. From 2012 to 2016, Earth's artificially lit outdoor area grew by 2.2% per year. Artificial light at night is a powerful environmental stressor which alters the biological rhythms of living organisms (fauna and flora), modifies species assemblages (e.g. fish in ports) and changes ecosystems at large. There is a broad scientific consensus that it poses a threat to biodiversity and this has led to growing concerns in recent years. Light pollution is specifically known to cause habitat fragmentation, impairing physiology and behaviour in fauna. It is notably thought to be a major factor in the gradual disappearance of insect and bird populations worldwide. Its effects seem to intensify with the use of LEDs (Light-Emitting Diodes) including outside cities. Another domain of light pollution is the horizontally polarised light reflection of certain artificial surfaces (e.g. roads and photovoltaic solar panels), posing significant threat to polarotactic insects that get trapped in search for water bodies.

Noise is an environmental factor which is also given growing attention. According to IPBES, noise's effects on nature are increasingly observed[33]. Expansion of human population, transport networks and extraction have a range of impacts upon species, depending on auditory capacities and noise wavelengths. **Underwater noises** that are due not only to shipping but also to pile drivers, sonars, seismic testing or windfarms are significant marine

[33] IPBES (2019): Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES secretariat, Bonn, Germany. 1148 pages. https://doi.org/10.5281/zenodo.3831673.

pollutants. Noise can be particularly problematic for marine organisms. It has been shown for instance that it may modify behaviour and physiology of invertebrates and it is suspected to increase infection risks and alter spawning behaviour of affected species. It is suspected, for instance, to increase infection risks and spawning behaviour of affected species. Evidence of the impact of noise pollution on **ecosystems** is also growing, like the reduction of the presence of songbirds in cities.

EU policies integrate the **need to protect biodiversity from light and noise** in a limited extent, in particular:

- The **Habitats Directive** requires Member States to take the necessary measures to avoid significant disturbance of protected species in Natura 2000 sites, which, where relevant, is applicable to light pollution (Article 6.2).
- Noise is one aspect of the good environmental status defined in the **Marine Strategy Framework Directive** No 2008/56.

Light and noise pollution in general is addressed in a number of EU policies and directives: the Environmental Noise Directive, the Outdoor Noise Directive, the Environmental Impact Assessment Directive (85/337/EEC). Reducing noise pollution is among the objectives of the EU Action Plan: *'Towards Zero Pollution for Air, Water and Soil'*. Noise and light are defined as pollutants in Regulation (EU) 2020/852 on the establishment of a framework to facilitate sustainable investment, (‘*pollutant’ means a substance, vibration, heat, noise, light or other contaminant present in air, water or land which may be harmful to human health or the environment, which may result in damage to material property, or which may impair or interfere with amenities and other legitimate uses of the environment*). Light and noise pollution is included in one of the six thematic priority objectives of the 8th Environment Action Programme to 2030 (“*pursuing zero-pollution, including in relation to harmful chemicals, in order to achieve a toxic-free environment, including for air, water, soil as well as in relation to* ***light and noise pollution****, and protecting the health and well-being of people, animals and ecosystems from environment-related risks and negative impacts*”).

There is a need to **better understand the overall impact** of these pollution sources of emerging concern on biodiversity, in particular how the conservation status of species and habitats is affected, mechanisms at stake and how to monitor and mitigate adverse effects.

Targets groups for this topic are notably regulatory bodies, civil society, local and regional decision –makers.

Successful proposals should:

- provide a **comprehensive review on available knowledge** on the impacts of noise and light pollution on biodiversity and ecosystem services (from genetic to species levels) and their combined effects with other drivers of biodiversity loss including climate change and invasive species. The scope should cover terrestrial (both in urban and rural areas), fresh water and marine environments. Projects should build upon research

performed on the European level as well as by the Member States and Associated Countries,

- assess the **overall impacts of noise and light pollution on biodiversity and ecosystem services** in Europe and the magnitude of the problems. This should include a scrutiny of applicable policies and their impact as well as a contextualisation of the problems from an environmental history perspective,
- **improve understanding of mechanisms leading to biodiversity loss**, including effects of noise and light pollution on the behaviour of animals which can eventually affect population viability,
- investigate how noise and light pollution **affect the conservation status** of species and habitats, and identify measures to avoid significant disturbance,
- assess the need and ability of **specific measures to prevent negative impacts** of light and noise on biodiversity, including monitoring,
- assess links to other policies where light and noise management is at place or relevance and synergies can be explored (disaster management, noise mapping etc.),
- **explore innovative solutions** to prevent and mitigate the impacts of light and noise on biodiversity and ecosystem services. This should not be limited to technological solutions.

Proposals should address Area A: terrestrial biodiversity and ecosystems or Area B: aquatic (including marine) biodiversity and ecosystems. The area (A or B) should be clearly indicated on the application.

Cooperation with projects supported by the mission 'Restore our Ocean and Waters' is expected for Area B. Successful proposals under Area B are expected to strengthen the European contribution to the United Nations Decade of Ocean Science for Sustainable Development (2021-2030).

Proposals should earmark the necessary resources for cooperation and networking activities. Collaboration with the European partnership on biodiversity Biodiversa+ should be explored, as needed.

This topic should involve the effective contribution of SSH disciplines. Participatory approaches, such as citizen science, could be appropriate modes of research for this action.

International cooperation is encouraged.

HORIZON-CL6-2023-BIODIV-01-3: Interdisciplinary assessment of changes affecting terrestrial and freshwater ecosystems, building on observation programmes

Specific conditions

Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 6.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 6.00 million.
Type of Action	Research and Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).

Expected Outcome: The expected outcomes should feed in the implementation of the European Green Deal[34] and the post-2020 global biodiversity framework of the Convention on Biological Diversity (CBD)[35]. Project results are expected to contribute to the following impact of destination "Biodiversity and ecosystem services": "Understand and address direct drivers of biodiversity decline – land and sea use change, natural resource use and exploitation, climate change, pollution, invasive alien species – as well as indirect drivers – demographic, socio-economic, technological, etc."

Project results are expected to contribute to all of the following outcomes:

- Attribution of ecosystem changes to direct and indirect drivers, and monitoring of driver effects on ecosystems through time;
- Enhanced understanding of the adverse impacts of climate change on biodiversity and ecosystem functioning;
- Enhanced science base, leading to better design and monitoring conservation and restoration actions for terrestrial, freshwater, and transitional ecosystems, including the reduction of greenhouse gas emissions, and increase of carbon removals, and supporting nature-based solutions;
- Enhanced support to a better alignment of the objectives and priorities of the relevant EU directives (Habitat[36], Bird[37], WFD[38], Nitrates[39]);

34 https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en
35 https://www.cbd.int/conferences/post2020/post2020-prep-01/documents
36 https://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm
37 https://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm
38 https://ec.europa.eu/environment/water/water-framework/index_en.html
39 https://ec.europa.eu/environment/water/water-nitrates/index_en.html

- Better and more transparent quantification of various uncertainties in ecosystem data and models, and propagation of these uncertainties into monitoring, spatial prioritization, and other applications.

Scope:

- These activities will foster a collective effort in the EU Member States and Horizon Europe Associated Countries to assess the status of terrestrial, freshwater, and transitional (land to sea) ecosystems (referred to as ecosystems hereafter) and prioritise conservation and restoration actions of these ecosystems including reduction of GHG missions and increases of carbon removals, with a special focus on the use of the wealth of Earth and Observation data available (remote-sensing, airborne, in-situ data).

- Use long-time series from the enhanced Earth Observation capacity in Europe (e.g. Copernicus) and in International Programmes together with other relevant sources of data to better understand the current and long-term dynamics and functioning of terrestrial and freshwater ecosystems in Europe under conditions related to global change

- Extensive use of ground based and/or airborne in-situ observation using, as appropriate, existing networks, novel observing systems, or citizen science, together with satellite data for assessing the impact of the main natural and anthropogenic pressures on the ecological processes of natural ecosystems, and on their dynamics and functioning (i.e., addressing individual and cumulative effects of multiple stressors), including in exploiting available high-resolution remote-sensing data.

- Assess the status and dynamics of these ecosystems, estimate their vulnerability to multiple stressors including anthropogenic and natural pressures, like climate change, and assess the impact of these stressors on the integrity and resilience of ecosystems

- Modelling of the ecological processes of natural ecosystems and of their interaction with the Earth System (i.e. biological, physical, and chemical processes, including primary production).

- Improving modelling of ecological processes and functional biodiversity under land-use and climate change that leads to ecosystem degradation (i.e. degraded, damaged, and destroyed ecosystems)

- Monitoring the status of natural ecosystems and assessment of the changes in relation to the underlying ecological processes.

- Integrate monitoring and modelling products into existing observatories supporting ecosystem management and conservation, to achieve better prioritisation, design and monitoring of terrestrial and freshwater ecosystem conservation and restoration actions"

This topic is part of a coordination initiative between the European Space Agency (ESA) and the European Commission (EU funded programmes) on Earth System Science. The ESA-EC

Earth System Science Initiative enables EC and ESA to support complementary collaborative projects, funded on the EU side through Horizon Europe and on the ESA side through the FutureEO programme[40]

In particular, ESA plans to complement, collaborate and coordinate with the action funded under this topic with dedicated scientific activities within the ESA Biodiversity Science Cluster (biodiversitysciencecluster.esa.int) which is part of Science for Society element of ESA FutureEO programme (eo4society.esa.int). ESA will also, to the extent possible, provide access to relevant resources (*e.g.*, virtual labs, digital platforms or 3rd party missions)

Proposals should address the collaboration with ongoing or future ESA projects and should towards this end include sufficient means and resources for effective coordination. Applicants are encouraged to enter in contact with the relevant ESA biodiversity science cluster projects and include in their proposals a work package/activities to ensure coordination with ESA relevant actions. The ESA biodiversity cluster focusses on the development, validation, and scientific analysis of novel satellite data products, the characterisation the structure and dynamics of terrestrial and freshwater ecosystems, the exploitation of the synergistic observation opportunities offered by the existing and coming Earth Observation missions (e.g., Copernicus sentinels, Earth Explorers, national missions) and advancing on the understanding of the response of ecosystems to different stressors using satellite technology.

Project activities shall fully exploit and build complementarities with the ongoing work regarding the establishment of the European Open Science Cloud and interact with relevant projects developing metadata standards and added value tools to ensure interoperability within and across fields of study.

Collaboration with the European Biodiversity Partnership (Biodiversa+) should be explored, as needed.

Biodiversity protection and restoration

Proposals are invited against the following topic(s):

HORIZON-CL6-2023-BIODIV-01-4: Nature protection: Better methods and knowledge to improve the conservation status of EU-protected species and habitats

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 4.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative	The total indicative budget for the topic is EUR 8.00 million.

[40] The Programme will be available here: https://www.esa.int/Applications/Observing_the_Earth/FutureEO

budget	
Type of Action	Research and Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: The Joint Research Centre (JRC) may participate as member of the consortium selected for funding.
Procedure	The procedure is described in General Annex F. The following exceptions apply: To ensure a balanced portfolio, grants will be awarded to applications not only in order of ranking but at least also to one project within the area A that is the highest ranked, and one project within the area B that is the highest ranked, provided that the applications attain all thresholds. Proposals shall clearly indicate the area they are applying to.

Expected Outcome: In line with the objectives of the European Green Deal, the EU biodiversity strategy for 2030, and existing EU nature legislation (Birds and Habitats Directives), project results will contribute to the following impact of destination "biodiversity and ecosystem services": "to plan, manage and expand terrestrial and marine protected areas and improve the conservation status of species and habitats, based on up-to-date knowledge and solutions"**.** More specifically, project results will improve the setting of conservation objectives and measures for EU-protected habitats and species, thereby also ensuring that the network of Natura 2000 sites enable the maintenance or restoration of favourable conservation status**.**

Results of individual projects are expected to contribute to at least one of the following expected outcomes:

- Favourable conservation status for species and habitats covered by the EU Birds and/or Habitats Directives, and clarification of what is needed on an EU or biogeographical scale or other ecologically relevant scale (e.g., major basin, major flyway) in line with the relevant parameters and their values on the basis of which Member States define favourable conservation status.

- Better implementation of the EU Birds Directive specifically in relation to the 42 huntable bird species listed in Annex II of the directive which are not in a secure status, by filling scientific knowledge gap in relation to the amount and quality of habitat that is needed for these species (with a focus on their breeding habitats), and to ensure that their hunting is carried out sustainably.

Scope: Proposals should address Area A or Area B as follows. The Area should be clearly indicated on the application.

Area A: Improving the conservation status of habitats and species protected under the Habitats and/or Birds Directive.

Successful proposals should:

- improve the definition of "favourable conservation status" of groups of habitats and/or species protected under the EU Birds and/or Habitats Directives, provide guidance on how to improve the monitoring of habitats and species and/or the setting of favourable reference values and favourable reference conditions in Member States. The focus of this work should be on data-deficient habitats and species, on habitats and species in the worst status (conservation status and/or EU Red list status), or with declining trends[41] and/or on those species the recovery of which has created tensions with stakeholders (e.g., large carnivores, some geese species, cormorants, etc.). A specific focus could also be placed on habitats and species which depend on the maintenance of sustainable agricultural land management.

- ensure the recovery of habitats and/or species in unfavourable status and/or with a declining trend according to the reporting under the EU Birds and/or Habitats Directive (2019)[42] by providing methodologies and recommendations on how to identify recovery needs for populations or restoration needs for habitats, including with regard to geographical location, quantity and quality of habitat to be restored.

Area B: Improving the conservation status of huntable bird species listed in Annex II of the Birds Directive.

Successful proposals should:

- Identify habitat management and restoration needs for huntable bird species in non-secure status, with a focus on agricultural habitats, evaluate the impact of hunting and provide recommendations for an adaptive harvest management of these species, considering the available species-specific data on habitat quality and quantity impacting their fecundity and breeding success and survival rate for these species. Preparatory work done by the Commission Services should be taken into account[43].

Proposals should closely follow and ensure consistency with any ongoing or future relevant policy developments, with a particular focus on the voluntary EU targets for improving the

41 State of Nature in the EU: Results from reporting under the nature directives 2013-2018: State of nature in the EU — European Environment Agency (europa.eu) National summary dashboards - Habitats Directive – Art.17: National summary dashboards - Habitats Directive – Art.17 — European Environment Agency (europa.eu)National summary dashboards - Birds Directive – Art.12: National summary dashboards - Birds Directive – Art.12 — European Environment Agency (europa.eu)

42 Article 17 Reporting Habitats Directive: https://nature-art17.eionet.europa.eu/article17/Article 17 National Summaries: CIRCABC - MS National Summaries (europa.eu)Article 12 Reporting Birds Directive: https://nature-art12.eionet.europa.eu/article12/Article 12 National Summaries: CIRCABC - MS National Summaries (europa.eu)

43 habitats - Library (europa.eu)

status of species and habitats[44] and increasing the coverage of protected areas[45], as well as in relation to the upcoming Commission proposal for legally binding restoration targets.

Proposals should earmark the necessary resources for cooperation and networking activities. They are expected to link with relevant projects such as EuropaBON, LIFE Integrated Projects and LIFE Strategic Nature Projects as well as with relevant projects under Horizon Europe topics, such as HORIZON-CL6-2021-BIODIV-01-02: Biodiversity and Ecosystem Services Collaboration with the European partnership on biodiversity Biodiversa+ should be explored, as needed.

The possible participation of the JRC would help ensure that the methodologies proposed can support environmental compliance assurance, particularly by leveraging geospatial intelligence.

HORIZON-CL6-2023-BIODIV-01-5: Understanding and reducing bycatch of protected species

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 9.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 18.00 million.
Type of Action	Research and Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: The Joint Research Centre (JRC) may participate as member of the consortium selected for funding.

Expected Outcome: In line with the European Green Deal and in particular with the objectives of the EU biodiversity strategy for 2030, the Birds, Habitats and Marine Strategy Framework Directives and the common fisheries policy, as well as the "Action plan to conserve fisheries resources and protect marine ecosystems", projects' results will contribute to improving the monitoring and assessment of the impact of bycatch in different fishing gears on protected and sensitive species, including in protected areas, defining and implementing effective mitigation and management tools, based on up-to-date knowledge and solutions. They will contribute to the following impacts of destination "Biodiversity and ecosystem services": "Understand and address direct drivers of biodiversity decline – land and sea use change,

[44] Guidance to Member States on how to select and prioritise species/habitats for the 30% conservation improvement target under the strategy: biodiversity_nature - Library (europa.eu)

[45] Commission Staff Working Document: Criteria and guidance for protected areas designations: biodiversity_nature - Library (europa.eu)

natural resource use and exploitation, climate change, pollution, invasive alien species – as well as indirect drivers – demographic, socio-economic, technological etc." and "Plan, manage and expand protected areas and improve the status of species and habitats based on up-to-date knowledge and solutions".

Selected proposals are expected to contribute to all following expected outcomes:

- Elimination or significant reduction of bycatch is achieved for marine mammals (e.g., up to 8500 dolphins killed each year in the Bay of Biscay), sea turtles (currently ~70 000 killed each year in EU waters) and seabirds (currently ~200 000 killed each year in EU waters) and sensitive or endangered fish species (e.g. elasmobranchs and sturgeons).

- Bycatch risks and reasons are well understood, including the spatial and temporal distribution of sensitive species.

- Information needed to improve Member States' monitoring programmes and implementation of management actions is acquired.

- Impacts of bycatches (rate of interactions, fate of individuals post-release, by gear and by fishery, impact on population abundance and sustainability) on the conservation status of species are assessed and understood.

- Interactions of bycaught species with fishing gears are minimised and where possible eliminated, and mortality following interaction is reduced.

- Member States are enabled to reach the target of the EU biodiversity strategy for 2030 to eliminate or reduce bycatch of sensitive species and to step up bycatch monitoring, as well as to fully and coherently implement the EU environmental and fisheries legislation and the Action plan to conserve fisheries resources and protect marine ecosystems and to protect marine ecosystems as required by the EU climate adaptation strategy.

- Member States are enabled to set criteria for Good Environmental Status under the Marine Strategy Framework Directive in relation to maintaining biodiversity and ensuring that all elements of marine food webs occur at normal abundance and diversity.

Scope: Proposals should work in one or more European regional seas and/or in other marine areas where EU fleet operates and should:

- Evaluate bycatch risk on a sea basin and/or local level (in particular for marine mammals, sea turtles, seabirds, and sensitive or endangered fish species such as e.g., elasmobranchs and sturgeons) by identifying the fishing activity of high-risk gear and comparing it with the spatial distribution/abundance of affected species, producing bycatch risk maps for all relevant species/gear interactions. Gather data and improve knowledge on the conservation status of bycaught species.

- Develop or improve tools for monitoring of bycatch, including long-term observation and surveying programmes, e.g. through extending the use of remote electronic

monitoring and artificial intelligence-based image recognition, enabling Member States to identify and implement adequate conservation measures as required by EU legislation.

- Close the knowledge gaps on the locations, precise extent (number of individuals, season and locations) and reasons for bycatch (relevant metiers and fisheries), focusing on species threatened by extinction or in a bad conservation status.
- Assess the effectiveness of existing bycatch mitigation methods (such as spatio-temporal closures or gear modifications) as well as of bycatch handling and safe release guidelines, and address their shortcomings, including through the development and testing of new approaches, focusing on high risk fisheries and most threatened species and areas.
- Engage relevant stakeholders and environmental and fishing authorities and operators in the research projects promoting co-design in the development and testing of new approaches.

This topic is expected to contribute to the conservation of whales, whose role in carbon sequestration in the ocean is now thought to be important, therefore this topic will indirectly contribute to carbon sequestration.

Proposals should earmark the necessary resources for cooperation and networking activities. Proposals should build on existing relevant projects, including funded under Horizon 2020 and LIFE programme, as well as relevant work done by the International Council for the Exploration of the Sea (ICES) and in Member States. They should also collaborate with Horizon Europe projects selected under topics on cumulative impact of stressors (i.e., HORIZON-CL6-2021-BIODIV-01-04: Assess and predict integrated impacts of cumulative direct and indirect stressors on coastal and marine biodiversity, ecosystems and their services) and marine/coastal observation & mapping (i.e., HORIZON-CL6-2022-BIODIV-01-01: Observing and mapping biodiversity and ecosystems, with particular focus on coastal and marine ecosystems). Additionally, they should collaborate with projects that will be funded under the Mission Restore our Ocean and Waters by 2030.

Concrete efforts shall be made to ensure that the data produced in the context of projects are FAIR (Findable, Accessible, Interoperable and Re-usable), particularly in the context of real-time data feeds, exploring workflows that can provide “FAIR-by-design” data, i.e., data that is FAIR from its generation.

International cooperation is encouraged, in particular with non-associated third countries participating in regional fisheries management organisations of EU interest.

The possible participation of the JRC in the project would consist in providing and analysing fisheries data as Member States upload some of the collected data to JRC databases.

HORIZON-CL6-2023-BIODIV-01-6: Restoration of deep-sea habitats

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 10.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 10.00 million.
Type of Action	Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).
Technology Readiness Level	Activities are expected to achieve TRL 5-6 by the end of the project – see General Annex B.

Expected Outcome: In line with the European Green Deal and, in particular with the objectives of the EU biodiversity strategy for 2030, the EU proposal for a nature restoration law[46] and the Birds and Habitats Directives, the Marine Strategy Framework Directive (MSFD), the Regulation 734/2008 on the protection of vulnerable marine ecosystems in the high seas from the adverse impacts of bottom fishing gears, the climate adaptation and mitigation strategies, the project should contribute to the destination impacts of aiming at bringing back biodiversity on a path to recovery, and preserving and sustainably restoring ecosystems and their services, planning, managing and expanding protected areas, mainstreaming biodiversity, ecosystem services and natural capital in the society and the economy, and addressing direct and indirect drivers of biodiversity decline. They should provide public authorities, as well as operators in marine ecosystem restoration, with solutions to plan and upscale restoration operations of deep-sea habitats based on up-to-date knowledge and solutions.

Projects results are expected to contribute to all of the following expected outcomes:

- Better prioritisation of sites for active restoration in EU and Associated Countries seas and definition of ecosystem functioning restoration targets, considering short to long timescales, and taking into account impacts of climate and other abiotic changes;
- Better decision making and contribution to policy formulation and implementation linked to protecting and restoring deep-sea marine biodiversity, ecosystem functioning

[46] EUR-Lex - 52022PC0304 - EN - EUR-Lex (europa.eu)

and ecosystem services and blueprints for the financing and the selection of tested active restoration approaches, tools and monitoring of their effects, taking into account cost-benefit analysis and integrating ecosystem services and natural capital accounting;

- Advanced knowledge on deep-sea ecosystems adaptation and demonstrated innovative and technically challenging active restoration of deep-sea habitats for climate change adaptation and mitigation.

Scope: Marine ecosystems usually have long recovery times. Climate change is adding risk factors. Effects of passive restoration (protection measures) may take multiple decades before benefits may be felt. This is even more the case for deep-sea ecosystems. They have low energy density, slower biochemical processes and assemble species with long life cycle / span. Active restoration should be explored to help accelerate the restoration.

Proposals should build on and capitalise on the knowledge base developed and lessons learnt from the Horizon 2020 MERCES project, notably its census of European marine key habitats maps, degraded habitats maps, key habitats restoration potential and its trials on deep-sea restoration, as well as from other national or EU relevant past or ongoing projects in the field of deep-sea ecosystems exploration from Horizon 2020, EEA Grants and Horizon Europe (notably in topic HORIZON-CL6-2021-BIODIV-01-03 and HORIZON-CL6-2022-CLIMATE-01-02).

The restoration activities should take place in areas with degraded habitats, and where protection measures against the causes of their degradation are already in place.

Proposals should develop and test innovative and technically challenging active restoration of deep-sea habitats. For this reason, and the cost of accessing the deep-sea, only one project may be funded with the budget available. Proposals should integrate different disciplines and novel approaches for the restoration that consider connectivity (including migratory species & vertical connections) in space and time, ecosystem modelling, as well as on site access, observation, and monitoring.

The restoration focus should not be only on species traits targets (population, assemblage, genetic diversity, sex determination, etc.), but also on ecosystem functions including adaptation potential. The proposals should include abiotic changes due to climate impact scenarios in identifying niche and refuge niche.

Proposals should set up governance frameworks for the restoration by involving local and national relevant actors (those having an impact on the achievement of the restoration goals, those having an interest and those who are impacted by related actions) to enable acceptability, ownership and a mechanism for long-term commitment to the restoration that exceed typical business and political cycles on financing, managing, regulating, monitoring and enforcement. Some short-term objectives are required to allow for measurements of restoration impacts in a reasonably shorter time frame to get on the right trajectory, but then check on mid- to long- term (5-20 years) should be planned.

Proposals should advance the knowledge base on the socio-economic costs and benefits of deep-sea restoration: including addressing the socio-economic importance of deep-sea ecosystems; considering upscaling issues and costs with restoration of deep-sea habitats, and timescales considerations.

Proposals should identify and test additional protection and management measures of the areas, to support the active restoration interventions over the long time, and provide recommendations for their application for new protected areas.

The proposals should contribute to filling the gaps in assessing deep-sea biodiversity recovery valuing changes in ecosystem goods and services; and contribute to define a natural capital accounting for deep-sea habitats.

The projects funded under this topic should build links with other relevant projects and initiatives such as Horizon 2020 and Horizon Europe projects in the field of deep-sea ecosystems and with projects funded under the European Mission 'Restore our ocean and waters by 2030', in particular with the Mission activities under objective 1 – protect and restore marine ecosystems and their biodiversity, and with the Mission lighthouse activities and Blue Parks, as well as with the Mission implementation monitoring system that will be part of the Mission Implementation Support Platform for reporting, monitoring and coordination of all relevant implementation activities. Proposals should outline a plan on how they intend to collaborate with other projects and initiatives, by e.g. participating in joint activities, workshops, common communication and dissemination activities, etc. Applicants should allocate the necessary budget to cover the plan. Relevant activities of the plan will be set out and carried out in close cooperation with relevant Commission services, ensuring coherence with related policy initiatives.

In order to achieve the expected outcomes in integrating and coordinating these different scaled approaches, international cooperation is strongly encouraged. A strong linkage should be ensured with the ongoing activities under the All-Atlantic Ocean Research and Innovation Alliance. Actions under this topic will build upon and link with Horizon projects. All in-situ data collected through actions funded from this call should follow INSPIRE principles and be available through open access repositories supported by the European Commission (Copernicus, GEOSS, and European Marine Observation and Data Network (EMODnet). Where relevant, creating links to and using the information and data of the European Earth observation programme Copernicus, the Group on Earth Observations (GEO) and the Global Earth Observation System of Systems (GEOSS) is expected.

Collaboration with the relevant existing European Research Infrastructures is considered necessary.

HORIZON-CL6-2023-BIODIV-01-7: Demonstration of marine and coastal infrastructures as hybrid blue-grey Nature-based Solutions

Specific conditions

Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 5.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 10.00 million.
Type of Action	Innovation Actions
Technology Readiness Level	Activities are expected to achieve TRL 5-7 by the end of the project – see General Annex B.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: Eligible costs will take the form of a lump sum as defined in the Decision of 7 July 2021 authorising the use of lump sum contributions under the Horizon Europe Programme – the Framework Programme for Research and Innovation (2021-2027) – and in actions under the Research and Training Programme of the European Atomic Energy Community (2021-2025). [47].

Expected Outcome: In line with the European Green Deal and, in particular with the objectives of the EU biodiversity strategy for 2030, the EU proposal for a nature restoration law [48] and the Birds and Habitats Directives, the Marine Strategy Framework Directive (MSFD), the climate adaptation and mitigation strategies, the new approach for a sustainable blue economy, the EU guidance document on integrating ecosystems and their services in decision-making, the projects should contribute to the destination impacts of mainstreaming biodiversity, ecosystem services and natural capital in the society and the economy, and addressing direct and indirect drivers of biodiversity decline. They should provide public authorities, as well as related infrastructures operators in their design, engineering, construction, installation and exploitation, with nature centred solutions that are beneficial for biodiversity, ecosystem services and the original infrastructure purpose (renewable energy production, or coastal protection).

Projects results are expected to contribute to all of the following expected outcomes:

- Pave the way for a new level of ecosystem-based management, in which future marine and coastal infrastructures (e.g., protection of coastal and urban areas from climate change impacts, offshore windfarms, harbours, tourism development, bridges, etc.) are intentionally designed and actively used to support the restoration (where the term encompasses multiple approaches to actively rehabilitate, repair, reallocate or reinvent

[47] This decision is available on the Funding and Tenders Portal, in the reference documents section for Horizon Europe, under 'Simplified costs decisions' or through this link: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ls-decision_he_en.pdf

[48] EUR-Lex - 52022PC0304 - EN - EUR-Lex (europa.eu).

damaged biodiversity and ecosystem processes and services) of marine ecosystem health and services (including climate mitigation & adaptation), where nature-based solutions alone cannot be envisaged;

- Contribute to the development of a framework for "blue buildings" rating based on the model of the LEED[49] (Leadership in Energy and Environmental Design) green building rating system;

- Upscale Blueprints integrating the conception, installation, exploitation, maintenance of hybrid blue-grey infrastructures that are beneficial to ecosystem functioning and restoration;

- Mainstream biodiversity in marine and coastal infrastructures and activities.

Scope: Climate policies trigger the development of several-large scale infrastructures in the marine and coastal environment. In particular, the EU offshore renewable energy plan targets for 40 GW of EU wave and tidal energy by 2050 from the 13 megawatts (MW) operating today. Climate adaptation and impacts reduction strategies imply the increase of an already important development of coastal and urban protection from erosion, sea level rise and extreme events. Global trade is supported by enlarging or building new ports. They may cause trade-offs against endemic biodiversity and alter on-going natural eco-evolutionary responses. They may cause trade-offs against endemic biodiversity and ecology, but they could protect, restore or harbour functional ecosystems (even if mostly novel) providing critical functions and services opportunities to biodiversity by mimicking and integrating natural processes and features in their design.

Proposals should be large scale demonstration of hybrid nature-based solutions with built coastal and marine infrastructures to preserve ecosystems and/or support their restoration. The infrastructure purpose should be originally aiming at climate policy targets (e.g., hard and soft coastal or urban protection from climate change impacts – sea level rise, extreme events, erosion - , renewable energy farms or islands, maritime services and safety, etc.) and with the highest potential for being replicated, scaled-up and deployed. Proposals should also assess the putative impacts/secondary effects of these infrastructures, notably regarding cumulative impacts of the biodiversity drivers such as climate, land and sea-use change (infrastructures), invasive alien species, etc. The action should consider impacts and opportunities from ecological connectivity with neighbouring ecosystems.

Proposals looking at infrastructures serving several purposes (such as Low Trophic Aquaculture; educational and recreational purposes; support of fishery via creation of nursery habitats; bio filtration and bio depollution) are encouraged. Proposals should integrate the relevant results of other Horizon 2020 or national projects on multi-use of the marine space.

Proposals should look how nature benefits could be put at the centre of the infrastructures by addressing the selection or the development of materials for their construction, design, installation, and maintenance, to maximise the positive effects on natural processes and

[49] https://www.usgbc.org/leed

enable their preservation (if in good status) or restoration of the local marine ecosystems and their socio-ecological management.

Proposals should explore and improve co-creation approaches with the relevant actors (infrastructure owners, governance, civil society and end-users or beneficiaries) for the design, installation and management of these built infrastructures with nature centred design. Social innovation is recommended when the solutions are at the socio-technical interface and require social change, new social practices, social ownership or market uptake. Proposals should provide evidence and data of the multiple benefits and potential trade-offs of these hybrid solutions on short and long-term timescales and, in particular, for the purposes of marine biodiversity and ecosystems functions protection and restoration, but also for the blue economy and society as a whole.

In particular, for hybrid infrastructures aiming at protection against climate impacts, the proposals should provide evidence-based analysis of their efficiency compared to more usual infrastructure approaches, and to usual nature-based solutions, or as alternatives where "NBS alone" cannot be envisaged due to local environmental features. The projects funded under this topic should build links with projects funded under the European Mission 'Restore our ocean and waters by 2030', in particular with the Mission activities under objective 1 – protect and restore marine ecosystems and their biodiversity, and with the Mission lighthouse activities and Blue Parks as well as with the Mission implementation monitoring system that will be part of the Mission Implementation Support Platform for reporting, monitoring and coordination of all relevant implementation activities. Proposals should also connect with relevant projects under Horizon Europe topics, such as (HORIZON-CL6-2022-BIODIV-01-03), on support of development of policies, business models and market conditions to scale up and speed up the implementation of nature-based solutions.

Projects are expected to contribute to the New European Bauhaus (NEB) initiative[50] by interacting with the NEB Community, NEBLab and other relevant actions of the NEB initiative through sharing information, best practices, and, where relevant, results.

In order to achieve the expected outcomes in integrating and coordinating these different scaled approaches, international cooperation is strongly encouraged. A strong linkage should be ensured with the ongoing activities under the All-Atlantic Ocean Research and Innovation Alliance. Actions under this topic will build upon and link with Horizon projects. All in-situ data collected through actions funded from this call should follow INSPIRE principles and be available through open access repositories supported by the European Commission (Copernicus, GEOSS, and EMODnet). Where relevant, creating links to and using the information and data of the European Earth observation programme Copernicus, the Group on Earth Observations (GEO) and the Global Earth Observation System of Systems (GEOSS) is expected.

[50] See COM/2021/573 final on 'The New European Bauhaus - Beautiful, Sustainable, Together' and https://europa.eu/new-european-bauhaus/index_en

Collaboration with the relevant existing European Research Infrastructures is considered necessary.

Mainstreaming biodiversity in society and the economy

Proposals are invited against the following topic(s):

HORIZON-CL6-2023-BIODIV-01-8: Addressing biodiversity decline and promoting Nature-based Solutions in higher education

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 3.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 3.00 million.
Type of Action	Coordination and Support Actions
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: Eligible costs will take the form of a lump sum as defined in the Decision of 7 July 2021 authorising the use of lump sum contributions under the Horizon Europe Programme – the Framework Programme for Research and Innovation (2021-2027) – and in actions under the Research and Training Programme of the European Atomic Energy Community (2021-2025). [51].

Expected Outcome: This topic aims to contribute to education, skills development and awareness raising about biodiversity loss, and how this can be addressed, notably with Nature-based Solutions (NBS), in the higher education sector. This is fundamental to further implement and upscale NBS and to mainstreaming biodiversity, ecosystem services, including carbon sequestration, climate resilience and pollution reduction, and natural capital in the society and economy. Through education and NBS, the topic contributes to the transformative change necessary to tackle societal challenges, notably addressing the EU biodiversity strategy for 2030 and the EU climate adaptation strategy.

Project results are expected to contribute to all of the following expected outcomes:

[51] This decision is available on the Funding and Tenders Portal, in the reference documents section for Horizon Europe, under 'Simplified costs decisions' or through this link: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ls-decision_he_en.pdf

- Improved and more coordinated education programmes and increased awareness about biodiversity loss and how this can be addressed together with climate change notably through NBS, in universities and technical schools.

- Increased awareness and development of skills among young people, teachers, professional organisations, on biodiversity, climate change and NBS.

- A transdisciplinary dialogue on inclusive NBS contributing to nature-based thinking and a nature-positive economy, drawing on inclusiveness, the pluralities of values and of knowledge.

- A sustainable recovery of society and the necessary transformative change through biodiversity-friendly actions, professional, collective and personal attitudes.

Scope: The European Green Deal communication puts forward a specific action for the Commission to prepare a European competence framework to help develop and assess knowledge, skills and attitudes on climate change and sustainable development. This competence framework should serve as a reference tool for the development and assessment of competences on environmental sustainability. Following the EU biodiversity strategy for 2030, the Commission proposed in 2022 a Council Recommendation on encouraging cooperation in learning for environmental sustainability, including biodiversity learning and teaching, which was accompanied by a competence framework.

Education plays indeed an essential role in addressing environmental sustainability by raising awareness and instilling the key competences needed for changing personal behaviours and empowering people to act in their respective communities, especially in the current context of economic recovery, biodiversity crisis and climate change.

Drawing on state-of-the-art science, including the results of EU-funded R&I projects on biodiversity and NBS, the selected project will develop and disseminate concrete guidance for higher education institutions. It will target vocational training, universities and technical schools, for greater involvement with citizens and professional organisations, to mainstream biodiversity and NBS into their learning, teaching and capacity building programmes.

Transdisciplinary collaboration is a fundamental prerequisite for mutual understanding of people working in different sectors when co-creating and co-implementing NBS. There is a need to go beyond tackling challenges individually and perceive the systemic complexity of challenges to be addressed by NBS, by working together across silos, sectors and epistemologies. This paradigm shift in education and skills development will contribute to the necessary transdisciplinary work for tackling both biodiversity and climate crises at different decision-making scales.

The successful proposals should:

- Develop networking and collaboration schemes on higher education curricula and programmes on NBS, as well as researcher mobility initiatives.

- Support and promote the teaching of NBS co-design and co-creation (considering biodiversity and ecosystem services as their fundamental building blocks) as part of high education degrees and further education qualifications. Explore ways of raising awareness and teaching the importance of biodiversity, including genetic, functional and taxonomic diversity, and ecosystem services, including carbon sequestration, climate resilience and pollution reduction, especially in those academic fields where this is still greatly lacking (e.g., economics, engineering, etc).

- Encourage holistic approaches centred on biodiversity and the interlinks with climate change; and assess and propose university curricula for NBS-related disciplines, as well as for universities of technology, engineering and other non-biodiversity focused studies that are relevant for NBS design, implementation, monitoring and maintenance.

- Develop collaboration, guidance, benchmarking and exchange of best practices on how the higher education sector can address its impacts on biodiversity when addressing climate change (e.g., in built infrastructure, consumption and other processes), including through NBS.

- Explore innovative ways of involving higher education institutions, their students and staff in tackling the biodiversity crisis, together with the climate crisis (e.g., through documentaries, awards, art interventions, campus improvements).

- Develop NBS capacity building and skills development programmes, in different EU official languages and knowledge transfer mechanisms, in coordination with the relevant professional organisations and building on the work developed on NBS standards and protocols, e.g. by the Horizon 2020 and Horizon Europe NBS project portfolio, or by the IUCN, so that new technical solutions and standards are used in the NBS supply market.

- In view of a just ecological transition, provide specific NBS vocational training and skills development programmes for the youth, long term unemployed or other social groups in need (including in most deprived regions), co-developed with the relevant professional training and social inclusion institutions.

- Explore innovative ways of ensuring a transdisciplinary dialogue on biodiversity, drivers of biodiversity change, climate and NBS among communities of practice and professional organisations, as well as in universities. In this respect, develop approaches to ensure the quality of transdisciplinary programmes and provide an innovative dialogue space ensuring transdisciplinarity and welcoming the pluralities of values and knowledge, in view of transformative change to tackle both climate and biodiversity crises.

- Outreach and cooperation activities between higher education institutions and citizens, the local and regional communities, businesses, research centres, or museums, supporting challenge-based and experiential learning with real-life applications, promoting nature-based thinking, public debate and a change of behaviour.

- Organise academic residences or summer schools with the relevant partners in Member States, where students can join interdisciplinary and multicultural discussions and witness, in person, the co-creation, co-implementation and co-monitoring of NBS, also in view of emancipatory action for transformative change.

Proposals should address all of the above points.

This topic requires the effective contribution of SSH disciplines and the involvement of SSH experts, institutions as well as the inclusion of relevant SSH expertise, in order to produce meaningful and significant effects enhancing the societal impact of the related research activities. In particular, SSH should be involved in view of ensuring the understanding and inclusion of different values and perceptions of nature, biodiversity and NBS, as well as issues of knowledge creation, identity and culture shaping NBS co-creation and co-implementation.

Proposals should include specific tasks and allocate sufficient resources to collaborate with other projects selected in any other relevant topic, by participating in joint activities, workshops, as well as common communication and dissemination. In particular, the project should build on the existing outputs and create synergies with the relevant projects in Erasmus+, the Horizon Europe Missions (notably “Restore Our Ocean and Waters by 2030” and "Adaptation to climate Change”), as well as the Horizon 2020 NBS project portfolio and its task forces. The project should also foresee synergies with HORIZON-CL6-2022-BIODIV-01-03: Network for nature: multi-stakeholder dialogue platform to promote nature-based solutions; with the HORIZON-CL6-2021-COMMUNITIES-01-06: Inside and outside: educational innovation with nature-based solutions; and HORIZON-CL5-2023-D1-01-10: Improving the evidence base regarding the impact of sustainability and climate change education and related learning outcomes. Applicants should plan the necessary budget to cover these activities without the prerequisite to define concrete common actions at this stage.

Proposals should ensure that all evidence, information and project outputs are accessible through the Oppla portal (the EU repository for NBS).

HORIZON-CL6-2023-BIODIV-01-9: Biodiversity, economics and finance: unlocking financial flows towards reversing of biodiversity loss

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 5.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 5.00 million.
Type of Action	Research and Innovation Actions

Expected Outcome: In line with the European Green Deal priorities and in particular with the EU biodiversity strategy for 2030 and the 2030 climate target plan, the successful proposal will help unlock financial flows needed for reversing biodiversity loss and help better implement the sustainable finance taxonomy, thus contributing to mainstream biodiversity, ecosystem services and natural capital in the society and economy and to build approaches for enabling transformative changes to face societal challenges, including through the deployment of nature-based solutions (NBS).

Project results are expected to contribute to all of the following expected outcomes:

- Mobilisation of mainstream finance to slow down, and reverse biodiversity loss in the broader context of environmentally sustainable development, by catalysing nature-positive investments such as nature-based solutions, and by promoting a more holistic approach that considers nature's essential contributions to other objectives such as those related to climate, health, food, and water security;

- New knowledge, methodologies, and tools to support the implementation of the EU strategy for financing the transition to a sustainable economy, with a view to reorienting financial flows towards activities that benefit protection, restoration and sustainable management and use of biodiversity and ecosystems, including information, tools, and metrics to better integrate biodiversity, ecosystem services and natural capital considerations in their decision-making processes;

- Better awareness, understanding and know-how of economic actors, the financial community, and key institutions, public and private, about the opportunities and barriers (knowledge gaps, skills gaps, etc.) associated with the implementation of the sustainable finance taxonomy[52] , including its technical screening criteria[53] and 'Do No Significant Harm' (DNSH) principle in regard of the environmental objective focusing on the protection and restoration of biodiversity and ecosystems[54]

- Contribution to the implementation of the EU biodiversity strategy for 2030 by helping to put Europe's biodiversity on the path to recovery by 2030 for the benefit of people,

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52 Delegated Acts of the correlated Regulation (EU) 2020/852: one adopted Act, C/2021/2800 final, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=PI_COM:C(2021)2800 and the other one in draft stage, but to be adopted in 2022.

53 Detailed technical screening criteria are being set out in Delegated Acts of the Taxonomy Regulation for relevant NACE activities to determine whether an economic activity 'Substantially Contribute' (SC) to the 5 environmental objectives as described in art. 9 of the Regulation, including the objective for the protection and restoration of biodiversity and ecosystems (2). Besides this, detailed technical criteria have been set up for relevant NACE activities to determine that an economic activity which substantially contributes to any of the other 5 environmental objectives as described in art. 9 of the Regulation, does not significantly harm (DNSH) the objective for the protection and restoration of biodiversity and ecosystems.

54 For 'SC' through any of the following means: (a) nature conservation (habitats, species); protecting, restoring and enhancing the condition of ecosystems and their capacity to provide services; (b) sustainable land management, including adequate protection of soil biodiversity; land degradation neutrality; and the remediation of contaminated sites; (c) sustainable agricultural practices, including those that contribute to halting or preventing deforestation and habitat loss; (d) sustainable forest management.

climate, and the planet and by better measurement, monitoring, and management of biodiversity.

Scope: Nature provides all sorts of essential services to our societies: clean air and water, food, pollination, carbon sequestration and pollination, it sustains tourism and leisure activities, it contributes to mental and physical health and delivers many other functions. In many instances, nature is also the most effective insurance policy – protecting us from floods, landslides, fires, or extreme heat.

However, we are facing an unprecedented crisis of biodiversity loss, posing a serious threat to our future welfare. 75% of the land-based environment and about 66% of the marine environment have been significantly altered by human actions. Nearly 1 million species are at risk of extinction from human activities. The loss of clean air, drinkable water, pollinating insects, forests, and species pose as big a threat to species survival as climate change. The loss of biodiversity increases the challenge of limiting climate change**,** as healthy ecosystems naturally absorb carbon from the atmosphere.

At the same time, Research findings [55] indicate that the conservation and effective management and guardianship of at least 30% of the planet in the most important places for biodiversity could protect up to 80% of plant and animal species, and secure 60% of the planet's carbon stocks and 66% of the planet's clean water. The latest IPCC report complements this statement: conservation of approximately 30% to 50% of the planet will also be key in maintaining the resilience of biodiversity and ecosystem services at a global scale. UNEP report on the State of Finance for Nature[56] states that investments in NBS need to triple by 2030 and to quadruple by 2050[57] if the world is to meet its climate change, biodiversity and land restoration targets. As underlined in the same report, more research is needed on how private financing can be strengthened and what are the low-hanging investment opportunities.

The EU sustainable finance taxonomy and other similar initiatives are underway with the aim to help guide investments towards more sustainable outcomes, in line with the objectives of the European Green Deal. They constitute a unique opportunity for ramping up investments in natural capital and projects that substantially contribute to biodiversity, as well as to other challenges, such as nature-based solutions and ecosystem restoration contributing to climate mitigation and adaptation**.**

Mobilising private investment, in particular to support the scaling up of NBS and the market for NBS in the European Union is key, in the context of a market characterised by smaller scale projects predominantly grants funded by the public sector.

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55 Jung, M., Arnell, A., de Lamo, X. *et al.* Areas of global importance for conserving terrestrial biodiversity, carbon and water. *Nat Ecol Evol***5,** 1499–1509 (2021). https://doi.org/10.1038/s41559-021-01528-7 and IPCC report 'Climate Change 2022: Impacts, Adaptation and Vulnerability'

56 State of Finance for Nature | UNEP - UN Environment Programme.

57 To amount to USD 8.1 trillion, and will be over USD 536 billion annually. USD 133 billion currently flows into nature-based solutions annually, with public funds representing 86% and private finance only 14%.

The project(s) should**:**

- Co-identify, analyse, and explore solutions to address potential barriers and hurdles in the implementation of the Taxonomy Regulation, for example related to the interpretation and the collection of data for biodiversity relevant technical screening criteria. The project(s) could address the technical criteria 'Substantially Contribute' to climate change mitigation and adaptation while following the 'Do No Significantly Does Harm' in terms of the protection and restoration of biodiversity and ecosystem; as well as the criteria 'Substantially Contribute' to the protection and restoration of biodiversity and ecosystem, especially for activities related to land management, restoration of ecosystems and remediation;

- More particularly, identify for which criteria/sectors there are practical implementation barriers and gaps, for example through analysis of case studies, when collecting the remaining Research and Innovation gaps;

- Building on the existing community's engagement in relevant Horizon 2020 and LIFE projects[58], engage the relevant stakeholders from the financial and biodiversity and NBS community involved in the implementation of the regulations in this analysis, and in the exploration and co-development of solutions in order to close the implementation gaps. This includes for example academics, regulatory bodies, financial institutions, civil society, industry and NGOs having co-developed relevant standards, protocols and certification schemes;

- Analyse the investment landscape in relation to protection and restoration of biodiversity and ecosystems, identifying best-practice case studies and evaluating the leverage potential of the EU taxonomy and its key success factors. Explore pathways for the future development of the taxonomy that could generate the most positive biodiversity outcomes;

- Provide the necessary guidance, training, and tools both for financial entities and for entrepreneurs engaged in "nature positive" activities, for the interpretation and collection of data of the technical screening criteria for determining whether an economic activity substantially contribute (SC) to one or more objectives, as set in the Regulation. It should also guide the interpretation of the technical screening criteria for determining whether an economic activity does significant harm (in relation to the DNSH principle) to the protection and restoration of biodiversity and ecosystems, as set in the Regulations. This should support compliance with related reporting and disclosure regulations;

- Identify potential skill gaps and propose a capacity building strategy to tackle them;

- Provide economic actors such as investors including Investment Fund Managers, corporates and financial institutions with tools, guidance, and methodologies to gather

[58] Such as LIFE PACTA which engage 'financial institutions, retail investors, financial regulators and civil society' and LIFE FinACTION.

reliable, consistent and standardised data to enable incorporation of biodiversity considerations into their investment decisions and risk management processes;

- Involve actively and co-create with the end-users and stakeholders (non-financial corporations, financial institutions, governments etc.) to fully account for their respective views and needs;

- Issue recommendations at EU as well as other levels on enabling conditions for biodiversity-focused sustainable finance and accounting principles, exploring synergies with other EU initiatives, such as the Non-Financial Reporting Directive (NFRD)[59] and the Corporate Sustainability Reporting Directive[60], as well as with relevant 'biodiversity-friendly' labels and standards.

Actions should bring together from the start multiple types of scientific expertise in social sciences and humanities, in particular in economics and finance, as well as scientific expertise in biodiversity and natural capital.

Actions should envisage clustering activities with the project(s) of the same topic and relevant topics on sustainable finance and valuation of ecosystem services[61]. To this end proposals should foresee dedicated tasks and appropriate resources for coordination measures, foresee joint activities and joint deliverables.

HORIZON-CL6-2023-BIODIV-01-10: Build up of knowledge on Nature Positive Economy and supporting its scale-up

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 5.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 5.00 million.
Type of Action	Research and Innovation Actions

59 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014L0095. Adopted by the Commission in April 2021, a new proposal will extend the scope of the NFRD to all large companies and all companies listed on regulated markets (except listed micro-enterprises) and will introduce more detailed reporting requirements that are coherent with the Taxonomy's concept of SC and DNSH. https://eur-lex.europa.eu/legal-content/EN/HIS/?uri=CELEX:52021PC0189.

60 https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en.

61 Notably Horizon Europe projects 'SELINA' and'Invest4Nature and projects resulting from the calls: 'HORIZON-CL6-2021-BIODIV-01-07: Ecosystems and their services for an evidence-based policy and decision-makin','HORIZON-CL6-2022-COMMUNITIES-01-05: Assessing the socio-politics of nature-based solutions for more inclusive and resilient communities' , 'HORIZON-CL6-2024-BIODIV-01-4: Biodiversity, economics and finance: Understanding macro-financial risks associated with biodiversity loss',' HORIZON-CL6-2023-BIODIV-01-10: Build up of knowledge on Nature Positive Economy and supporting its scale-up'.

Expected Outcome: In line with the European Green Deal priorities, in particular the EU biodiversity strategy for 2030 and the revised climate targets, the successful proposal will support the development of policies and market conditions to scale up and accelerate the implementation of nature positive economic activities with particular focus on Nature-based Solutions (NBS). It will promote mainstreaming of biodiversity, ecosystem services and natural capital valuation in the society and economy.

Project results are expected to contribute to all of the following expected outcomes:

- Increased clarity of concepts around nature positive economy and its components, with better understanding of the synergies and trade-offs with other sustainable economic activities, such as a circular and sustainable bioeconomy[62], and the interactions with the EU sustainable finance taxonomy;
- New knowledge and increased expertise of relevant stakeholders in both public and private sectors, including economic and financial decision makers, on the market and determinants of nature positive activities with NBS at the core;
- Creation of an EU community of 'nature-based enterprises' as a basis for promoting EU global leadership;
- New enabling policy, regulations, support, tools, and capacity building measures, addressing market barriers, and leading towards better integration of innovative nature-based entrepreneurship and nature-based solutions in the current economic and financial system;
- Support to the implementation of the EU biodiversity strategy for 2030, the new EU climate adaptation strategy, the new EU sustainable finance strategy, and increased synergies with other key policy areas in support of European Green Deal priorities.

Scope: The EU biodiversity strategy for 2030 states that "industry and business have an impact on nature, but they also produce the important innovations, partnerships and expertise that can help address biodiversity loss". From the perspective of the private sector, integrating natural capital and biodiversity considerations into their decision-making processes makes economic sense as it can enhance corporate resilience and minimise investment risks. At the same time, economic activities that aim at reversing of biodiversity loss can create positive outcomes for the society such as job creation and sustainable economic growth in rural, post-industrial and disadvantaged areas and strengthen resilience against environmental and climate stressors, contributing to a fair and green transition and recovery in line with the European Green Deal. According to the World Economic Forum, a nature-positive recovery "can unlock an estimated $10 trillion of business opportunity by transforming three economic

[62] Cf. EU Bioeconomy Strategy| European Commission (europa.eu) and its progress report 'Stocktaking and future developments: report from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions'.

ecosystems that are responsible for almost 80% of nature loss and create 395 million resilient jobs by 2030 in the process"[63].

Nature-based solutions (NBS) can play a particularly key role in leveraging of the economic and societal potential of nature with the development of existing and new market sectors with 'nature-based enterprises' (NBEs) at the core. Such innovative NBEs use nature (and ecosystem services) as an input to deliver nature positive outputs - products, services and jobs that are sustainable, future-oriented, and more resilient. By definition, they constitute a backbone of the bioeconomy.

However, nature-positive economy where such NBEs can thrive is still at its infancy and enabling framework conditions are required to improve market conditions and to unlock investment. The market is encountering many specific difficulties due to market fragmentation, early stage of development and difficulty in assembling the required knowledge, skillset, and governance structures for supplying and maintaining "living solutions" such as nature-based solutions. There is a need at the same time to increase manyfold the investment in NBS[64].

The action should:

- On Concept: Undertake in-depth research into the key concepts underpinning nature positive economy, establishing synergies and trade-offs with other policies, strategies, and business models such as bioeconomy related, and exploring the role of nature positive activities and NBS in promoting transformative change to provide holistic solutions that address global challenges such as climate, biodiversity, and pollution crisis;

- On Market Knowledge: Building on the work of Horizon 2020 projects and their taskforces, identify barriers and analyse market potential in different economic sectors, at European and national level when possible, for each sector, identify the stakeholders of the different value chains for the different types of nature positive economic activities, estimating the net job creation potential with a view to supporting the framing of nature positive economy narrative. This work should include identification and analysis of representative case studies and reflections on positioning towards nature positive economic activities as defined by the Sustainable Finance Taxonomy[65];

- Foster collaboration between nature-based entrepreneurs, research and technical organisations, policy makers, financiers and investors, business development bodies through, for example, participatory arrangements and spaces, to close the Science Policy Implementation gap;

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63 https://www3.weforum.org/docs/WEF_The_Future_Of_Nature_And_Business_2020.pdf.

64 According to UNEP State of Finance for Nature 2021, by 2030 if the world is to meet its climate change, biodiversity and land degradation targets, the investment will need to triple, unlocking in particular private finance (only 14% of the current investment).

65 That is to say the criteria 'Substantially Contribute' in regards of the protection and restoration of biodiversity and ecosystems

- On Indicators: Building on previous research, notably natural capital valuation methods including both monetary and non-monetary economic valuation approaches for nature-based solutions[66], deliver progress towards standardised, widely accepted economic indicators, reflecting wider socio-economic, biodiversity and natural capital benefits;

- On Market development: using the collaborative and participatory arrangements, develop and pilot strategies, measures (both market and non-market) and approaches for scaling and speeding up the implementation of nature positive economic activities, including Nature-based Solutions (NBS), both from supply and demand side perspective to boost nature-based market development, innovation, and job creation in EU and beyond. This may comprise for market supply economic, finance and governance innovations, capacity building and training;

- Explore and facilitate synergies and interconnection with different EU, MS and Horizon Europe Associated Countries initiatives, such as: EU and national Business and Biodiversity platforms, national restoration plans, Business Acceleration Services, Climate KIC, Smart Specialisation Strategies, Recovery Plans, the EU Biodiversity Partnership, Circular Bio-based Europe Partnership, European Bioeconomy Policy Forum, for more coordinated actions and aggregated impact on NBS and nature positive activities;

- Set up and/or collaborate with relevant marketplaces and similar initiatives at the relevant scales, so that potential project partners, entrepreneurs, investors, and innovation stakeholders can match supply, demand and expertise on designing, implementing, managing, monitoring, valuing, financing NBS, ecosystem services and nature positive activities;

- On Standardisation: support the engagement of the relevant communities (including the communities engaged in the relevant Horizon 2020, Horizon Europe and LIFE projects) in contributing to the development of sector-specific standards and/or certification schemes;

- Build on and/or establish synergies with the relevant work by initiatives/projects/studies including, but not limited to the EIB led study on facilitating access to finance for Nature-based solutions, the EC publication 'The vital role of NBS in the Nature-Positive Economy'[67], the World Economic Forum's New Nature Economy Report Series, The Economics of Biodiversity: The Dasgupta Review, The State of Finance for Nature 2021[68];

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66 The published EC Handbook on evaluating the impact of NBS provides a comprehensive reference point on how to measure different types of impact. There are also many Horizon 2020 and Horizon Europe projects on Natural Capital, as well as LIFE projects (e.g. LIFE Transparent).

67 The vital role of nature-based solutions in a nature positive economy | European Commission (europa.eu)

68 State of Finance for Nature | UNEP - UN Environment Programme.

- Actions should bring together from the start multiple types of scientific expertise in social sciences and humanities, in particular in economics and finance, as well as scientific expertise in biodiversity and natural capital.

Other conditions:

Actions should envisage clustering activities with the projects with the Horizon 2020 and Horizon Europe Natural Capital Accounting and NBS project portfolio and respective task forces as well as any Horizon Europe relevant projects on NBS[69] and Bioeconomy. To this end proposals should foresee dedicated tasks and appropriate resources for coordination measures, foresee joint activities and joint deliverables.

HORIZON-CL6-2023-BIODIV-01-11: Biodiversity loss and enhancing ecosystem services in urban and peri-urban areas

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 5.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 5.00 million.
Type of Action	Research and Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: The Joint Research Centre (JRC) may participate as member of the consortium selected for funding.

Expected Outcome: In line with the European Green Deal, in particular with the objectives of the EU biodiversity strategy for 2030 and the EU proposal for a nature restoration law[70], projects will contribute to the following impact: "to mainstream biodiversity, ecosystem services and natural capital in the society and economy"**.**

They should address all of the following outcomes:

[69] notably coordinate with Horizon Europe projects resulting from: HORIZON-CL6-2022-COMMUNITIES-01-05: Assessing the socio-politics of nature-based solutions for more inclusive and resilient communities; HORIZON-CL6-2022-BIODIV-01-04: Natural capital accounting: Measuring the biodiversity footprint of products and organizations; HORIZON-CL6-2021-BIODIV-01-05: The economics of nature-based solutions: cost-benefit analysis, market development and funding; HORIZON-CL6-2022-BIODIV-01-03: Network for nature: multi-stakeholder dialogue platform to promote nature-based solutions; s, and the 2 topics HORIZON-CL6-2023-BIODIV-01-9 and HORIZON-CL6-2024-BIODIV-01-4.

[70] Proposal for a Regulation of the European Parliament and of the Council on nature restoration, COM(2022) 304 final, 22.06.2022.

- Better implementation and delivery of the EU proposal for a nature restoration law and the EU biodiversity strategy for 2030, particularly through new resources and knowledge to support the deployment across EU of urban (and peri-urban) greening plans;

- Increased capacity and skills in cities to work 'at the right scale' of the challenge and across policies, measures, strategies, including spatial planning capacity, so as to help deliver and assess the urban greening plans, green infrastructure strategies and more widely transformative change towards more sustainable and resilient cities to implement the EU climate adaptation strategy;

- Better understanding on how and under which conditions spatial planning can help optimise the ecosystem services of the solutions, strategies and actions, such as ecosystem restoration/creation and connectivity, Nature-based Solutions (NBS), blue and green infrastructure while addressing social equity and spatial justice aspects; operating this new knowledge into new pathways and methodologies;

- New tools and solutions for better integration of nature-based objectives in investments in infrastructure and other urban systems as well as better investment cases for renaturing the urban and peri-urban areas and maintain NBS in the long-term thanks to new and innovative governance and finance models;

- Better understanding on how to manage the tension between biodiversity protection, urban development pressure and fair access to nature for the urban citizen, identifying the relevant scale and timeframe while considering the long-term impact of spatial planning strategies;

- New approaches, tools and good practices for decision-making processes supporting municipal planning structures in co-creation of policies and plans for NBS through the lens of social equity and environmental fairness.

Scope: Cities with their peri-urban areas have a vital role in protecting and enhancing nature and nature contribution to people in urban areas across EU, such as health, well-being, and climate resilience. They are also key in delivering global and EU biodiversity objectives and policies, as recognised both in the 'post-2020 Global Biodiversity Framework (GBF) Draft 1'[71] and in the 'EU biodiversity strategy for 2030'[72], as well as in the proposal for a nature restoration law[73] which sets targets for urban and peri-urban ecosystems.

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71 Cf. enabling conditions: 'The implementation of the global biodiversity framework requires integrative governance and whole-of-government approaches to ensure policy coherence and effectiveness, political will and recognition at the highest levels of government. It will require a participatory and inclusive whole-of-society approach that engages actors beyond national governments, including subnational governments,citiesand other local authorities (including through the Edinburgh Declaration)' and CBD/SBI/3/INF/25 as well as future CBD Decision on the updated plan of action on subnational governments, cities and other local authorities for biodiversity'.

72 Measure on bringing back nature to cities and their peri-urban areas, with greening plans to be developed by cities of more than 20 000 inhabitants.

73 Proposal for a Regulation of the European Parliament and of the Council on nature restoration, COM(2022) 304 final, 22.06.2022

Cities are at the same time pledging for a recognition of their pivotal role(s) in delivering an ambitious GBF, with more than 200 sub-national authorities having signed the Edinburgh Declaration[74]: as decision makers and regulators for land-use and urban development through their statutory role in spatial planning; as land and infrastructure (grey and green) owner, manager or shareholders, such as brownfields and public spaces, including natural and protected areas; as co- initiators and co-funders of local green initiatives, from urban gardening to depaving doorsteps and to the implementation of large-scale NBS.

There is however a lack of knowledge and know-how on:

- how to assess ecosystem condition and services in urban and peri-urban areas, and their contribution to the challenges of the cities,
- how to best plan and prioritise the protection, renaturing, and reconnecting of the NBS and green and blue infrastructure so as to optimise the ecosystem services and address the policy priorities of the city while 'leaving no one behind' as stressed by the European Green deal (e.g., promote urban and regional resilience, while addressing spatial justice to avoid increased inequality),
- how to combine, connect and manage different re-naturing actions and interventions and the scales of these actions- from an individual intervention to an urban and functional urban area in order to minimise the trade-offs and disservices and optimise the benefits in a cost effective and efficient manner.

The successful proposal should:

- Building on the work of Horizon 2020 projects and their task forces, take stock of the **state** the existing urban and peri-urban ecosystems and their services and identify direct (urban development pressure etc.) and indirect drivers of loss of biodiversity and ecosystem services at local level (policy, spatial regulations, financial incentives, land management practices, etc.);
- Develop a replicable methodology for cities and urban areas across Europe to co-design pathways, a shared long-term vision, an integrated strategy with policies and an action plan (e.g., with responsibilities, timeline and financing) towards the urban ecosystem restoration targets as formulated in the Commission proposal for a nature restoration law[75];
- Include in the methodology the necessary mapping and assessment methods, economic and co-creation governance models to co-develop and prioritise i. combination of **cost** effective and efficient solutions that will enable to co-implement the strategy and to co-monitor the delivery; ii. innovative solutions and governance models to integrate systematically the strategies in the public, private and people decision making processes,

74 Edinburgh Declaration on post-2020 global biodiversity framework, available at: https://www.gov.scot/publications/edinburgh-declaration-on-post-2020-biodiversity-framework/.

75 Proposal for a Regulation of the European Parliament and of the Council on nature restoration, COM(2022) 304 final, 22.06.2022

such as public procurement, transport and climate policies, spatial regulations, land management decision, market incentives, etc; iii. innovative financing and business models;

- Co-develop and test the methodology in a representative sample of cities across EU with local stakeholders from the whole society that will enable the uptake of the models and tools developed across EU and EU regions, thus supporting EU territorial cohesion;

- Engage in the testing cities different departments of local authorities, local research and technical organisations, big urban/ land managers or users, including farmers, citizen, including vulnerable groups, SMEs such as nature-based enterprises, etc. Citizen science approach could be used for this purpose;

- Identify the skills and building capacity needs at the local and regional levels, the potential for job creation as well as existing capacity building programmes, with an eye at the inclusion of marginalised communities and at the gender dimension;

- Propose how urban greening plans and spatial planning, including regulations and building code, can act as enablers of the development of NBS market;

- Disseminate outcomes and capacity building activities across EU, connecting with the relevant platforms such as recommended in the EU guidance for urban greening plans, as well as with the "Cities with nature platform"[76];

Proposals should also:

- Build on existing methods and data from the Urban Greening Plan guidance and toolbox, including JRC MAES urban, EPSON studies, EEA data on green infrastructure;

- Build on the outcomes of the relevant EU-funded projects of the Horizon 2020 and LIFE Programmes[77], including further testing and developing of the EU Impact Evaluation Framework for NBS[78] and similar highly relevant protocols and guidelines;

- Envisage clustering activities with the relevant Horizon 2020 NBS projects and respective task forces as well as with relevant Horizon Europe projects[79] and relevant

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76 The formally constituted Advisory Committees to the CBD on Local Governments and Biodiversity has ICLEI as the Secretariat. The committees' main objectives are to coordinate the contribution and participation of all levels of subnational government in processes under the CBD and to act as an advocacy platform for enhanced cooperation between CBD Parties and all levels of subnational government. One of the implementation-orientated platforms is "Cities With Nature", which act as multi-stakeholder platforms at the local level for learning, measuring and commitments, as well as tracking and reporting on these commitments.

77 Such as 'LIFE UrbanGreeningPlans'.

78 The EC Handbook on evaluating the impact of NBS provides a comprehensive reference point on how to measure different types of impacts.

79 Such as Horizon Europe project NaturaConnect (Horizon-CL6-2021-BIODIV-01-08) and projects stemming from the calls: 'HORIZON-CL6-2022-BIODIV-01-07: Ecosystems and their services for an evidence-based policy and decision making', 'HORIZON-CL6-2022-COMMUNITIES-02-02-two-stage: Developing nature-based therapy for health and well-being', 'HORIZON-CL6-2021-BIODIV-01-05: The economics of nature-based solutions: cost-benefit analysis, market development and

successful projects resulting from calls of the EU Missions "Climate-Neutral and Smart Cities" and "Adaptation to Climate Change";

- The use of social science and humanities methods and of social innovation is encouraged to encounter also different perceptions, values, experiences, practices, and social production across all stages of urban planning and to contribute to the empowerment of citizens.

HORIZON-CL6-2023-BIODIV-01-12: Reinforcing science policy support with IPBES and IPCC for better interconnected biodiversity and climate policies

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 4.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 4.00 million.
Type of Action	Coordination and Support Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: Legal entities established in non-associated third countries may exceptionally participate in this Coordination and support action in a capacity other than as an associated partner. The Joint Research Centre (JRC) may participate as member of the consortium selected for funding.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: Eligible costs will take the form of a lump sum as defined in the Decision of 7 July 2021 authorising the use of lump sum contributions under the Horizon Europe Programme – the Framework Programme for Research and Innovation (2021-2027) – and in actions under the Research and Training Programme of the European Atomic Energy Community (2021-2025). [80].

funding', 'HORIZON-CL6-2022-BIODIV-01-03: Network for nature: multi-stakeholder dialogue platform to promote nature-based solutions'; HORIZON-CL6-2024-BIODIV-02-2-two-stage: Demonstrating the potential of Nature-based Solutions and the New European Bauhaus to contribute to sustainable, inclusive and resilient living spaces and communities'.

[80] This decision is available on the Funding and Tenders Portal, in the reference documents section for Horizon Europe, under 'Simplified costs decisions' or through this link: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ls-decision_he_en.pdf

Expected Outcome: In line with the Commission priority 'A stronger Europe in the world', a successful proposal will step up EU science policy support to biodiversity policy at EU and international level, and in particular the interconnections with climate policies[81]. This will require the contribution to processes triggered by the EU and global biodiversity knowledge centres, IPBES and IPCC to achieve targeted impacts on biodiversity-relevant policies, and to integrate structured policy input into the research cycle. Projects should deliver the following outcomes:

- EU projects and initiatives are aware of and use the knowledge generation, policy support and capacity building functions of IPBES, including the recommendations issued by task forces of IPBES and IPCC (where relevant for biodiversity);
- Contribution of and uptake by research projects and initiatives reinforcing the evidence base of EU biodiversity and climate policy by promoting synergies and avoiding conflicts, as well as taking into account the knowledge generation, policy support and capacity building functions of IPBES, in line with the recommendations issued by the task forces of IPBES and IPCC;
- Address shortcomings in the uptake of IPBES and IPCC findings and conclusions in sectorial policy making other than for biodiversity, and business decisions at European, national and local level;
- Better support from EU research for policy requests to the EU and global Knowledge Centres for Biodiversity and to the European contribution to IPBES.

Scope: In line with the Commission's priority 'A stronger Europe in the world', the European Union must take and demonstrate leadership in this field, notably by increasing its support to the EU and global biodiversity knowledge centres[82] and to IPBES – and to elevate it to the same level as the IPCC.

- Besides economic support, this also includes networking efforts to reinforce synergies and cooperation of the work of EU services, scientists and practitioners with CBD, IPBES, regional Multilateral Environmental Agreements, UN organisations and programmes, and other relevant research communities to underpin the implementation, monitoring and review of the post 2020 global biodiversity framework.
- This action delivers targeted support to areas of specific interest for European research policy by using as well as contributing to IPBES outputs. It also helps European scientists, in particular those from southern, central and eastern EU countries, and those from the Western Balkans, Central Asia, and from Africa [83], who remain underrepresented, due to a lack of capacity to participate in meetings, networking or science input at global level, to play their role by contributing to EU and global regular

81 Considering Horizon Europe Cluster 5 – Destination 1 "Climate Science and Responses".

82 The EU Knowledge Centre for Biodiversity is available at https://knowledge4policy.ec.europa.eu/biodiversity_en.

83 Europe and Central Asia form one region for IPBES purposes. Cooperation with Africa is a priority for the policy agenda of the European Union.

assessments (EU ecosystem assessment, IPBES global assessments, Gap and Stocktake Reports, global biodiversity outlook). Major functions of IPBES still need to be further developed to achieve a proper level of uptake in Europe: knowledge generation, policy support and capacity building functions, including the task forces.

The project should cover all of the following points:

- providing assistance to the EU and Associated Countries, to central Asian and to African scientists, knowledge holders and local communities for reinforcing the input into the EU and global biodiversity knowledge centres, IPBES and IPCC on biodiversity;
- translating IPBES and other relevant research outputs for policy and decision-making into a language targeted to a wider readership by the EU public, interest groups, research and innovation projects, policy makers and businesses, and into (a set of) EU languages;
- networking and facilitating synergies through cooperation between IPBES, IPCC and amongst scientists and relevant scientific bodies of other regional Multilateral Environment Agreements, such as the United Nations Economic Commission for Europe (UNECE) Air Convention;
- proposing standards for EU-funded biodiversity projects to apply the relevant outcomes of the IPBES data and knowledge task force;
- supporting European negotiators at IPBES plenary meetings and inter-sessional work as well as at the scientific body meetings of CBD and other biodiversity-related MEAs of relevance to IPBES. This includes back-office support to the EU IPBES and IPCC negotiation teams and to delegations of Member States and Associated Countries in need of assistance in synthesizing scientific evidence of relevance for IPBES and IPCC plenary work.

The project should detail a plan on how the work can be further financed and governed over the medium- and long-term and secure commitments that enable the work to continue after the funding of this topic ends.

Proposals should not develop any new platforms but ensure that all relevant evidence, data and information is accessible through e.g., the Oppla portal and cooperate with existing networks of national platforms[84]. They should also prepare the inclusion of their results in the EC Knowledge Centre for Biodiversity, hosted by the Joint Research Centre (JRC), according to an agreed format, and cooperate with the Science Service project 'Bio-Agora'.

The project is to set a clear plan on how it will collaborate with other projects selected under related topics of the Cluster 6 Work Programmes 2021-245, and with the Biodiversity Partnership Biodiversa+. This includes links to ESFRI research infrastructures, to test whether they could host predictive models, visualization and analysis of their platform's early warning systems, to respond to IPBES and IPCC assessments and to CBD requests, by participating in

[84] The network of national platforms in Europe & Central Asia for the IPBES, http:\\www.ipbes.eu.

joint activities such as workshops, scientific deliverables, or joint communication and dissemination measures. Proposals should include dedicated tasks and allocate sufficient resources for coordination measures and indicate the necessary flexibility to react to requests stemming from future IPBES and IPCC work programme development.

Proposals should involve the contribution from the social sciences and humanities disciplines.

Biodiversity friendly practices in agriculture, forestry and aquaculture

Proposals are invited against the following topic(s):

HORIZON-CL6-2023-BIODIV-01-13: Crop wild relatives for sustainable agriculture

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 6.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 12.00 million.
Type of Action	Research and Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: The following additional eligibility criteria apply: the proposals must apply the multi-actor approach. See definition of the multi-actor approach in the introduction to this work programme part.

Expected Outcome: Activities under this topic seek to preserve biodiversity and thereby contribute to the objectives of the EU biodiversity strategy for 2030 and the upcoming post 2020 global biodiversity framework. By increasing agrobiodiversity, activities will contribute to food security, adaptation of the agricultural production to the effects of climate change, and thereby support implementation of the farm to fork strategy, the common agricultural policy and the EU climate policy under the European Green Deal.

Projects funded under this topic are expected to contribute to all of the following outcomes:

- More effectiveness measures for the conservation of Crop Wild Relatives (CWR) due to increased knowledge and systematic monitoring and documentation of the diversity, the threats and the conservation status of CWR;
- Conservation of CWR is improved due to a) better coverage of CWR in gene banks, b) the establishment of genetic reserves for in situ conservation, and c) enhanced genetic characterisation of CWRs;

- Knowledge on valuable traits, such as tolerance to biotic and abiotic stresses or nutritional properties is more easily available to breeders and accelerates the breeding of more resilient crop varieties;

- Greater use of CWR in pre-breeding and breeding activities, both in formal and on-farm crop improvement programmes;

- Farmers are more aware of the value of CWRs and have improved access to varieties and cultivars with high resilience and/or adapted to marginal lands.

Scope: Crop Wild Relatives (CWR) – also referred to as the wild cousins of cultivated crops - are a key asset for agrobiodiversity, sustainable agriculture and food security overall. CRWs contain genes for a multitude of useful traits such as tolerance to pest and diseases, resource efficiency and adaptability to more extreme weather conditions or nutritional quality. Their inherent genetic diversity together with the associated diversity of microbiota is a vast resource for developing more productive, nutritious and resilient crop varieties and for diversifying farming systems.

Despite their value, a wide range of CWRs are threatened and face pressures, e.g., from intensive agriculture, urbanisation, pollution and the effects of climate change. At the same time, the conservation and use of CWRs in breeding lags significantly behind the one of main crops. It is estimated that for about 30% taxa associated with 63 crops, no germplasm accessions exist and that about 95% of CWR taxa are underrepresented in genetic resources collections. As a consequence, knowledge is lacking about the diversity that exists and precisely how that diversity may be used for crop improvement and in farming.

More systematic efforts are needed to improve the conservation of CWR in –situ and ex-situ and increase their use in plant breeding and farming.

Proposals should:

- review and increase our knowledge on the diversity, the conservation status (both in situ and ex situ), the threats, monitoring and the utilization of CWR in Europe; due account should be taken of the local knowledge of farmers, e.g., as regards the specific attributes of CWR resources, their integration in agro-ecosystems and methods for their management on-farm;

- promote the breath of taxa and genetic diversity of CWR in gene bank collections and improve their description and geno- and phenotypic characterisation;

- set-up pilots of genetic reserves for CWR under different types of management regimes and pedo-climatic conditions, and develop models for their long-term viability;

- unravel the genetic basis of valuable traits of CWR such as the resilience to different biotic and abiotic stresses or nutritional quality;

- develop high-quality genomic resources to promote the use of CWR in pre-breeding and breeding activities of formal and on-farm crop improvement programmes;
- promote the on-farm management and conservation of CRW genetic resources taking into account the adaptation of CWR to local conditions;
- carry out training activities and increase awareness of breeders, farmers, consumers and the various actors in value chains (e.g., the agri-food industry) about the value of CWR, including by carrying out on-farm demonstrations.

Work under this topic should be carried out in various pedo-climatic zones[85] and benefit both conventional and organic farming as reflected in the expertise of the consortia. Proposals must implement the "multi-actor approach", and build partnerships across research, conservation, breeding, farming and business sectors, considering a balanced representation of partners from within the EU and Associated Countries. They should also demonstrate a sound representation of SSH disciplines.

HORIZON-CL6-2023-BIODIV-01-14: Biodiversity friendly practices in agriculture – breeding for Integrated Pest Management (IPM)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 5.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 10.00 million.
Type of Action	Research and Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: The following additional eligibility criteria apply: the proposals must apply the multi-actor approach. See definition of the multi-actor approach in the introduction to this work programme part.

Expected Outcome: In line with the objectives of the European Green Deal, the EU Climate Policy, EU biodiversity strategy for 2030 and the farm to fork strategy, a successful proposal will contribute to the transition to more sustainable practices in agriculture by reducing the need for external inputs, notably chemical pesticides [86], and support biodiversity in agroecosystems.

Projects are expected to contribute to all of the following outcomes:

[85] https://www.eea.europa.eu/data-and-maps/figures/biogeographical-regions-in-europe-2

[86] The farm to fork strategy sets the target to reduce by 50% the overall use and risk of chemical pesticides and reduce use by 50% of more hazardous pesticides

- Enhanced knowledge of relevant traits for resistance and/or tolerance (resilience) to biotic stresses;
- Enlarged availability and access to plant varieties which can better cope with increased pest and diseases pressure;
- Increased knowledge, knowledge transfer, and capacity of farmers and agricultural advisers to implement Integrated Pest Management with plant varieties that can better cope with plant pests and that are adapted to the local environmental and pedo-climatic conditions (e.g., terroir effects, soil health status, local disease pressures, positive interactions with biological control) and farming practices (e.g., intercropping, crop rotation, carbon farming).

Scope: The European Green Deal has set ambitious targets to reduce by 2030 the use and the risk of chemical pesticides and fertilisers, reduce nutrient losses and increase organic farming[87]. Plant breeders need to consider more systematically characteristics that respond to these demands and contribute to crop resilience and adaptation, particularly to increasing biotic and abiotic stresses, in particular in the context of climate change.

Breeding for integrated pest management (IPM) aims to boost the development of plant varieties with tolerance of or resistance to relevant pest(s)[88] and diseases, adapted to local environmental and pedo-climatic conditions, and diversification approaches with the goal of reducing reliance on chemical pesticides.

Proposals should:

- Contribute to a better understanding of crop-specific genetic characteristics and crop-environment management (GxExM) interactions underpinning tolerance to pest pressure;
- Identify useful traits/combination of traits and progress in the development of plant varieties with increased resistance or tolerance to plant pests and adapted to local conditions;
- Embark in breeding activities for pest-tolerant or pest-resistant varieties making use of all type of breeding approaches and allow for participatory breeding with involvement of farmers;
- Promote the deployment of resistant plant varieties in combination with the range of tools available for integrated pest management such as crop diversification, soil and crop management (e.g., crop residue management), biological control agents (e.g., micro- and macro-organisms), the preservation and enhancement of natural enemies of plant pests

[87] European Green Deal farm to fork and biodiversity strategies with 2030 targets: reduce by 50% the overall use and risk of chemical pesticides and reduce use by 50% of more hazardous pesticides; reduce nutrient losses by at least 50% while ensuring no deterioration in soil fertility; reduce the use of fertilisers by at least 20%; achieve at least 25% of the EU's agricultural land under organic farming.

[88] A pest is defined here as any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products (EU legislation, Regulation 2016/2031)

(e.g., beneficial insects/mites/nematodes/antagonistic, symbiont microorganisms, beneficial endophytes);

- Support capacity building, training and education enabling farmers/growers to adopt sustainable agricultural practices in pest management following the integration of tolerant plant varieties;

- Increase general awareness of the benefits of IPM and the adoption of resistant plant varieties for consumers and in the value change.

Proposals must implement the 'multi-actor approach' and ensure adequate involvement of researchers, the breeding sector, farmers, advisors and other relevant actors of the value chain. The topic is open to all types of farming systems (e.g., arable farming, horticulture, fruit trees). Proposals should cover various biogeographical regions[89] with a balanced coverage reflecting the various pedo-climatic zones in Europe in a representative way. Result of activities should benefit both conventional and organic farming.

Proposals should specify how they plan to collaborate with other proposals selected under this and other relevant topics, for example by undertaking joint activities, workshops or common communication and dissemination activities. Proposals should allocate the necessary resources to cover these activities.

HORIZON-CL6-2023-BIODIV-01-15: Integrative forest management for multiple ecosystem services and enhanced biodiversity

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 7.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 7.00 million.
Type of Action	Coordination and Support Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: Legal entities established in non-associated third countries may exceptionally participate in this Coordination and support action in a capacity other than as an associated partner. The following additional eligibility criteria apply: the proposals must apply the multi-actor approach. See definition of the multi-actor approach in the introduction to this work programme part.

[89] https://www.eea.europa.eu/data-and-maps/figures/biogeographical-regions-in-europe-2

	The Joint Research Centre (JRC) may participate as member of the consortium selected for funding.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: Eligible costs will take the form of a lump sum as defined in the Decision of 7 July 2021 authorising the use of lump sum contributions under the Horizon Europe Programme – the Framework Programme for Research and Innovation (2021-2027) – and in actions under the Research and Training Programme of the European Atomic Energy Community (2021-2025). [90].

Expected Outcome: In line with the European Green Deal, EU climate policy, and the EU forest and biodiversity strategies, this topic promotes research-based and evidence-based forest conservation and management approaches that apply an understanding of the structure, function, and dynamics of natural and sustainably managed forest ecosystems to achieve integrated environmental, economic, and social outcomes.

Project results are expected to contribute to all of the following outcomes:

- Intensive collaboration, mutual learning and sharing of knowledge among the conservation and forestry bodies, forest managers, research institutions and other interested stakeholders to exploit synergies and minimise trade-offs in forest management.
- Contribution to the development of computer models to be used as operational tools for examining the effects of climatic change on forest functioning.
- Practical recommendations and guidelines addressing multiple, possibly conflicting objectives of forest management, to promote forest conservation and resilience and mitigate the impacts of various forest disturbances, while supporting the socio-economic goals of forests through the support of an efficient utilisation of forest resources and services.
- Contribution to the achievement of EU forest related policy targets (biodiversity, bioeconomy, climate mitigation and adaptation).
- Diversification of forest management methods and their mutual balance and appropriate use in the given context ("context-dependent integrative forest management") through the combination of different scientific disciplines, strong involvement of practitioners, researchers and advisors, biodiversity monitoring systems based on expert taxonomic knowledge combined with technologies, decision support tools and sustainability

[90] This decision is available on the Funding and Tenders Portal, in the reference documents section for Horizon Europe, under 'Simplified costs decisions' or through this link: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ls-decision_he_en.pdf

indicators. Application of context-dependent and site-appropriate, multi-stakeholder participatory and interdisciplinary methods.

- Enhanced knowledge on ecological forestry practices and their impacts on climate change adaptation and biodiversity conservation/restoration.

Scope: This topic addresses integrative forest management strategies that optimise actively managed forest ecosystems in such a way that the ecological and socio-economic functions are sustainable and economic viable.

The aim is to achieve a better understanding how integrative forest management concepts (e.g. close-to-nature forestry, continuous cover forestry, retention forestry, etc.) are currently applied in Europe, their implications on the environment and biodiversity, society, and forest-based economy as well as to accelerate the implementation of innovative approaches through targeted and evidence-based guidelines and tools.

Proposals should:

- Provide an in-depth analysis of current concepts and principles of integrative forest conservation, management and utilisation strategies and assess their socio-economic and ecological impacts;
- Establish a network of living labs for integrative forest conservation, management and utilisation approaches inspired by best practices and covering different socio-cultural and bio-geographical conditions;
- Develop applicable evidence-based guidelines and tools for the upscaling of integrative forest conservation, management and utilisation approaches;
- Consider a strong stakeholder involvement and supportive policies;
- Support exchange of knowledge, dialogue and good practices among stakeholders and institutions, including science-based dialogues.

The project must implement the multi-actor approach and ensure an adequate involvement of the primary production sector and the wider forest-based value chain.

Due to the scope of this topic, international cooperation is strongly encouraged, in particular with China. This topic is within the scope of the Administrative Arrangement between the European Commission and the Ministry of Science and Technology of the People's Republic of China on a Co-funding Mechanism for the period 2021-2024 to support collaborative research projects under the Food, Agriculture and Biotechnologies (FAB) and the Climate Change and Biodiversity (CCB) flagship initiatives.

Actions will contribute to implementing the EU-China Food, Agriculture and Biotechnology (FAB) flagship initiative, which aims to ensure sustainability of agri-food systems, catering for the needs of a growing population, the reduction of food and agricultural losses and waste, and the provision of safe and healthy foodstuffs. Interaction with other actions developed

under the EU-China Climate Change and Biodiversity (CCB) Research Flagship and the Flagship on Food, Agriculture and Biotechnologies (FAB) is encouraged if relevant.

JRC is available for sharing and taking up results and findings on the monitoring of the forest ecosystem multifunctionality in the EU Observatory for Deforestation, Forest Degradation and Associated Drivers and JRC Big Data Analytics Platform.

HORIZON-CL6-2023-BIODIV-01-16: Valorisation of ecosystem services provided by legume crops

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 5.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 10.00 million.
Type of Action	Research and Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: The following additional eligibility criteria apply: the proposals must apply the multi-actor approach. See definition of the multi-actor approach in the introduction to this work programme part.

Expected Outcome: In line with the European Green Deal priorities, the farm to fork strategy, the EU biodiversity strategy for 2030 and the EU zero pollution ambition, the successful proposal will promote sustainable, productive, climate-neutral, environment-friendly and resilient farming systems, which would provide consumers with affordable, safe, traceable, healthy and sustainable food while increasing the provision of ecosystem services.

The farm to fork strategy states that '[a] key area of research will relate to (…) increasing the availability and source of alternative proteins such as plant, microbial, marine and insect-based proteins and meat substitutes'. The ambitious targets in the farm to fork strategy on the reduction of fertilizer use by at least 20% by 2030 and on reaching at least 25% of EU agricultural land under organic farming by 2030 will also create a favourable environment for the development of EU-grown protein plants which naturally enrich the soil reducing the need for synthetic fertilisers. Most recently, the Versailles declaration[91] also highlighted the importance of increasing EU plant-based proteins as a means of reducing the EU's dependency on key imported agricultural products and inputs and improving food security.

The new common agricultural policy (CAP) put into practice eco-schemes that can provide support for longer rotation cycles with environmentally beneficial crops such as leguminous

[91] 20220311-versailles-declaration-en.pdf (europa.eu)

crops. Other instruments that benefit protein crops under the new CAP are sectoral interventions, investment subsidies under rural development programmes and coupled income supports.

Activities will also support the implementation of the action plan for the development of organic production.

Proposals results are expected to contribute to all of the following expected outcomes:

- Improved quantification, in environmental and economic terms, of the ecosystem services provided by legume crops, including those related to soil biodiversity and fertility.
- Increased knowledge and capacity of farmers and agricultural advisers to include minor and major legume crops in their cropping schemes with a positive ecological and economic impact.
- Diversified farming practices throughout the EU and Associated Countries, where legume crops contribute to healthier and sustainable diets, resilience to climate change and increase of agrobiodiversity.

Scope: The European Union and Associated Countries' arable agricultural systems are often characterised by short rotations or monocultures, leading to problems such as higher pest pressure, soil erosion, loss of soil fertility or loss of biodiversity. As a result, there is an imperative need to reveal the full potential of diversification of cropping systems, with the aim of improving productivity, and supporting the development of resource-efficient and sustainable value chains. Protein-rich plants, and in particular legumes, play a key role in cross-cutting issues related to crop rotation, sustainable soil management and closing nutrient cycles. They have the potential to enable the environmental sustainability, productivity, climate neutrality and resilience of farming systems, by increasing the provision of ecosystem services while restoring and enhancing biodiversity and generating fair economic returns for farmers.

The environmental, nutritional and economic benefits that leguminous crops bring to all players of the value chain, provide an opportunity for further developing the leguminous crop sector in the EU and Associated Countries. This could eventually contribute to reducing the EU's dependency on imports of nitrogen fertilisers and protein crops for feed, while support meeting the objectives of farm to fork strategy.

While the direct benefits of legume crops as food and feed are usually recognized, their environmental and economic benefits derived from the increase of the provision of the ecosystem services they provide, are less understood and not valorised. The focus of this proposal is on the economic and environmental benefits of the production of legume crops, regardless their cultivation purpose is for food or for feed uses.

Proposals should:

- Increase knowledge on the different and complementary benefits from the use of legume crops (both annual and perennials) in the provision of ecosystem and environmental services, such as the value of the nitrogen transfer to succeeding or companion crops (including in grassland systems), the efficiency of different legume varieties to fix nitrogen in the soil in function of specific conditions (e.g., soil type, established rhizobia consortia), the role of legume crops for wind protection, water runoff or other erosion control strategies.

- Explore new synergies between combinations of legume crops and other crops that can benefit from nitrogen fixation, in systems like crop rotations, intercropping, mixed cropping, cover cropping or agroforestry.

- Evaluate the global competitiveness of legume crops cultivation in different contexts of the EU and Associated Countries (considering relevant economic, social or environmental aspects) through a cost-benefit analyses and life-cycle environmental assessment, versus imports from third countries.

- Develop tools or methods that allow to measure and quantify in economic terms the value of the nitrogen transfer between various crops, for different crop combinations, in relation to environmental aspects such as the reduction of use of nitrogen fertiliser, carbon emissions, pollution, nitrogen losses, reduced GHG emissions, pest/weed/disease management and increased crop and microbial diversity.

- Identify and remove the barriers to crop diversification or to crop rotation. Provide indicators so that farmers and advisors are better equipped to evaluate the benefits of growing legumes, including for weed management, as well as recommendations to strengthen crop diversification and longer rotation cycles with environmentally beneficial crops.

- Promote the engagement of downstream actors in new value chains based on crop diversification. This should facilitate the market penetration of leguminous crops, linked to market outlets and consumers demand and influence the transition towards more sustainable and healthy food and feed systems.

- Include minor or underutilised legume crops (mostly perennial but also annual varieties) that are not the frequent objects of research activities. Consider their potential for enhancing the ecosystem and economic services not only due to their key role in sustainable soil management and closing nutrient cycles (likewise major legume crops) but also due to their adaptation to agroecological niches/marginal area and capability to withstand abiotic and abiotic stress and climate change.

- Generate capacity building material, organize trainings or knowledge sharing activities, including the development of guidelines (e.g. booklets, decision-support tools) to foment the dissemination, uptake and upscale of results.

Proposals should include a dedicated task, appropriate resources and a plan on how they will collaborate with other projects funded under this or other topics (i.e. but not limited to projects funded under topic HORIZON-CL6-2021-FARM2FORK-01-02 and HORIZON-CL6-2022-BIODIV-02-02-two-stage), and ensure synergy with relevant activities carried out under other initiatives in Horizon Europe such as the upcoming partnership on agroecology[92] and the Mission "A Soil Deal for Europe"[93]. Proposals should also seek potential synergies with and capitalise on the results of past or ongoing projects both in the EU and beyond (e.g., Horizon 2020 projects LegValue[94] and TRUE[95], the thematic network 'Legumes Translated'[96] or SusCrop ERA-NET project[97]).

Proposals should benefit both the conventional and the organic farming sectors.

In order to achieve the expected outcomes, international cooperation is encouraged. This topic should involve the effective contribution of social sciences and humanities (SSH) disciplines.

In this topic the integration of the gender dimension (sex and gender analysis) in research and innovation content is not a mandatory requirement.

Biodiversity and health

Proposals are invited against the following topic(s):

HORIZON-CL6-2023-BIODIV-01-17: Interlinkages between biodiversity loss and degradation of ecosystems and the emergence of zoonotic diseases

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 4.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 12.00 million.
Type of Action	Research and Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: The Joint Research Centre (JRC) may participate as member of the

92 'European Partnership accelerating farming systems transition: agroecology living labs and research infrastructures' at: https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/european-partnerships-horizon-europe/candidates-food-security_en

93 https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/soil-health-and-food_en

94 www.legvalue.eu

95 www.true-project.eu

96 www.legumestranslated.eu

97 https://www.suscrop.eu/projects-first-call/legumegap

	consortium selected for funding.

Expected Outcome: In line with the European Green Deal and in particular with the objectives of the EU biodiversity strategy for 2030, projects will develop knowledge on the links between the degradation of ecosystems with its associated biodiversity loss and the exposure to, emergence and spread of zoonotic diseases to humans. This will compliment other initiatives by addressing the biodiversity and health nexus with a focus on the effects of biodiversity loss and degradation of ecosystems on the emergence of zoonotic diseases in the context of climate change and globalization**.**

Proposals are expected to contribute to all of the following expected outcomes:

- Better understand the relation between the degradation of ecosystems with its associated biodiversity loss, including both macro-organisms (e.g. insects, animal and plants) and environmental and host-associated microbiomes (e.g. micro algae, fungi, bacterial and virus) and the emergence of zoonotic diseases, focusing on how human drivers for biodiversity loss, such as illegal wildlife trade, land use change in biodiversity hot-spot regions, food consumption, use of antimicrobial agents, etc. interact with the spread of zoonotic diseases.

- Understand under which conditions and at what scale the protection of biodiversity and the restoration of ecosystems can contribute to mitigate the emergence and spread of zoonotic diseases.

- Better understand the socio-economic and behavioural factors that will lead to the development and implementation of improved policies on mitigating the risk of emergence and spread of zoonotic diseases. This should also include the ecology and behavioural traits of those animals which play a role in the spread of zoonotic diseases.

- Based on this knowledge, propose practical strategies to minimize the emergence and spread of zoonotic diseases through addressing biodiversity loss.

- Better understand the biodiversity – health nexus and identify biodiversity relevant parameters and propose the necessary monitoring schemes for further integration into the One Health approach with specific focus on emerging zoonotic diseases. This monitoring should contribute to the establishment or improvement of early detection and warning systems on risks of emerging zoonotic diseases.

- In collaboration among the projects to be funded, create a knowledge platform for a) sharing information on relevant research activities and results concerning the prevention of zoonotic disease emergence in relation to biodiversity; and b) reinforcing the communication and coordination between academics, innovators, end-users, researchers, public health and environmental authorities and citizens in order to create the strong system needed for the prevention of the emergence of zoonotic diseases. This platform should be a joint deliverable between the projects to be funded and will be expected to coordinate the research activities which aim to understand and mitigate the risks of

zoonotic disease emergence in relation to the degradation of ecosystems with its associated biodiversity loss, allowing closure of current gaps and break down of existing silos. Proposals should dedicate appropriate resources to develop this joint deliverable in cooperation with the other project/s funded under this topic.

Scope: Zoonotic diseases, which result from cross-species transmission of pathogens between animals and humans, appear to emerge more frequently and pose significant threats to the health and welfare of people across the planet. Without the necessary scientific information and evidence on the underlying causes and drivers of this more frequent emergence, the only way of responding to them is after their emergence and spread.

Over the last decades, research has indicated that biodiversity loss and the linked degradation of ecosystems could simultaneously increase human exposure to existing pathogens, as well as increase of the probability of the emergence and spread of infectious diseases. Unsustainable exploitation of biodiversity, land-use change, illegal wildlife trade and consumption, together with the impacts of climate change and use of antimicrobial agents, increase the contact between humans and wildlife that consequently lead to the more frequent occurrence of emerging infectious diseases, of which around 75% are of zoonotic origin.

The high risks of these infectious diseases demonstrate the need for a real paradigm shift: preventing the emergence and spread of infectious zoonotic diseases by focusing on the root causes and underlying mechanisms potentially linked to biodiversity loss and degradation of ecosystems and improving their prediction and early detection.

This topic aims to identify and understand better the interlinkages between biodiversity loss with the linked ecosystem degradation and the emergence of zoonotic diseases. Further research is needed to better understand how the different drivers that lead to biodiversity loss and ecosystem degradation, and how the protection of biodiversity and the restoration of ecosystems may influence the emergence and spread of zoonotic diseases. Also better understanding is needed on how the conservation of animal and microbiome genetic resources may influence the emergence of zoonotic diseases.

The better understanding of these interlinkages will help to establish better prediction and early detection systems, will enhance the coordination between all relevant stakeholders, ensure fast information sharing and early response and hence reduce the spread of zoonotic diseases.

The topic should contribute to better understanding the biodiversity – health nexus and help towards an enhanced integration of biodiversity parameters and monitoring with the One Health approach.

The development of methods and identification of indicators to monitor the relevant biodiversity parameters will be essential as well as the establishment of baselines of these parameters.

The mitigation strategies in relation to biodiversity loss and ecosystem degradation to be proposed should take into consideration all the aforementioned information and findings. The

better understanding of the socio-economic and behavioural factors, as well as the involvement of local communities and environmental, animal and human health stakeholders is crucial for the preparation of these strategies.

Proposals should include a dedicated task, appropriate resources and a plan on how they will collaborate with other projects funded under the same field and ensure synergy with relevant activities carried out under other initiatives in Horizon Europe, such as:

- HORIZON-CL6-2021-BIODIV-01-11: What else is out there? Exploring the connection between biodiversity, ecosystem services, pandemics and epidemic risk;
- HORIZON-CL6-2021-FARM2FORK-01-18: One Health approach for Food Nutrition Security and Sustainable Agriculture (FNSSA);
- HORIZON-HLTH-2021-ENVHLTH-02-03: Health impacts of climate change, costs and benefits of action and inaction.

To achieve the expected outcomes, the following also need to be ensured:

- Coherence and coordination with the European Partnership for pandemic preparedness, the European Partnership for One Health/AMR Antimicrobial Resistance (AMR) and the European Partnership for Animal Health and Welfare (PAHW).
- Opportunities for cooperation with relevant European or international Agencies and initiatives, such as European Food Safety Authority (EFSA), European Economic Area (EEA), European Centre for Disease Prevention and Control (ECDC), Health Emergency Preparedness and Response Agency (HERA), One Health High-Level Expert Panel (OHHLEP), One Sustainable Health, EU4Health actions (in particular One Health Surveillance), Preventing Zoonotic Disease Emergence (PREZODE), Ecohealth Alliance, etc.

The proposals should take up relevant knowledge assessed by major science-policy bodies such as the Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services (IPBES), the Intergovernmental Panel on Climate Change (IPCC), and by the Convention on Biological Diversity. They should also take into consideration and build up on the results of the request made to EKLIPSE on Biodiversity and Pandemics. Proposals should show how their results and outcomes could provide timely information to the work of these and further relevant global initiatives.

The proposals should foresee cooperation with the European partnership on biodiversity Biodiversa+ and the Science Service “Bio-agora” and use existing platforms and information sharing mechanisms relevant to the topic. They should also contribute knowledge to the EC Knowledge Centre for Biodiversity.

In order to achieve the expected outcomes, international cooperation is strongly encouraged.

Coordination with Member States and Associated Counties should be sought out.

This topic should involve the effective contribution of social sciences and humanities disciplines (SSH).

Interconnection of biodiversity research and policies

Proposals are invited against the following topic(s):

HORIZON-CL6-2023-BIODIV-01-18: Additional activities for the European Biodiversity Partnership: Biodiversa+

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 60.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 60.00 million.
Type of Action	Programme Co-fund Action
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: The proposal must be submitted by the coordinator of the consortium funded under HORIZON-CL6-2021-BIODIV-02-01: European partnership rescuing biodiversity to safeguard life on Earth. This eligibility condition is without prejudice to the possibility to include additional partners. If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).
Procedure	The procedure is described in General Annex F. The following exceptions apply: The evaluation committee will be composed partially by representatives of EU institutions. If the proposal is successful, the next stage of the procedure will be grant agreement amendment preparations. If the outcome of amendment preparations is an award decision, the coordinator of the consortium funded under HORIZON-CL6-2021-BIODIV-02-01: European partnership rescuing biodiversity to safeguard life on Earth will be invited to submit an amendment to the grant agreement, on behalf of the beneficiaries.

Legal and financial set-up of the Grant Agreements	This action is intended to be implemented in the form of an amendment of the grant agreement concluded pursuant to topic HORIZON-CL6-2021-BIODIV-02-01. For the additional activities covered by this action: • The funding rate is 30% of the eligible costs. • Beneficiaries may provide financial support to third parties (FSTP). The support to third parties can only be provided in the form of grants. • Financial support provided by the participants to third parties is one of the primary activities of this action in order to be able to achieve its objectives. The EUR 60 000 threshold provided for in Article 204(a) of the Financial Regulation No 2018/1046 does not apply. • The maximum amount of FSTP to be granted to an individual third party is EUR 7 000 000. This amount is justified since provision of FSTP is one the primary activities of this action and it is based on the extensive experience under predecessors of this partnership. • The starting date of grants awarded under this topic may be as of the submission date of the application. Applicants must justify the need for a retroactive starting date in their application. Costs incurred from the starting date of the action may be considered eligible (and will be reflected in the entry into force date of the amendment to the grant agreement).
Total indicative budget	The total indicative budget for the duration of the partnership is EUR 165 million.

Expected Outcome: The second instalment of the partnership is expected in continuation to contribute to expected outcomes specified in topic HORIZON-CL6-2021-BIODIV-02-01: European partnership rescuing biodiversity to safeguard life on Earth, for continuation of the activities and the continuation of already agreed outcomes.

Scope: The objective of this action is to continue to provide support to the European Partnership Biodiversa+ identified in the Horizon Europe Strategic Plan 2021-2024 and first implemented under the topic HORIZON-CL6-2021-BIODIV-02-01: European partnership rescuing biodiversity to safeguard life on Earth, and in particular to fund additional activities (which may also be undertaken by additional partners) in view of its intended scope and duration, and in accordance with Article 24(2) of the Horizon Europe Regulation.

The consortium which applied to and received funding under HORIZON-CL6-2021-BIODIV-02-01: European partnership rescuing biodiversity to safeguard life on Earth is uniquely placed to submit a proposal to continue the envisioned partnership. Not only did this consortium submit the proposal leading to the identification of the partnership in the Horizon Europe strategic planning 2021-2024, it has also implemented the partnership through co-funded calls in years 2021 and 2022 based on this planning and further to topic HORIZON-CL6-2021-BIODIV-02-01. In this context, the current consortium has particular expertise in relation to the objectives of the Partnership, the activities to be implemented in particular FSTP calls or other calls/scope of calls clearly required/envisioned pursuant to initial proposal/partnership, and other relevant aspects of the action. In practice, another consortium could not continue the activities of the Partnership underway without significant disruption to the ongoing activities, if at all.

The scope of the application for this call on the European partnership for Biodiversity Biodiversa+ should focus on the flagship programmes 2023-27 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, and all horizontal activities to allow the Partnership to operate and to achieve its five specific objectives.

It is expected that the partnership continues to organise joint calls on an annual base and therefore it should factor ample time to run the co-funded projects. It should build on, and widen, the data availability in European Research Infrastructures federated under the European Open Science Cloud.

The partnership should collaborate closely with the EC 'Knowledge Centre for Biodiversity' and with the Science Service project 'Bio-Agora', and seek to collaborate with EU space programmes (Copernicus, Galileo) to foster the use of emerging or operational space technologies for policy development. Moreover, the partnership should describe specific activities foreseen in order to strengthen the synergies with other related Missions and Partnerships.

While the award of a grant to continue the Partnership in accordance with this call should be based on a proposal submitted by the coordinator of the consortium funded under HORIZON-CL6-2021-BIODIV-02-01 and the additional activities (which may include additional partners) to be funded by the grant should be subject to an evaluation, this evaluation should take into account the existing context and the scope of the initial evaluation as relevant, and related obligations enshrined in the grant agreement.

Taking into account that the present action is a continuation of topic HORIZON-CL6-2021-BIODIV-02-01 and foresees an amendment to an existing grant agreement, the proposal should also present in a separate document the additional activities and additional partners, if any, to be covered by the award in terms of how they would be reflected in the grant agreement.

The partnership should pool the necessary financial resources from the participating national (or regional) research programmes with a view to implementing joint calls for transnational proposals resulting in grants to third parties.

The Commission envisages to include new actions in future work programme(s) to continue providing support to the partnership for the duration of Horizon Europe.

Call - Biodiversity and ecosystem services

HORIZON-CL6-2024-BIODIV-01

Conditions for the Call

Indicative budget(s)[98]

Topics	Type of Action	Budgets (EUR million)	Expected EU contribution per project (EUR million)[99]	Indicative number of projects expected to be funded
		2024		
Opening: 17 Oct 2023 Deadline(s): 22 Feb 2024				
HORIZON-CL6-2024-BIODIV-01-1	IA	12.00	Around 6.00	2
HORIZON-CL6-2024-BIODIV-01-2	IA	16.00	Around 8.00	2
HORIZON-CL6-2024-BIODIV-01-3	RIA	13.00	Around 6.50	2
HORIZON-CL6-2024-BIODIV-01-4	RIA	5.00	Around 5.00	1
HORIZON-CL6-2024-BIODIV-01-5	RIA	4.00	Around 2.00	2
HORIZON-CL6-2024-BIODIV-01-6	RIA	6.00	Around 6.00	1
HORIZON-CL6-2024-BIODIV-01-7	RIA	5.00	Around 5.00	1
HORIZON-CL6-2024-BIODIV-01-8	RIA	12.00	Around 6.00	2

[98] The Director-General responsible for the call may decide to open the call up to one month prior to or after the envisaged date(s) of opening.
The Director-General responsible may delay the deadline(s) by up to two months.
All deadlines are at 17.00.00 Brussels local time.
The budget amounts are subject to the availability of the appropriations provided for in the general budget of the Union for years 2023 and 2024.

[99] Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.

HORIZON-CL6-2024-BIODIV-01-9	RIA	3.00	Around 3.00	1
Overall indicative budget		76.00		

General conditions relating to this call	
Admissibility conditions	The conditions are described in General Annex A.
Eligibility conditions	The conditions are described in General Annex B.
Financial and operational capacity and exclusion	The criteria are described in General Annex C.
Award criteria	The criteria are described in General Annex D.
Documents	The documents are described in General Annex E.
Procedure	The procedure is described in General Annex F.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G.

Understanding and addressing the main drivers of biodiversity loss

Proposals are invited against the following topic(s):

HORIZON-CL6-2024-BIODIV-01-1: Invasive alien species

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 6.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 12.00 million.
Type of Action	Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply:

	The Joint Research Centre (JRC) may participate as member of the consortium selected for funding.
Technology Readiness Level	Activities are expected to achieve TRL 6-7 by the end of the project – see General Annex B.
Procedure	The procedure is described in General Annex F. The following exceptions apply: To ensure a balanced portfolio, grants will be awarded to applications not only in order of ranking but at least also to one project within the area A that is the highest ranked, and one project highest ranked within the area B, provided that the applications attain all thresholds. Proposals shall clearly indicate the area they are applying to.

Expected Outcome: In line with the European Green Deal and in particular with the objectives of the EU biodiversity strategy for 2030, projects will contribute to the following impact of destination "Biodiversity and ecosystem services": "Understand and address direct **drivers of biodiversity decline…** invasive alien species…".

Project results are expected to contribute to all of the following expected outcomes:

- The establishment of alien species accidently introduced in the EU environment is minimised and where possible they are eradicated,
- Early warning systems to inform relevant stakeholders of the introduction of invasive alien species, building upon EASIN,
- The introduction of invasive alien species is effectively prevented and established ones are systemically managed,
- Public awareness, literacy and engagement, on invasive alien species monitoring and management are supported and improved,
- Pressure on species on the Red List threatened by invasive alien species is reduced, contributing to the following key commitment of the EU biodiversity strategy for 2030 " a 50% reduction in the number of Red List species threatened by invasive alien species".

Scope: Invasive alien species are one of the five main direct drivers of biodiversity loss. Besides inflicting major damage to nature and the economy, many invasive alien species also facilitate the outbreak and spread of infectious diseases, posing a threat to humans and native wildlife. The rate of new introductions of invasive alien species has increased in recent years. Without effective control measures, risks to our nature and health will continue to rise. Climate change and land-use changes facilitate the spread and establishment of many alien species and create new opportunities for them to become invasive. This topic is therefore contributing to the adaptation to climate change.

Regulation (EU) 1143/2014 on invasive alien species (IAS) entered into force on 1 January 2015. It establishes a list of Invasive Alien Species of Union concern (the Union list). The IAS Regulation provides for a set of measures to be taken across the EU in relation to invasive alien species included on the Union list. EASIN (European Alien Species Information Network) facilitates information on Alien Species and officially supports the EU Regulation 1143/2014.

Successful proposals should:

- Develop models based on dynamic data, accessible to end users, to prioritise species, manage pathways and sites most vulnerable by the introduction of invasive alien species;
- Develop methods for the identification, early detection and surveillance of invasive alien species, such as sensors for biophysical signals (sounds, ultrasounds, volatile organic compounds, thermal etc.), DNA-based including barcoding and application of environmental DNA, artificial intelligence, sentinel plants in ports, airports, railway stations, and logistics platforms. The use of robotics (both aerial and non-aerial), especially in marine environments, could be considered.

Proposals should address Area A: terrestrial ecosystems or Area B: aquatic (including marine) ecosystems. The Area should be clearly indicated on the application.

Proposals should build synergies with on-going projects supported under Horizon 2020 and other projects supported under Horizon Europe. The project "Natural Intelligence for Robotic Monitoring of Habitat" could provide hints about the usage of mobile robotic sensors.

Cross-articulation with the other data spaces, and notably with the European Open Science Cloud shall be foreseen, exploiting synergies and complementarities of the different approaches.

Participatory approaches, such as citizen science, could be appropriate modes of research for this action.

In area B in particular, projects results funded under the following topics should be considered: HORIZON-CL6-2021-BIODIV-01-03: Understanding and valuing coastal and marine biodiversity and ecosystems services, Topic HORIZON-CL6-2021-BIODIV-01-04: Assess and predict integrated impacts of cumulative direct and indirect stressors on coastal and marine biodiversity, ecosystems and their services and HORIZON-CL6-2022-BIODIV-01-01: Observing and mapping biodiversity and ecosystems, with particular focus on coastal and marine ecosystems. In addition, in area B, projects should coordinate their activities with objective 1 of the Mission "Restore our ocean and waters".

Proposals should include specific tasks and allocate sufficient resources to coordinate with existing platforms and information sharing mechanisms, in particular the EC Knowledge Centre for Biodiversity. Collaboration with the European partnership on biodiversity Biodiversa+ should be explored, as needed.

This topic should involve contributions from the social sciences and humanities disciplines.

The possible participation of the JRC in the project would ensure that the approach proposed is compatible with the IAS policy implementation and that data and information generated is shared through EASIN.

International cooperation is encouraged.

Biodiversity protection and restoration

Proposals are invited against the following topic(s):

HORIZON-CL6-2024-BIODIV-01-2: Digital for nature

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 8.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 16.00 million.
Type of Action	Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used). The Joint Research Centre (JRC) may participate as member of the consortium selected for funding.
Technology Readiness Level	Activities are expected to achieve TRL 6-7 by the end of the project – see General Annex B.
Procedure	The procedure is described in General Annex F. The following exceptions apply: To ensure a balanced portfolio, grants will be awarded to applications not only in order of ranking but at least also to one project within the area A that is the highest ranked, and one project highest ranked within the area B, provided that the applications attain all thresholds. Proposals shall clearly indicate the area they are applying to.

Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: Purchases of equipment, infrastructure or other assets specifically for the action (or developed as part of the action tasks) may be declared as full capitalised costs.

Expected Outcome: In line with the European Green Deal and in particular with the objectives of the EU biodiversity strategy for 2030 projects' results will contribute to the following impacts of the destination "biodiversity and ecosystem services": "Plan, manage and expand **protected areas** and improve the conservation status of species and habitats based on up-to-date knowledge and solutions"; "to understand and address **drivers of biodiversity decline** and "mainstream **biodiversity, ecosystem services,** including through the development of **Nature-based Solutions".**

The projects results are expected to contribute to all of the following expected outcomes:

- A better monitoring (in terms of the number of species and habitats, more exhaustive territory coverage, more frequent in time, more accurate and cost-effective) of biodiversity in the EU by high-throughput methods (for example environmental DNA, sound/image/spectral analysis, lidar, usage of mobile platforms, space technologies, etc.), leading to a better implementation of the nature directives.

- A better understanding of the state of nature and of the drivers of biodiversity loss (linked to direct human activity, to climate change, etc…) and of the state of conservation of nature through a better usage of existing data, and through the bridging of data gaps in order to support the implementation of the EU biodiversity strategy for 2030 and therefore to reverse biodiversity loss and to restore and protect ecosystems.

- A more complete view of the state of nature and its evolution which is needed to support policy implementation and policy making, including the Member States' reporting obligations, supporting the definition and implementation of prevention and restoration measures and the monitoring of the achievement of their objectives, the extension of protected areas, the monitoring of invasive alien species, and the implementation of Nature based solutions and the assessment of their performance.

Scope: As quoted in a recent paper in Nature Communications, the growing amount of the collected environmental data is not optimally used: "there is a mismatch between the ever-growing volume of raw measures (videos, images, audio-recordings) acquired for ecological studies and our ability to process and analyse this multi-source data to derive conclusive ecological insights rapidly and at scale"[100]. In the European Union, there is already a range of group of experts monitoring species and habitats, including in the view of reporting under the Birds and Habitats directives. However, the generated datasets are not sufficiently accessible (too many small, isolated communities of practice, different servers, different data access

[100] Tuia, D., Kellenberger, B., Beery, S. *et al.* Perspectives in machine learning for wildlife conservation. *Nat Commun***13,** 792 (2022) https://doi.org/10.1038/s41467-022-27980-y.

methods, different formats, rarely accessible through web-services) and too often not well known or advertised outside of their original circle of experts: the access to the results (consolidated data, statistics, maps) of these field surveys should be significantly concentrated behind single entry points. Also, the access to modern technologies (*e.g.,* image recognition, sound analysis, high-throughput DNA-based techniques, usage of AI, usage of space, etc.) too often represents an important effort for each group of experts, beyond their environmental expertise. As a result, the technological developments remain an important effort for each group, while the solutions should better be provided as a service (to be configured to the need of each group) and mutualised. The natural domain being very large and sometimes difficult to access, the existing databases are still not dense enough, in terms of spatial and temporal coverage: many species and habitats are insufficiently covered (and sometimes not monitored at all), resulting in information gaps. Also, scarce samplings do not allow to distinguish non-presence from a lack of/insufficient/inadequate fields visit. A massive use of automated, and potentially mobile, sensor technologies (such as, but not limited to, images, video, sounds/ultra-sounds recording, spectral signatures, structure description by lidar, environmental DNA sampling, etc.) the use of remote sensing technologies (e.g. to over large areas, monitor environmental condition) and associated with processing algorithms (in particular, but not limited to, deep learning and AI processing algorithms) is therefore needed. The goal of this topic is to facilitate the access to data, encourage the usage of automated/robotic/space data collection systems for data collection, encourage community approaches for the exchange of data and good practices (in particular for data processing).

Proposals should address Area A or Area B as follows. The Area should be clearly indicated on the application.

- Area A: a project focussing on data harvesting through high-throughput methods (as described in the introduction, e.g. environmental DNA, sound/image analysis, lidar, spectrometry, usage of mobile platforms, remote-sensing, etc.), analysis and interoperability solutions, with the goal of concentrating the information in a single access point, and lowering the technical hurdle for the biologist and managers of natural sites, offering the best solutions in a ready-to-use form;

- Area B: a project focussing on new robotic solutions, including mobile, to improve the efficiency of biodiversity related solutions, allowing to improve the performance of the field campaign, with denser information of species and habitats.

Area A: data harvesting, analysis and interoperability solutions

The successful proposal is expected to address the needs in terms of IT solutions, to increase information density, in terms of species and habitats sampled, territory coverage, timeliness, and accuracy.

As a result, much denser data collections should be available through a common data portal. The successful proposal should demonstrate the feasibility to combine different sources of information, for example to assess the conservation status of habitats or species. In that respect, several approaches could be tested, from data combinations defined by expert rules,

and data storage formats, to machine learning or data-mining technologies. Such digital solutions could support the definition of conservation measures and management plans, and the monitoring and forecast (though model ingesting in-situ observations) of their progress to their objectives, at site, regional and national levels. Furthermore, the results could be used by member states for their formal monitoring and reporting obligations, or to check and enhance the performance of Nature Based Solutions.

The successful proposal should:

- Ensure interoperability of available data, enabling EU-scale information systems by developing solutions to connect and harvest data from already existing data bases. This will guarantee information fusion and support third party usage of the data.

- Develop cost-effective and easy-to use tools and software to collect and analyse different existing data sources and formats (in vivo data, photographs, sound recordings, lidar, spectrometry, eDNA, satellite images etc.), to facilitate cost-effective data analysis, map and link existing databases and provide algorithms to better analyse them.

- Develop data hosting and data processing solutions to extract information on populations (such as diversity, counts, trends), habitats (such as identification, area covered, and area change in time), assessment of conservation status and trend, information of species and habitats health conditions, degradations, and destructions (natural or human-driven). The accumulation of information should allow synoptic analysis of species and habitats, allowing to detect hot spot of issues and trends. Innovative solutions, such as data mining, remote-sensing and AI approaches need to be considered.

- Develop a solution to host, process, analyse and search available data in relation to protected habitats and species (including protected sites management information, their conservation objectives and measures, and restoration actions).

- Analyse and define infrastructure solutions, that would let biologists and managers of natural sites quickly create a dedicated working framework, furbished with all data harvesting, processing, sharing solutions. In this approach, the future European Green Deal data space should be considered as a potential common solution, or part of the solution.

- Develop tutorials for practitioners, based on academics and industry knowledge, on how to best use existing databases and data harvesting, data analysis and data sharing solutions. The tutorials should help the users to quickly set up and use their working environment.

- Propose easy-to-use solutions to utilise robotic sensors and Internet of Things (IoT): automated sensors, automated sampler, including mobile sensors (terrestrial, aerial and under-water) and animals tagging solutions, data sharing through wireless communication systems, to support a systematic data collection. Such approach should

help better mapping the known/unknown and significantly increase the density of collected data, spatially and temporally.

- Analyse the conditions under which data, raw data acquired from sampling, data coming from existing databases and data resulting from processing can be shared. A clear data sharing framework, accommodating special needs, simple to use in practice, supporting open data policies, and enabling the broadest usage whilst encouraging the largest community to contribute, should be defined. Special attention will be paid to endangered species and sensitive species (in the sense of the Birds and Habitats Directives) for which the shared data needs to be controlled, and methods for effective detection of invasive species by high throughput search would be encouraged.

- Enable EU Member States, Associated Countries, and accession countries to coherently set conservation objectives, preparing management plans, manage shared habitat types and species, deal with similar conflicts and socio-economic dimensions, permitting procedures, spatial planning, with a focus on implementing the Birds and Habitats Directives and their Natura 2000 network.

- Fully exploit and build complementarities with the ongoing work regarding the establishment of the European Open Science Cloud and interact with relevant projects developing metadata standards and added value tools to ensure interoperability within and across fields of study.

- Contribute to a web of FAIR data and supporting services that enable an interconnected disciplinary ecosystem that allows stakeholders to share digital objects and build on them in a seamless fashion.

- The architecture for a unified EU web-GIS with all the data collected from the Directives should be considered. In that matter, the proposed system should allow the member states sharing their habitats and species maps, and in particular the habitats maps used to designate their Natura 2000 sites, as well as subsequent updates. Also, the platform should help collecting information to update habitats and species maps, in order to obtain a common knowledge database about habitats and species, and their evolution, in relation to the Birds and Habitats Directives. The platform should as well foster the implementation of open data best practices at European level and across boundaries.

- Automatic translation functions should be offered by the platform to better connect EU Member States, Associated Countries and Accession Countries to support them in the implementation of the legislation on nature protection (such as the Birds and Habitats directives, the Invasive Alien Species regulation or the Marine Strategic Framework Directive).

Proposals should consider the possibilities offered by the future “Green data spaces” (CNECT). The DEP CSAs on the “preparatory actions for the European Green Deal Data Space” (exploring cloud-to-edge solutions, platforms and initiatives for data storage, exchange, and analysis as good practices for setting up the data spaces) are expected for Q4

2022-Q2 2024 and the "data spaces support centre" will start delivering on architectural blueprints in late 2023 and onward.

Proposals should earmark the necessary resources for cooperation and networking activities. Proposals should link to other relevant Horizon 2020 and Horizon Europe projects and initiatives, such as BiCIKL, EuropaBON, BioDT and connect to existing European Biodiversity data infrastructures including DiSSCo, eLTER and LifeWatch, where relevant. Proposals should also connect with relevant projects under Horizon Europe topics, such as HORIZON-CL6-2021-BIODIV-01-01: European participation in global biodiversity genomics endeavours aimed at identifying all biodiversity on Earth.", HORIZON-CL6-2021-BIODIV-01-02: Data and technologies for the inventory, fast identification and monitoring of endangered wildlife and other species groups, HORIZON-CL6-2021-BIODIV-01-07: Ecosystems and their services for an evidence-based policy and decision-making and HORIZON-MISS-2021-OCEAN-02: Protect and restore marine and fresh water ecosystems and biodiversity. Projects using satellite data should link to HORIZON-CL6-2021-GOVERNANCE-01-14: User-oriented solutions building on environmental observation to monitor critical ecosystems and biodiversity loss and vulnerability in the European Union.

The possible participation of the JRC would help ensure that the methodologies proposed can support environmental compliance assurance, particularly by leveraging geospatial intelligence.

Collaboration with the European partnership on biodiversity "Biodiversa +" should be explored, as needed.

Area B: new robotic sensors for biodiversity

To increase the density of species and habitats observations across the EU territory, new robotic, and possible mobile, solutions need to be developed.

The proposed innovative solutions should:

- Be ready to use, easy to deploy and operate in natural environment.
- Consider automated solutions, and mobile platforms (land, air, water and under water) carrying sensors (such as, but not limited to, image, sound, lidar, spectrometry, eDNA, etc.) should be designed with fields campaigns in mind, in particular in terms of autonomy (energy, autonomy of moving and sampling decisions). Improvements in terms of species tagging, and species-carried tracking or telemetry devices should also be considered.
- The project should focus on innovative sensors that would allow significantly increasing knowledge in biodiversity, or bringing new information about the species and habitats conservation status, and increase spatial and temporal coverage, and to facilitate access to environments that are difficult to sample.

- Propose a large degree of data collecting automation and compatibility with the system described in project 1.
- The project should generate at least 1 innovative prototype of robotic/automated sensor and 1 innovative prototype of mobile solution, demonstrating improved performances compared to the currently available solutions.
- The project should analyse the conditions and costs of the production of the robotic system, as well as the conditions and costs of its usage and maintenance.

The project "Natural Intelligence for Robotic Monitoring of Habitat" could provide hints about the usage of mobile robotic sensors.

International cooperation is encouraged.

Mainstreaming biodiversity in society and the economy

Proposals are invited against the following topic(s):

HORIZON-CL6-2024-BIODIV-01-3: Dependence of society and the economy on pollinators

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 6.50 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 13.00 million.
Type of Action	Research and Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: The following additional eligibility criteria apply: the proposals must apply the multi-actor approach. See definition of the multi-actor approach in the introduction to this work programme part.

Expected Outcome: In line with the European Green Deal and in particular with the objectives of the EU biodiversity strategy for 2030 and the EU pollinators' initiative, projects will contribute to mainstream **biodiversity in society and the economy.**

Project results are expected to contribute to all following expected outcomes:

- Direct and indirect dependences of our society and the economy on pollinators are better understood and quantified;

- Monetary and non-monetary valuation of ecosystem services provided by pollinators are advanced, and used to improve ecosystem accounting;

- Tools for mainstreaming pollinator conservation into the food, health, energy, materials and land management sectors are developed, tested and promoted with public authorities, businesses and the general public;

- Risks of reversible and irreversible cascading effects in natural and modified ecosystems due to pollinator decline, and their impacts on human wellbeing, are better understood and forecasted, and integrated into models for participatory scenario planning.

Scope: The importance of pollinators for humankind is common knowledge, featuring prominently outside of the scientific realm in popular culture and arts. Yet, even well-known benefits provided by pollinators such as crop pollination are still inadequately understood. Other benefits remain for the most part obscure, and thus unacknowledged, due to the lack of research targeting the complexity of pollinator niches and plant-pollinator networks. Amid the dramatic decline of pollinating species in Europe, these gaps hinder understanding of the character and full magnitude of threats to human wellbeing. Moreover, the gaps hinder mainstreaming of the conservation of pollinators, and more broadly biodiversity, in the public and private sector and thereby impede an effective societal response. This topic aims to address fundamental knowledge gaps in functional roles of pollinators in natural (natural plant-pollinators networks) and human-modified ecosystems (e.g. agro-ecosystem), and building on that i) advance research on far reaching consequences of their decline and scenario planning and ii) develop and disseminate tools that enable systematic mainstreaming in key sectors.

The proposed projects should build on the Assessment Report on Pollinators, Pollination and Food Production of IPBES[101], the first ever EU-wide Ecosystem Assessment 2020[102], the INCA project[103], the European Red List assessments[104], and knowledge and experience gained through past projects supported under the EU Framework Programme for Research and Innovation[105]. Furthermore, the projects should liaise with relevant ongoing projects under Horizon Europe[106] and EU funded monitoring initiatives[107].

The proposals should show how their results would contribute to the EU policies, as well as to the global sustainable development agenda (UN Sustainable development Goals.

Proposals should include specific tasks and envisage sufficient resources to develop joint deliverables (e.g., activities, workshops, as well as joint communication and dissemination) with all projects funded under this topic and to facilitate cooperation with the European

101 https://ipbes.net/assessment-reports/pollinators
102 https://publications.jrc.ec.europa.eu/repository/handle/JRC120383
103 https://ec.europa.eu/eurostat/documents/7870049/12943935/KS-FT-20-002-EN-N.pdf/de44610d-79e5-010a-5675-14fc4d8527d9?t=1624528835061
104 https://ec.europa.eu/environment/nature/conservation/species/redlist/
105 https://wikis.ec.europa.eu/display/EUPKH/Research+and+innovation
106 https://wikis.ec.europa.eu/display/EUPKH/Horizon+Europe
107 https://wikis.ec.europa.eu/display/EUPKH/Monitoring+initiatives

biodiversity partnership Biodiversa+[108] and other platforms such as the EC Knowledge Centre for Biodiversity[109].

For the implementation of the eligibility condition on the 'multi-actor approach', proposals should ensure adequate involvement of researchers, farmers and other land managers, businesses involved in the food, medicine, energy and/or materials sectors, decision-makers at local and/or regional level, civil society organisations and other relevant actors.

Successful proposals should:

- Investigate essential functional roles of pollinators in natural and human-modified ecosystems, and associated ecosystem services. This should encompass ecosystem services underpinned by pollinators both directly and indirectly;

- Fill knowledge gaps on animal pollination ecology (what pollinates what, how much, where and when) and investigate the full spectrum of animals that pollinate wild and cultivated plants in Europe, going beyond the well-known insects (bees, hoverflies, butterflies, moths). The structure and functionality of plant-pollinator networks should be analysed. The research scope should include the European continent as well as EU overseas territories;

- Build a platform that will serve one-stop shop for information on animal pollination ecology. A database with systematised information on plan-pollinator interactions, including the spatial dimension of plant-pollinator networks, should be part of the platform. The platform should build on what already exists and should be devised in close collaboration with researchers and other potential users. Options to integrate this deliverable into the already existing platforms should be explored, with a view to ensure its long-term viability;

- Assess the dependency of society and the economy on ecosystem services underpinned directly and indirectly by pollinators, quantify and map the risks associated with pollinator decline. Monetary and non-monetary valuation of those ecosystem services should be advanced, including their tangible and less tangible elements, and utilised to improve ecosystem accounts and scale up their use in the public and private sector;

- Investigate biomass supply chains dependent on pollinators, build tools for businesses to assess their vulnerability to pollinator decline and improve guidelines on how they can help to reverse the decline and thereby mitigate future risks. This should in particular cover the food (including production of plants with mandatory cross-pollination), medicine, energy and materials sectors;

- Build tools for land managers and planners to support spatial decision-making with regard to the conservation of pollinators and protection of the local flow of ecosystem services that they deliver, e.g., digital atlases, maps, applications. In particular, tools for

[108] https://www.biodiversa.org
[109] https://knowledge4policy.ec.europa.eu/biodiversity_en

farmers should be developed, enabling assessment of impacts on their income and overall business performance of farms, early warning of pollination-deficit as well as social impacts on farming communities;

- Investigate the dependency of sustainable nutrition on pollinators and potential risks due to their decline. Particular attention should be paid to food with invaluable and irreplaceable properties for human health (e.g. with regard to micronutrients);

- Investigate risks of cascading effects in natural (natural plant-pollinators networks) and human-modified ecosystems due to pollinator decline and their impacts on human wellbeing, and undertake scenario forecasting towards 2050 in the case of an unmitigated pollinator decline. Uncertainty and irreversibility of the effects should be well integrated in the build-up of models.

HORIZON-CL6-2024-BIODIV-01-4: Biodiversity, economics and finance: Understanding macro-financial risks associated with biodiversity loss

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 5.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 5.00 million.
Type of Action	Research and Innovation Actions

Expected Outcome: In line with the European Green Deal priorities and in particular with the EU biodiversity strategy for 2030 and the EU strategy for financing the transition to a sustainable economy, the successful proposal(s) will help unlock financial flows needed for reversing biodiversity loss, and contribute to mainstreaming biodiversity, ecosystem services and natural capital in the society and economy.

Project results are expected to contribute to all of the following expected outcomes:

- New knowledge to accelerate the ecological transition and socioeconomic transformation towards nature-positive economy across EU, in a context of erosion of natural capital and degradation of ecosystems and their essential services;

- Enhanced understanding and quantification of the macroeconomic significance of biodiversity and implications of its loss at EU level as a basis for more coordinated and better organised responses by key economic actors and institutions, including key policy making processes (e.g., EU semester);

- Information, tools and metrics to better integrate biodiversity and its loss into mainstream macro-financial analytical frameworks, risk assessment and management methods as a basis for enhancing natural capital and NBS;

- Development of more comprehensive and more robust environmental risk management in the financial sector;

- Mobilisation of mainstream finance to slow down, and reverse biodiversity loss in the broader context of environmentally sustainable development by catalysing nature-positive investments contributing to the objectives of the European Green Deal;

- Evidence base to support the implementation of the EU strategy for financing the transition to a sustainable economy.

Scope: The erosion of natural capital combined with the collapse of ecosystems entails potentially far-reaching economic and financial implications, including risks for macroeconomic and financial stability of key institutions, countries and regions. The decline of ecosystem services poses physical risks for economic and financial actors that depend upon those services, while socioeconomic transformations could trigger transition risks. As more than half of the world's GDP relies on nature[110], it is estimated that the risks triggered by ecosystem degradation to human societies could be at least as high as those imposed by climate change. Furthermore, these risks are growing as biodiversity is declining at unprecedented rates in human history, which calls for improved understanding, assessment and risk management approaches by key economic actors such as corporates, governments, central banks and financial supervisors. However, a wide range of challenges, including the complexity of ecosystem processes, uncertainty about tipping points and valuation problems, make it very difficult.

Actions should improve the state-of-art knowledge on the relationships between biodiversity, economy and the financial system including better understanding of the nature and degree of risks associated to biodiversity loss, how these risks interact with each other and are likely to evolve over time.

In particular, actions are expected to:

- Expand the evidence base on the dependence of the EU economy and its financial sector on nature, including by producing relevant macroeconomic indicators, e.g., assessing the share of the EU GDP and employment that depends on nature and evaluate implications of biodiversity loss. As much as possible, research should also extend to country level analysis and/or prepare the ground for future more in-depth studies with increased geographical resolution.

[110] Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy | World Economic Forum (weforum.org).

- Develop scenarios tailored to financial risk assessment, including identification of assets under highest risk from being stranded and sectors that represent the highest risk exposure.

- Co-design principles for a more comprehensive and more robust environmental risk management in the financial sector, develop innovative methodologies and tools to support risk assessment that can better capture the specificities of nature and ecosystems.

- Explore tools to assess the alignment of corporates and financial institutions with major European and global biodiversity-related goals, including by leveraging of the EU Taxonomy on Sustainable Finance.

- Investigate how biodiversity loss interacts with climate change and other socio-environmental challenges in regard of macro-financial stability and how different risks can reinforce each other.

- Identify possible response options and issue recommendations for EU institutions and Member States, investors, companies and other financial market participants about macro-financial risks of biodiversity loss.

In their research, actions should investigate various possible risk categories including both physical and transition ones, their transmission channels and cascading effects through sectors and supply chains, as well as adaptive capacity of economic and financial agents/institutions, with particular focus on the EU, its Member States and Horizon Europe Associated Countries. The analysis should extend to worst-case scenarios and include low-probability but high-impact biodiversity-related tail risks.

Actions should build on and/or establish synergies with the relevant work by initiatives/projects/studies including, but not limited to, the World Economic Forum's New Nature Economy Report Series[111], Network for Greening the Financial System[112], Taskforce on Nature-related Financial Disclosures[113], The Finance for Biodiversity (F4B) initiative Accounting for ecosystems and their services in the European Union (INCA)[114] and EU Member States (MAIA)[115] projects, Indebted to Nature report[116] and the working paper 'A "Silent Spring" for the Financial System? Exploring Biodiversity-Related Financial Risks in France'[117].

Actions are expected to involve and co-create with the end-users (financial institutions, non-financial corporations, governments etc.) to fully account for their respective views and needs. Actions should bring together from the start multiple types of scientific expertise in social

111 https://www.weforum.org/reports/new-nature-economy-report-series
112 https://www.ngfs.net/en
113 https://tnfd.global/
114 https://ec.europa.eu/eurostat/documents/7870049/12943935/KS-FT-20-002-EN-N.pdf/de44610d-79e5-010a-5675-14fc4d8527d9?t=1624528835061
115 https://maiaportal.eu/about
116 https://www.dnb.nl/en/general-news/2020/indebted-to-nature/
117 https://publications.banque-france.fr/en/silent-spring-financial-system-exploring-biodiversity-related-financial-risks-france

sciences and humanities, in particular in economics and finance, as well as scientific expertise in biodiversity and natural capital.

Actions should envisage clustering activities with projects funded under this topic as well as with other relevant Horizon Europe and Horizon 2020 projects working on links between biodiversity and sustainable finance and economics of biodiversity[118]. To this end proposals should foresee dedicated tasks and appropriate resources for coordination measures, joint activities, and joint deliverables.

HORIZON-CL6-2024-BIODIV-01-5: Transformative action of policy mixes, governance and digitalisation addressing biodiversity loss

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 2.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 4.00 million.
Type of Action	Research and Innovation Actions

Expected Outcome: In line with the European Green Deal priorities, in particular with the EU biodiversity strategy for 2030 and the 2030 climate pact, successful proposals will develop knowledge and tools to understand the role of transformative change for biodiversity policy making, address the indirect drivers of biodiversity loss, and initiate, accelerate and upscale biodiversity-relevant transformative changes in our society. They will also help understanding the impacts of and the opportunities offered by digital transformation, new emerging technologies, and social innovation on biodiversity. Successful proposals will contribute to the following expected impact: mainstream biodiversity, ecosystem services and natural capital in the society and economy: integrate them into public and business decision-making; build approaches for enabling transformative changes to face societal challenges including through the deployment of Nature-Based Solutions (NBS).

Projects should address all of the following outcomes:

- Foresight on society well-being based on realistic assumptions on careful use of natural capital and analysis of the consequences in terms of economic growth.
- Evaluation of feasibility and limits of decoupling economic activities from natural capital use.

[118] Notably Horizon Europe projects Invest4Nature and projects resulting from the calls: “H HORIZON-CL6-2023-BIODIV-01-10: Build up of knowledge on Nature Positive Economy and supporting its scale-up”.

- Knowledge and understanding of the transformative changes needed to address the indirect drivers of biodiversity loss underpinned by societal values and behaviours, better design of policy mixes and governance.

- Operational knowledge available to, and used by policymakers, on indirect drivers of biodiversity loss that are underpinned by societal values and behaviours, and on the transformative changes that are necessary to tackle these indirect drivers.

- Improved and new systemic, sustainable policy mixes and governance approaches developed to enable biodiversity-relevant transformative change, based on a range of policy tools, economic research, instruments or regulations.

- Methods and tools promoting win-win solutions for biodiversity and socio-economic objectives, the use and mainstreaming of 'green over grey' approaches and the application of the 'do no harm' principle are available and taken up across the policy spectrum, planning and investment decisions, business and finance, and civil society.

- Approaches to facilitate the application of such methods and tools are identified and used, while factoring in societal and political processes (such as citizen engagement, political campaigns, science denialism). Solutions can include stocktaking of good practice, standards, agreements, charters, commitments, regulations, engaging society and incorporating lifelong learning.

- A better understanding of the impacts on, risks and opportunities for biodiversity of digital transformation (for example data-driven technologies, artificial intelligence, robotics, automation, miniaturised sensors, citizen science applications, crowd sourcing), new materials (e.g., for biomimicry), the energy sector (e.g., through energy/electricity infrastructure), and new and emerging technologies.

- Identification and assessment of how system-level change affecting biodiversity through social innovation happens.

- Testing active intervention by R&I policy and sector policies (niche creation, reformulation of governance), also by empowering and endowing communities.

Scope: In line with the EU biodiversity strategy for 2030, successful proposals will develop:

- operational knowledge and understanding of transformative change needed to address the indirect drivers of biodiversity loss underpinned by societal values and behaviours, which is available to, and used by policy makers.

- improved and innovative governance tools and policy mixes that can effectively initiate, accelerate and upscale such biodiversity-relevant transformative changes in our society.

- help understanding the impacts of and the opportunities offered by digital transformation, use of data and sensors, emerging technologies such as AI and robotics and social innovation on biodiversity.

- Proposals should look at key indirect drivers of biodiversity loss (including production and consumption patterns, human population dynamics and trends, trade, technological innovations and local through global governance), the kind of transformative changes necessary to tackle these societal drivers, effective governance approaches, tools and policy mixes to enable these changes, and how to further mainstream biodiversity into policy making, science, and governance within and beyond socio-economic, climate and environmental agendas.

- Proposals should generate knowledge on how to tackle biodiversity loss linked to technological and social innovation, which includes digitalisation. Proposals should explain how changes by technological/social innovation are impacting biodiversity – for example by bringing in new and emerging technologies, new production processes, consumer products, regulations, incentives, or participatory processes.

- Proposals should produce case studies on what transformative change means in practice and a collection of good and failed examples of developing and implementing policy tools, best practices and instruments, and on impacts of digitalisation, which could feed into the just transition process and inform and inspire transformative change through learning, co-creation and dialogue.

- Proposals should develop methodologies to assess the impacts of their proposed solutions on policy and its decision making. This includes impacts from energy/electricity infrastructure related to digitalisation, on democracy and on trust in science on environmental, social and economic systems. Such assessments should focus on the direct and indirect effects of digital developments on biodiversity, intertwined with climate change and health.

- This topic should involve contributions from the social sciences and humanities disciplines, as well as social innovation.

- The proposals should build their analysis upon the synergies of multiple Sustainable Development Goals, to deliver direct and indirect biodiversity benefits, and of the role of biodiversity in reaching the set of Sustainable Development Goals, considering the importance of policy mixes, governance and digitalisation.

- Proposals should include specific tasks and allocate sufficient resources to develop joint deliverables (e.g., activities, workshops, joint communication and dissemination) with all projects from the same topic and the portfolio of all projects on transformative change related to biodiversity funded under this destination since 2021.

- Proposals should use or interoperate with existing platforms and information sharing mechanisms relevant for transformational change and on biodiversity knowledge.

- Projects are expected to cooperate with the European partnership on biodiversity, Biodiversa+, and the Science Service project Bio-agora. Proposals should show how their results and outcomes could provide timely information for major science-policy

bodies such as the Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services (IPBES), the Intergovernmental Panel on Climate Change (IPCC), and the Convention on Biological Diversity.

- Where relevant, projects are expected to create links to and use information, data and impact-related knowledge from the European Earth observation programme Copernicus, the ESA EO4SD initiative, the Group on Earth Observations (GEO) and the Global Earth Observation System of Systems (GEOSS).

Biodiversity friendly practices in agriculture, forestry and aquaculture

Proposals are invited against the following topic(s):

HORIZON-CL6-2024-BIODIV-01-6: Promoting pollinator friendly farming systems

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 6.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 6.00 million.
Type of Action	Research and Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: The following additional eligibility criteria apply: the proposals must apply the multi-actor approach. See definition of the multi-actor approach in the introduction to this work programme part.

Expected Outcome: In line with the EU biodiversity strategy for 2030, the farm to fork strategy, the EU climate policy under the European Green Deal, successful proposals will promote a pollinator friendly agriculture, contribute to the transition to more sustainable practices in agriculture, and support biodiversity in agroecosystems.

The project results are expected to contribute to all of the following expected outcomes:

- Farming systems are more pollinator-friendly and support (agro)biodiversity;
- Pollinator-friendly varieties, rotations and combination of crops are promoted;
- Farmers are more aware of the importance of pollinator-specific planning and measures available to enhance pollination services;
- Breeding sector is adapted to develop varieties adapted to pollinator-friendly farming.

Scope: The production of many crops depends on pollinators. Different types of measures are needed to tackle the causes of pollinator decline, enhance crop pollination, and promote pollinators in agriculture. Many crops have specific traits, which have been identified to enhance crop–pollinator interactions. The development of crop varieties with specific traits to attract and reward pollinators is an appealing strategy to address needs of agriculture and pollinators. This could also improve crop yields, nutritional resources for pollinators and promote a pollinator-friendly agriculture.

Pollination activities are also impacted by variety (genotype), environment, and management practices (GxExM). Pollinator-specific planning needs to consider temporal and spatial crop management and other strategies of management (e.g., field margin composition and structure) to enhance pollination services.

Proposals should:

- Increase the understanding of the crop-farming system-pollinator relationship in combination with the interaction between crop, environment and management (GxExM);
- Identify crop traits that enhance crop-pollinator interactions, engage in breeding activities and contribute to the development of pollinator-friendly varieties;
- Identify, test and demonstrate farming systems that take into consideration temporal and spatial diversification of crops as well as landscape features to match pollinators needs;
- Promote and facilitate the uptake of farm-pollinator friendly practices;
- Support capacity building, training and education enabling farmers/growers to adopt sustainable agricultural practices;
- Develop strategies to create value of pollinator friendly approaches along the value chain.

Proposals should build on the results of relevant projects funded under Horizon 2020 and ensure collaboration with projects funded under the following call in Horizon Europe work programme 2021-2022: *HORIZON-CL6-2022-BIODIV-02-01-two-stage: Maintaining and restoring pollinators and pollination services in European agricultural landscapes.*

Proposals must implement the 'multi-actor approach' and ensure adequate involvement of researchers, the breeding sector, farmers, agricultural advisors and other relevant actors. The topic is open to all types of farming systems (e.g., arable farming, horticulture, fruit trees) in various geographical and pedo-climatic conditions. Result of activities should benefit both conventional and organic farming.

HORIZON-CL6-2024-BIODIV-01-7: Reintroduction of landscape features in intensive agricultural areas

Specific conditions

Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 5.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 5.00 million.
Type of Action	Research and Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: The Joint Research Centre (JRC) may participate as member of the consortium selected for funding.

Expected Outcome: In supporting the implementation of the European Green Deal, the EU biodiversity strategy for 2030, the farm to fork strategy and the common agricultural policy, successful proposals will contribute to develop and improve practices in agriculture to support and make sustainable use of biodiversity and a wide range of ecosystems services.

Projects results are expected to contribute to all of the following expected outcomes:

- Drivers and challenges for the re-introduction of landscape features in intensive farming areas are better identified.
- Strategies to reintroduce landscape features in intensive agricultural areas for national and regional policy- and decision-makers are built, contributing to the following key-commitments of the EU biodiversity strategy 2030: “At least 10% of agricultural area is under high-diversity landscape features”; and “Three billion new trees are planted in the EU, in full respect of ecological principles”.
- Solutions for climate change adaptation and to provide ecosystem services, in particular carbon sequestration, are developed for areas of intensive agriculture.
- The ground for possible future demonstration projects is prepared.

Scope: According to the EU biodiversity strategy for 2030, “to provide space for wild animals, plants, pollinators and natural pest regulators,10% of agricultural area should be brought back under high-diversity landscape features, including, inter alia, buffer strips, rotational or non-rotational fallow land, hedges, non-productive trees, terrace walls, and ponds”. These should help enhance carbon sequestration, prevent soil erosion and depletion, filter air and water, and support climate adaptation. In addition, more biodiversity often leads to more agricultural production over the medium and long term.

In the EU there are large agricultural intensive areas where nature has almost disappeared. There is a need to reintroduce nature to improve the state of the environment by delivering ecosystem services and as a contribution to climate mitigation and adaptation. In particular it is needed to achieve ecological corridors, in conjunction with other multifunctional Nature-

based Solutions. Landscape features may also be included as remedial measures to protect soil; their biogeochemical functions may counteract the spread of chemical pollutants from agriculture to groundwater and open waters, especially those derived from natural and mineral fertilizers.

The new common agricultural policy (CAP) may offer specific tools to support farmers who dedicate space for biodiversity rich landscape features, such as dedicated eco-schemes or area related interventions (such as agri-environmental interventions) or non-productive investment interventions (one-off costs arising from establishing landscape features such as hedges, ponds, wetlands or stone walls). The agri-environment interventions under CAP Strategic Plans will continue to be implemented on a voluntary basis. They have been used in a quite limited extent until now to promote the reintroduction of biodiversity-rich landscape features in areas of intensive agriculture. Eco-schemes are new tools to support farmers in the first pillar of the CAP (direct payments) in the form of incentives to farmers to adopt more environment-friendly practices. They may cover the reintroduction of biodiversity rich landscape features, but this will depend on a number of factors, notably the implementation choices of Member States in their CAP Strategic Plans and the level of support.

This topic intends to look into key-factors which may lead to the reintroduction of landscape features in areas of intensive agriculture beyond financial incentives.

Proposals should:

- assess the increase of the environmental and economic value and the potential for land productivity linked to the increase of biodiversity rich landscape elements on agricultural land with intensive organization of production. They should address the valuation (monetary and social benefits) of the ecosystem services of landscape features, based on existing R&I projects, and assess the perception of land managers/owners of this value increase. Proposals could notably build on available knowledge on Natural Capital Accounting[119].

- investigate into possible business models which can combine the reintroduction of landscape features with rewarding economic activities including possibly recreational ones. This could build on positive experiences with productive trees part of arable land agroforestry system**s**. Projects should address the need to build green corridors and consider where and why reintroducing landscape features makes sense for this. The need to restore water systems through the restoration of streams and small rivers should be included.

- assess the decision-making process of land owners/managers which can lead to the reintroduction of landscape features in areas of intensive agriculture and analyse enabling mechanisms. This assessment should go beyond analysing available financial incentives and should include in particular factors such as social, generational and gender aspects, awareness about the intrinsic value of biodiversity and the importance of

[119] Natural Capital Accounting - Environment - European Commission (europa.eu)

agricultural land for maintaining biodiversity in the natural landscape matrix in the context of climate change and persistent landscape fragmentation, the type of land exploitation (land in private ownership or lent, legal form of holdings…), etc,

- identify possible pathways towards more diversified business models involving nature and what could be the right incentive(s) (beyond financial incentives) to lead to change.
- formulate strategies to reintroduce landscape features in areas of intensive agriculture.

The topic is open to all types of farming systems (e.g., arable farming, horticulture, fruit trees) in various geographical and pedo-climatic and conditions.

This topic should involve the effective contribution of social sciences and humanities (SSH) disciplines.

Proposals should build on the results of relevant EU-funded research projects. They should use existing platforms and information sharing mechanisms notably the EC Knowledge Centre for Biodiversity.

The JRC may provide expertise on landscape features identification, typology, quantification in the frame of EU policy.

HORIZON-CL6-2024-BIODIV-01-8: Conservation and protection of carbon-rich and biodiversity-rich forest ecosystems

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 6.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 12.00 million.
Type of Action	Research and Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: The following additional eligibility criteria apply: the proposals must apply the multi-actor approach. See definition of the multi-actor approach in the introduction to this work programme part. The Joint Research Centre (JRC) may participate as member of the consortium selected for funding.

Expected Outcome: In line with the EU biodiversity and climate objectives, successful proposals will support the protection of biodiversity-rich forest ecosystems, at the species'

distribution rear edges and margins that are at high risk of collapse in light of a rapidly changing climate.

Project results are expected to contribute to all of the following outcomes:

- Improved knowledge on the cross-impacts between biodiversity and climate change: drivers of biodiversity loss and the interrelation with forest-based adaptation and mitigation needs; impacts of climate change on forest biodiversity and forest species migration; and links between forest species diversity and forest resilience to climate change.
- Identification of win-win management practices (including non-intervention, climate-smart forestry) and development and implementation of ecosystem protection and restoration methods and tools for resilient, carbon rich and biodiversity supportive forests.
- Better understanding of the drivers and barriers for natural co-migration of forest communities and development of approaches and guidelines to foster co-migration.
- Improved tools and indices for the joint monitoring of biodiversity and climate aspects on forests.
- Empirical analysis of the current forest management and conservation practices in European forests of high ecological value, including governance (regulations and their impact), management responses to climate change and an assessment of drivers that determine management on the ground.
- Strict protection of primary and old-growth forest in Europe by 2030.

Scope: Biodiversity-rich forest ecosystems, in particular at the species' distribution edges, are at a high risk in light of a rapidly changing climate. When not being in their optimal climate conditions, they are more fragile to biotic and abiotic damages and do not provide ecosystem services in an optimal manner.

While for tree species assisted migration and assisted gene flow is considered as a possibly solution in actively managed forests, the dependent forest communities (e.g., plants, fungi, insects, soil microorganisms etc.) might fail to follow the speed of habitat shifts what in turn may result in a loss of biodiversity. In addition, migration failure of mutualistic species (fungi, mycorrhiza) can jeopardize the success of tree migration.

Protected areas without the option for assisted migration, will particularly depend on the larger landscape context for community migration and adaptation, as many of them have not been designed to account for the long-term and large-scale dynamics.

Proposals will:

- Set up case studies in European forests or tropical forests; particularly targeting forests of high ecological value, such as primary and old-growth forests, Mediterranean forests, peat swamp forests or mangroves.
- Improve existing or develop new predictive models of biodiversity changes, advance the understanding of species connection with the forest habitat, and analyse to what extent species can survive in a changed and fragmented habitat with a view to establishing protected forest networks.
- Analyse directions of assisted tree migration to maximize dynamic gene conservation (as form of ex situ conservation)
- Assess the risk for biodiversity loss in protected areas and develop protection strategies that consider the larger landscape and regional context to allow for natural species and community migration.
- Develop approaches and guidelines for forest managers and conservationists in a context of forest ecosystem migration and map scenarios of potential forest ecosystem migration routes.
- Connect with relevant institutions at regional, national and EU-level as well as relevant stakeholders to regularly disseminate the research results.
- Improve monitoring techniques, including remote-sensing and field-data methods integrating technologies such as AI, IoT, robotics or blockchain, to better assess biodiversity and climate aspects of forests.

Due to the scope of this topic, international cooperation is strongly encouraged.

The project must implement the multi-actor approach and ensure an adequate involvement of the primary production sector and the wider forest-based value chain.

JRC will contribute with dataset on forest tree species distribution and support the development of satellite monitoring of forest metrics.

HORIZON-CL6-2024-BIODIV-01-9: Selective breeding programme for organic aquaculture

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 3.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 3.00 million.
Type of Action	Research and Innovation Actions

Technology Readiness Level	Activities are expected to achieve TRL 3-5 by the end of the project – see General Annex B.

Expected Outcome: In line with the European Green Deal priorities and in particular with the EU biodiversity strategy for 2030 and the 2030 climate target pact, a selective breeding programme for organic aquaculture will be developed contributing to the impact "develop and improve practices in agriculture, forestry, fisheries and aquaculture to support and make sustainable use of biodiversity and a wide range of ecosystems services".

The selected project is expected to contribute to all of the following outcomes:

- Contribution to a non-toxic environment, to a high level of biodiversity (including genetic diversity) and to high animal welfare standards meeting the species-specific behavioural needs;
- Significantly boost in the quality of aquaculture products, improving traits of economic and welfare importance;
- Increased feed efficiency that will also result in a reduced environmental impact through the minimization of feed residues in the natural environment;
- Less disease outbreaks through genetic progression, i.e. greater disease resistance, increased feed efficiency, faster growth and improved traits of economic and welfare importance;
- Increased knowledge and acceptance of organic aquaculture and its products in the general public through true stakeholder and consumer involvement.

Scope: Regulation (EU) 2018/848 lays down detailed production rules for organic aquaculture and requires the use of organic juveniles for on-growing purposes. Breeding under organic conditions is essential to achieve the objectives of organic aquaculture and respect its principles. Breeding is at the same time essential to allow the farmers to reach good productive results and efficient use of the resources under organic production conditions.

Proposals should plan breeding programs under organic aquaculture for the main European aquaculture finfish species, i.e. seabass, seabream, trout and salmon. They should breed organic juveniles under organic production conditions respecting high animal welfare standards (as set in regulation 2018/848 and Implementing Regulation 2020/464) and should aim to improve species resilience, diseases resistances and feed efficiency satisfying nutritional needs using as much as possible alternative feed materials to increase production sustainability.

Proposals should work on different species and/or different climatic areas tailored to the specificity of the organic aquaculture production and carefully analyse each solution not only in terms of performance but also in terms of the welfare of the farmed animals. They should work on preserving genetic diversity and adaptive potential by developing selective breeding programmes considering interactions between genotypes and rearing systems.

In this topic the integration of the gender dimension (sex and gender analysis) in research and innovation content is not a mandatory requirement.

Call - Biodiversity and ecosystem services

HORIZON-CL6-2024-BIODIV-02

Conditions for the Call

Indicative budget(s)[120]

Topics	Type of Action	Budgets (EUR million)	Expected EU contribution per project (EUR million)[121]	Indicative number of projects expected to be funded
		2024		
Opening: 17 Oct 2023 Deadline(s): 22 Feb 2024 (First Stage), 17 Sep 2024 (Second Stage)				
HORIZON-CL6-2024-BIODIV-02-1-two-stage	IA	16.00	Around 8.00	2
HORIZON-CL6-2024-BIODIV-02-2-two-stage	IA	10.00	Around 5.00	2
HORIZON-CL6-2024-BIODIV-02-3-two-stage	RIA	10.00	Around 5.00	2
Overall indicative budget		36.00		

General conditions relating to this call	
Admissibility conditions	The conditions are described in General Annex A.
Eligibility conditions	The conditions are described in General Annex B.

120 The Director-General responsible for the call may decide to open the call up to one month prior to or after the envisaged date(s) of opening.
The Director-General responsible may delay the deadline(s) by up to two months.
All deadlines are at 17.00.00 Brussels local time.
The budget amounts are subject to the availability of the appropriations provided for in the general budget of the Union for years 2023 and 2024.

121 Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.

Financial and operational capacity and exclusion	The criteria are described in General Annex C.
Award criteria	The criteria are described in General Annex D.
Documents	The documents are described in General Annex E.
Procedure	The procedure is described in General Annex F.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G.

Mainstreaming biodiversity in society and the economy

Proposals are invited against the following topic(s):

HORIZON-CL6-2024-BIODIV-02-1-two-stage: Demonstrating Nature-based Solutions for the sustainable management of water resources in a changing climate, with special attention to reducing the impacts of extreme droughts

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 8.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 16.00 million.
Type of Action	Innovation Actions
Admissibility conditions	The conditions are described in General Annex A. The following exceptions apply: Applicants submitting a proposal under the blind evaluation pilot (see General Annex F) must not disclose their organisation names, acronyms, logos, nor names of personnel in Part B of their first stage application (see General Annex E).
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: In addition to the standard eligibility conditions, proposals must include demonstration activities to be carried out in at least four different Member States or Associated Countries. At least one of the proposed

	demonstrations must take place in a region eligible for Cohesion funds.
Procedure	The procedure is described in General Annex F. The following exceptions apply: This topic is part of the blind evaluation pilot under which first stage proposals will be evaluated blindly.

Expected Outcome: In line with the European Green Deal priorities, notably the EU biodiversity strategy for 2030, as well as the EU climate adaptation strategy and the EU's climate mitigation ambition for 2030 and 2050, the successful proposals will support the development of Nature-based Solutions (NBS) contributing to the sustainable management of water resources in a changing climate, with a special attention to reducing the impacts of extreme droughts.

Project results are expected to contribute to all of following expected outcomes:

- Cost-effective ways of implementing NBS at large scale for integrated water management are ready to use for relevant stakeholders and widely replicated;
- Consolidated evidence of the contribution of NBS to sustainable water management and of NBS' cost and resource efficiency, notably concerning the reduction of impacts of droughts;
- Enhanced implementation of EU policies, notably for water management (Water Framework Directive, as well as the Floods Directive, when relevant), climate adaptation (Article 5 of the European Climate Law, EU strategy for climate change adaptation), the EU biodiversity strategy for 2030 and the EU soil strategy for 2030.

Scope: Due to the changing climate, many European regions are already facing more frequent, severe, and longer lasting droughts. Extreme droughts can have cascading effects; e.g., they reduce water levels in rivers and ground water, stunt tree and crop growth, increase pest attacks, favour the occurrence of sand drifts and storms and fuel wildfires. Moreover, impacts of extreme droughts accumulate over time across large areas, and the effect can linger for years. In areas with an intense demand for water supply, the impacts of droughts add up to the stress imposed to water systems by human activities.

In Europe, most of the losses caused by extreme drought (~EUR 9 billion/year) affect agriculture, forestry the energy sector and the public water supply. Extreme droughts in western and central Europe in 2018, 2019 and 2020 caused considerable damage. With global climate change deepening, the impacts will be even more severe in the future, including decreasing quality, occurrence and availability of standing and running water.

By deploying systemic thinking NBS utilise an understanding of the structure and functioning of local ecosystems over time to address a broad range of societal challenges, including having enough water of good quality, both in surface waters and in ground water. They also contribute to restoration of biodiversity and help carbon sequestration in the soil. As such,

NBS are highly adaptable to respond to changing local conditions and are often more cost and resource efficient than purely technological approaches in the longer term.

The 2021 EU climate adaptation strategy underlines that NBS represent multipurpose, "no regret" solutions, with environmental, social and economic benefits and help build climate resilience. They can have an essential role in land-use management and infrastructure planning to reduce costs, provide climate-resilient services, and improve compliance with Water Framework Directive (WFD) requirements.

However, evidence on the cost-efficiency of these measures remains dispersed and incomplete, and do not address the whole catchment area in a holistic approach. River basin management plans are still limited in the recognition of NBS capacity to contribute to drought resilience. Furthermore, we are still missing more and longer-term evidence of the combined effects of different designs and combinations of NBS operating in different contexts (urban, peri-urban and rural) and/or at different scales and/or different climatic zones, in what regards the sustainable management of water resources to reduce the impacts of extreme droughts. At the same time, the co-benefit that these NBS may bring to reduce hydrogeological risks such as flood peaking and stabilising hydrographs for both droughts and floods is still to be demonstrated.

The successful proposals should:

- Demonstrate innovative, systemic and locally attuned NBS (as single interventions or as a combination of them), for the management of catchment water resources and the reduction of extreme drought risks, in areas that are heavily impacted by temporary or lasting water scarcity and areas that are being increasingly exposed to this risk with the deepening of climate change.

- Be incorporated into an integrated design concept for land and water management at the appropriate scales (preferably at landscape level, integrating water, soil and ecosystems as a whole), in accordance with WFD objectives, considering longitudinal connectivity of water flows, lateral connectivity with floodplains and adjacent grounds, and connections between surface- and groundwater.

- Plan, co-design and co-deploy solutions in a transdisciplinary multi-stakeholder and participatory context with due consideration and integration of social and cultural aspects and climate change effects.

- Building on the work of Horizon 2020 projects and their taskforces, develop an advanced monitoring programme for the demonstrated solutions and test and further develop as needed the EU Impact Evaluation Framework for NBS to assess the economic, social and ecological benefits of NBS and provide quantitative evidence, including positive and negative synergies, and analysis of trade-offs, for higher performance.

- Identify and assess barriers related to: functional conflicts in land-use; NBS technical, commercial, social and cultural acceptance (e.g., farmers perceptions and values, the role of private landowners); and policy regulatory frameworks (e.g., the role of the common agriculture policy, urban, rural and regional development plans) - and propose ways to overcome them (for example through new business cases and governance approaches).

- Develop methodologies and tools, adapted to end-users (e.g., farmers, forest owners, local authorities, engineers, spatial planners), enabling the replication and up-scaling of NBS.

- To provide a long-term evidence as ambitious as possible, new interventions should be complemented with the analysis of established NBS. In this respect, opportunities to build up from relevant initiatives should be explored (e.g., LIFE, INTERREG, national funded projects, etc).

- Develop protocols and standards for the design, operation and maintenance of NBS, building on existing work, considering:

- The best solutions for different soil characteristics (as these determine the type and impact of droughts) and soil health, relief and geo-morphological conditions, including urban conditions;

- The resilience of NBS, considering present and future climatic conditions and water regimes;

- The ecological performance and resilience of NBS, to deal with both natural and human-induced hazards, such as extreme weather events, desertification, forest fires, plant- and animal diseases (pests), other human activities and socio-political approaches that could have an impact on land-use;

- The long-term maintenance of NBS: also in relation to the adequate management of biomass, synergies with other approaches that affect the management of ecosystems like agroforestry, etc.

Proposals should address all of the above points.

Because of the substantial investments that might be necessary for implementing the NBS, additional or follow-up funding (private or public) should be sought, considering the EU taxonomy, including from relevant regional/national schemes under the Recovery and Resilience Fund, the European Structural and Investment Funds (ESIF), or other relevant funds. Please note, however, that reference to such additional or follow-up funding will not lead automatically to a higher score in the evaluation of the proposal.

This topic requires the effective contribution of SSH disciplines and the involvement of SSH experts, institutions as well as the inclusion of relevant SSH expertise, in order to produce meaningful and significant effects enhancing the societal impact of the related research activities. This means proposals should bring together from the early start multiple types of

scientific expertise in both natural sciences (e.g., ecology, climate, pedology) and social sciences and humanities (e.g., economics, geography, sociology) together with a variety of urban and/or rural community representatives, farmers, businesses, civil society organisations and citizens.

Social innovation is recommended when the solution is at the socio-technical interface and requires social change, new social practices, social ownership or market uptake.

Proposals should set out a clear plan on how they will collaborate with other projects selected under this topic and any other relevant topic/call, by participating in joint activities, workshops, as well as common communication and dissemination activities. This includes notably the Horizon 2020 NBS project portfolio, including the European Green Deal Call, and its task forces; Horizon Europe projects Invest4Nature and Naturance and HORIZON-CL6-2022-BIODIV-01-03: Network for nature: multi-stakeholder dialogue platform to promote nature-based solutions. Applicants should plan the necessary budget to cover these activities without the prerequisite to define concrete common actions at this stage.

Proposals should ensure complementarity and foresee synergies with the activities of the Horizon Europe missions "A Soil Deal for Europe", "Restore our Ocean and Waters by 2030" and "Adaptation to Climate Change", as well as with the partnerships Biodiversa+ and Water4All.

Proposals should ensure that all evidence, information and project outputs will be accessible through the Oppla portal (the EU repository for NBS). Where relevant, proposals should consider creating links, contributing to and using the information and data of other platforms such as NWRM, Climate-ADAPT, BISE and the European Drought Observatory.

HORIZON-CL6-2024-BIODIV-02-2-two-stage: Demonstrating the potential of Nature-based Solutions and the New European Bauhaus to contribute to sustainable, inclusive and resilient living spaces and communities

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 5.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 10.00 million.
Type of Action	Innovation Actions
Admissibility conditions	The conditions are described in General Annex A. The following exceptions apply: Applicants submitting a proposal under the blind evaluation pilot (see General Annex F) must not disclose their organisation names, acronyms,

	logos, nor names of personnel in Part B of their first stage application (see General Annex E).
Procedure	The procedure is described in General Annex F. The following exceptions apply: This topic is part of the blind evaluation pilot under which first stage proposals will be evaluated blindly.
Evaluation Procedure	To ensure a balanced portfolio covering demonstration activities in diverse geographical areas of the European Union and Associated Countries, grants will be awarded first to the highest ranked application according to the standard procedure described in Horizon Europe General Annexes D and F, followed by other applications that are the highest ranked among those that ensure the most complementary geographical coverage, provided that the applications attain all thresholds. When assessing geographical coverage, the evaluation will take into account the location of the application's demonstration activities, not the location of the application's participants/beneficiaries.

Expected Outcome: In line with the European Green Deal priorities and the EU climate adaptation strategy, as well as the EU's climate ambition for 2030 and 2050 and the EU biodiversity strategy for 2030, the successful proposals will support the development of Nature-based Solutions (NBS) contributing to the resilience and the sustainable, balanced and inclusive development of urban, peri-urban and rural areas.

The overall aim of this topic and associated R&I activities is to leverage the New European Bauhaus (NEB) core values of sustainability, inclusion and aesthetics in Nature-based Solutions (NBS), in light of a wider transformation to enable a more sustainable, inclusive and resilient society.

Project results are expected to contribute to all of following expected outcomes:

- A transdisciplinary integration of NBS and the NEB is demonstrated in different contexts, contributing to the transformative change needed to tackle the climate and biodiversity crises, and drawing on inclusiveness and the pluralities of values, knowledge, cultural diversity and cultural heritage.
- High quality, multifunctional, co-created public spaces that enhance sustainability, resilience and the well-being of communities, through the combination of NBS and the NEB, with digital, social and cultural innovation.
- Greater understanding of the links between NBS and the NEB and how to better make these two approaches compatible and integrated in places and buildings, landscapes, industrial systems, policies and communities.

- Communities benefit from the implementation of a new societal vision encompassing sustainability, resilience, health, well-being and inclusion, based on the demonstration of the combination of the NEB with NBS.

Scope: NBS can be an integral part of our living spaces that contribute to our well-being, promote togetherness and connect to our cultural heritage. There is growing evidence that NBS are a valuable entry for transforming behaviour towards sustainability, while contributing with multiple benefits that help communities address different societal challenges – from microclimate regulation to climate change, water management, green job creation, tourism opportunities, urban regeneration, health and well-being.

The NEB aims to make the European Green Deal a positive and tangible experience for citizens, connecting it to our daily lives and living spaces. It is a bridge between the world of science and technology, art and culture and is about leveraging our green and digital challenges to transform our lives and society. By integrating the values of sustainability, inclusion and aesthetics/quality of experience, the NEB supports the development of holistic solutions to global challenges through a place-based, participatory, and transdisciplinary approach.

The systemic integration of social, cultural, digital and nature-based innovation in the design, development and governance of public space has a tremendous potential to transform these spaces into diverse, accessible, safe, inclusive and high-quality areas that increase well-being and health and deliver a fair and equitable distribution of the associated benefits.

It becomes important to analyse the potential of NBS in view of the NEB initiative and conceptualise and demonstrate how to link these two approaches, avoid trade-offs, and enhance synergies and complementarities, through local demonstration. In this regard, proposals should focus on the first transformation of the NEB (places), while also integrating, when possible, the other two transformations (ecosystem of innovation; diffusion of new meanings) in the process.

The successful proposals should:

- Deliver visionary and integrated solutions combining nature-based innovation and social, cultural, or digital solutions, with the NEB approach, in order to increase sustainability and resilience of communities and citizens' well-being. These solutions should address environmental, social, cultural, economic determinants of resilience and well-being and support communities in reducing their exposure to climate-related risks, pollution (including noise) and social tensions.

- Demonstrate how the integration of NBS and NEB in solutions for innovative land-use management, urban design and planning could enhance ecosystem services, foster equitable access to public spaces, enhance their quality and use, or promote sustainable mobility.

- Considering the existing NBS portfolio, further demonstrate NBS, enriched with the new elements brought by the NEB (e.g., aesthetics, quality of experience), as well as with concerns on the circularity, ecodesign, origin and sustainability of materials used. These solutions should be applied in innovative configurations, e.g., in protected areas, eco-tourism sites, transport infrastructure, educational and cultural buildings, etc, notably contributing to urban regeneration, tourism opportunities, green job creation, social inclusion, or health and well-being.

- Considering that NBS inherently should always enhance biodiversity, explore the connections and possible trade-offs (and propose ways to overcome them) between biodiversity targets in NBS and the NEB, including in what concerns functionality and aesthetics/quality of experience.

- Propose solutions that involve innovative ways to make NBS compatible with built cultural heritage (e.g., cultural landscapes), and explore the possible role of NBS in increasing built cultural heritage's resilience to climate change and natural disasters.

- Propose and test guidelines and innovative tools for the implementation, maintenance, monitoring and evaluation of NBS integrating the NEB approach (e.g., addressing issues of design/ergonomics or quality of experience), as well as the necessary business and governance models for their implementation and upscaling (e.g. local incentives for NBS in public and private spaces; exploring different forms of engagement, inclusion and stewardship, etc).

- Building on the approach of the NEB, develop place based NBS with strong citizen engagement (e.g., youth, elder, vulnerable communities), through social innovation, and the necessary tools for citizen participation and the co-creation of solutions.

- Incorporate outreach, dissemination and cooperation activities with local communities, industry, educational institutions, research centres, professional organisations or museums and other cultural organisations, supporting challenge-based and experiential NBS with real-life NEB applications, promoting public debate and a change of behaviour.

- Engage, through sustainable transdisciplinary collaborations, communities of practice that very rarely work together (e.g., architects, landscape architects, designers, artists, ecologists, spatial planners, psychologists, economists, or engineers), bridging epistemological gaps, while also contributing to the breaking up of silos in local/regional administrations.

- Explore the role of NBS and NEB in transformative change to provide holistic solutions to address global challenges (climate, biodiversity, water, economic, demographic, etc), including through transformative and contemporary arts.

Proposals should address all of the above points.

For wider impact, proposals should ensure a diversity of demonstration contexts (e.g., urban, rural, protected areas) and geographical representation, as well as the inclusion of a diversity of actors for local demonstration: local and/or regional authorities, business, academia, and civil society.

Other than the critical role of ecological sciences, this topic requires the effective contribution of SSH disciplines and the involvement of SSH experts, institutions as well as the inclusion of relevant SSH expertise, in order to produce meaningful and significant effects enhancing the societal impact of the related research activities. The involvement of disciplines such as psychology, behavioural science, economics, geography, anthropology, sociology, architecture, arts, cultural heritage, or design studies, is considered essential to the diffusion of new meanings, enhance social learning and promote the role of social and cultural innovation in transforming public spaces, with particular attention to inclusion, quality of experience and cultural perceptions of nature.

Social innovation is recommended when the solution is at the socio-technical interface and requires social change, new social practices, social ownership, or market uptake.

Because of the substantial investments that might be necessary for implementing the NBS, additional or follow-up funding (private or public) should be sought, including from relevant regional/national schemes under the Recovery and Resilience Fund, the European Structural and Investment Funds (ESIF), or other relevant funds.

Projects should envisage clustering activities with the projects of the same topic and with the Horizon 2020 NBS project portfolio and respective task forces and notably coordinate with Horizon Europe projects resulting from: HORIZON-CL6-2022-COMMUNITIES-01-05: Assessing the socio-politics of nature-based solutions for more inclusive and resilient communities; HORIZON-CL6-2022-COMMUNITIES-02-02-two-stage: Developing nature-based therapy for health and well-being; HORIZON-CL6-2022-BIODIV-01-03: Network for nature: multi-stakeholder dialogue platform to promote nature-based solutions; and HORIZON-CL6-2023-BIODIV-01-8: Addressing biodiversity decline and promoting Nature-based Solutions in higher education. Collaboration with the European Biodiversity Partnership (Biodiversa+) should also be explored. To this end, proposals should foresee dedicated tasks and appropriate resources for coordination measures, foresee joint activities and joint deliverables.

Proposals should build on existing outcomes of the Horizon 2020 and Horizon Europe NBS project portfolio and other NEB related projects funded in Horizon Europe and ensure the proposed activities are complementary. Complementarity should also be sought with Horizon Europe Missions, notably “100 Climate-Neutral and Smart Cities by 2030”, “Restore our Ocean and Waters by 2030” and “Adaptation to Climate Change”.

Projects are expected to contribute to the NEB initiative by interacting with the NEB Community, NEBLab and other relevant actions of the NEB initiative through sharing information, best practice, and, where relevant, results.

Proposals should ensure that all evidence, information, and project outputs will be accessible through the Oppla portal (the EU repository for Nature-based solutions).

In the context of this topic, geographical areas of the European Union and Associated Countries are NUTS level 1 regions of European Union Member States and of Associated Countries for which they are defined. In the case of Associated Countries without NUTS classification, the country as a whole is to be considered as one geographical area:

- List of Associated Countries not defined by NUTS level 1: Armenia; Bosnia and Herzegovina; Faroe Islands; Georgia; Kosovo[122]; Israel; Moldova; Tunisia; Ukraine.
- List of countries not defined by NUTS level 1 with which association negotiations are being processed or where association is imminent: Morocco.

Biodiversity friendly practices in agriculture, forestry and aquaculture

HORIZON-CL6-2024-BIODIV-02-3-two-stage: Promoting minor crops in farming systems

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 5.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 10.00 million.
Type of Action	Research and Innovation Actions
Admissibility conditions	The conditions are described in General Annex A. The following exceptions apply: Applicants submitting a proposal under the blind evaluation pilot (see General Annex F) must not disclose their organisation names, acronyms, logos, nor names of personnel in Part B of their first stage application (see General Annex E).
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: The following additional eligibility criteria apply: The proposals must apply the multi-actor approach. See definition of the multi-actor approach in the introduction to this work programme part.
Procedure	The procedure is described in General Annex F. The following

[122] This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence.

	exceptions apply: This topic is part of the blind evaluation pilot under which first stage proposals will be evaluated blindly.

Expected Outcome: In line with the objectives of the farm to fork and biodiversity strategies, successful proposals will promote diversification in agriculture as a means to increase the resilience and sustainability of the sector vis-a-vis challenging environmental, climatic and economic conditions. By increasing agrobiodiversity, activities will contribute to food security, adaptation of the agricultural production to the effects of climate change, and thereby support implementation of the farm to fork strategy, the common agricultural policy and the EU climate policy under the European Green Deal.

Successful proposals will contribute to the following outcomes:

- Increased evidence of the environmental benefits of minor crops;
- Farmers make use of a wider range of crops, and combination of crops;
- Minor crops are integrated in farming systems promoting their environmental benefits;
- Increased resilience and climate adaptation of farming systems vis-a-vis biotic and abiotic stresses;
- Feed and food industry make use of minor crops;
- Creation of new avenues for farmers and value chains through a wider range of products.

Scope: Farmers face increasing pressure to shift production towards lower input systems, while continuing to ensure sufficient supplies of food and non-food products. The European Green Deal in particular has set ambitious targets to reduce by 2030 the overall use of chemical pesticides and fertilisers, reduce nutrient losses and increase organic farming[123]. Activities shall release the value of minor crops and promote their broader use in breeding, farming and in food/non-food value chains. For the purpose of this topic, minor crops are defined as underutilised and/or genetically diverse crops [124] (including landraces and varieties).

- Promote the access to minor crops engaging in breeding activities;
- Improve agronomic management practices for minor crops;

123 European Green Deal farm to fork and biodiversity strategies with 2030 targets: Reduce by 50% the overall use and risk of chemical pesticides and reduce use by 50% of more hazardous pesticides; reduce nutrient losses by at least 50% while ensuring no deterioration in soil fertility; this will reduce use of fertilisers by at least 20 %; achieve at least 25% of the EU's agricultural land under organic farming.

124 Applicants are expected to explain and justify the choice of crops (including tree and other perennial crops) in relation to the proposal's and topic's ambition.

- Explore the effects and benefits of minor crops and demonstrate the ecosystems services supported by farming system diversification and the integration of minor crops (if applicable, including novel crop rotations).

- Identify and test avenues for marketing and processing of more diverse farming outputs across the value chain;

- Promote the uptake of minor crops through the development of guidelines and wide-spread practical demonstrations taking into account a range of farming systems, pedo-climatic conditions and value chains;

- Support capacity building, training and education enabling farmers/growers to adopt sustainable agricultural practices.

The topic is open to all types of farming systems (e.g., arable farming, horticulture, fruit trees) in various geographical and pedo-climatic conditions. Result of activities should benefit both conventional and organic agriculture.

Activities must implement the multi-actor approach, thus ensure an adequate involvement of researchers, farmers, advisors, food industry, and other players in the value chain and consumers. Communication and outreach to a wide range of stakeholders is essential. This topic should include the effective contribution of SSH disciplines.

Where relevant, proposals should seek complementarities and synergies, while avoiding duplication and overlap, with relevant actions funded under Horizon 2020[125]. Proposals should specify how they plan to collaborate with other proposals selected under this and other relevant topics, for example by undertaking joint activities, workshops or common communication and dissemination activities. Proposals should allocate the necessary resources to cover these activities.

In this topic, the integration of the gender dimension (sex and gender analysis) in research and innovation content is not a mandatory requirement.

[125] Projects from topic Horizon 2020 SFS-01-2020 - Biodiversity in action: across farmland and the value chain: RADIANT (Grant agreement ID: 101000622), CROPDIVA (Grant agreement ID: 101000847), DIVINFOOD (Grant agreement ID: 101000383) and BIOVALUE (Grant agreement ID: 101000499)