

## Short descriptions for sectors in Climate-ADAPT

*Guidelines for sector tagging Climate-ADAPT database items - June 2024*

### **Background**

Under the option “EU sector policies” in the main menu of Climate-ADAPT, the current sectors considered are Agriculture, Biodiversity, Buildings, Coastal Areas, Disaster Risk Reduction, Ecosystem based approaches, Energy, Financial, Forestry, Health, Marine and Fisheries, Transport, Urban and Water management.

The process of uploading database items to Climate-ADAPT includes tagging them to one or more of these specific sectors (compulsory field). This can be confusing when there is a lack of clear distinctions among the sectors, which might lead to some inconsistencies and malfunction in the searching process.

### **Purpose**

To have concise and clear descriptions for each Climate-ADAPT sector, with the aim to facilitate the process of submission database items by providers, ensuring the consistency of the sector tagging.

When a database item cannot be tagged to any of these Climate-ADAPT sectors (because it deals with general or horizontal issues), the item should be tagged to “Non specific”.

### **Criteria for the description of the sectors on Climate-ADAPT**

The descriptions of the sectors include the following main points:

- Main assets of the sector: identification of the main asset that is or can be subject of impacts, vulnerability and risk due to climate change. Consider the ecological, economic and social dimensions at EU level.
- EU policy scope of the sector: The key reference(s) to any instrument that set up the EU Policy in the sector (Directive, Agenda, Strategy...).
- Possible overlaps with other sectors.

## Agriculture

The agricultural sector provides food (from crop and livestock production), services and resources and guarantees people livelihood.

Agriculture is among the economic sector most susceptible to changes in climate patterns. Climate impacts vary across European regions in relation to observed and expected changes in mean values of temperature and rainfall as well as in the frequency and intensity of extreme weather events (i.e. heat waves, drought, hail, etc.). Adaptation to climate change is pivotal for the agricultural sector that has important socio-economic implications for society and food security. However, agriculture plays a key role also in climate change mitigation as it is responsible of the release of greenhouse gases (GHG) in atmosphere.

The European Common Agriculture Policy (CAP) is the main policy that influences the development of the agricultural sector in Europe, driving farming decisions with a high potential in advancing both climate change mitigation and adaptation options. The CAP is made up of two so-called “pillars”. Pillar 1 preliminary covers direct payments and Pillar 2 finances rural development with the aim to improve the economic, environmental and social condition of the European rural areas.

The agriculture sector, as highlight also in the CAP, is strictly connected with other sectors considered in Climate-ADAPT, specifically Water Management, Forestry, and Biodiversity.

## Biodiversity

Biodiversity has an intrinsic value in itself, and it is the source of ecosystem services sustaining and benefitting human wellbeing. Biodiversity-based ecosystem services to humans include, for instance, pollination, clean air and water, control of floods or erosion, soil fertility and the production of food, fuel, fibre or medicines.

Climate change affects biodiversity and ecosystem services in multiple ways through complex interactions among and between species and their habitats. The direct and indirect effects of the changing climate regime are causing habitat loss, increased extinction rates, changes in species distribution (often impeded by habitat fragmentation and limited species dispersal ability), phenological changes, and ecological disruptions, e.g. through decoupled predator-prey relationships or (new) invasive species.

At the EU policy and legislation level, the Natura 2000 network was established through the Birds Directive and the Habitats Directive. The EU Biodiversity Strategy to 2020 aims to halt the loss of biodiversity and ecosystem services, and according to its target 5 the invasive alien species regulation has been set up. EU biodiversity policy is supported by the LIFE Nature fund and the Biodiversity Information System for Europe (BISE).

Particularly with regard to ecosystem services, there are overlaps with other sectors. The most noticeable overlaps can be found with Ecosystem based approaches/Green Infrastructure, Water management, Forestry, Agriculture, Coastal Areas and Marine and Fisheries.

## Buildings

Buildings can be affected by climate change in several different ways: extreme temperatures would imply decrease in the living comfort; extreme events, such as storms, flooding, landslides, sea level rise, coastal erosion and snow, could increase the risk of collapse or declining state.

Dealing with climate change adaptation in the buildings sector is, therefore, often the result of synergies with other sectors. Examples of synergies with other sectors include:

- Energy: to improve the capacity to cope with heat, thermal insulation should be improved;
- Urban: to decrease the heat island effect, green roofs could be introduced;
- Disaster Risk Reduction: to decrease the impact of flooding, either buildings should have waterproof ground floors, or could be raised on pillars, or even floating;
- Water management: minimize potable water demand by storing and using rain water.

The main EU policies of reference:

- European Standardization Organizations as CEN and CENELEC are fostering the integration of climate change adaptation in standardization of the construction/building sector since 2014.
- Within the regulations on Environmental Assessment Guidance (Directive 2001/42/EC and Directive 85/337/EEC), climate change is one of the aspects for infrastructure, including buildings
- The European Cohesion policy (or regional policy) provides regional funds to the Member states to develop new infrastructure, as for instance buildings.

## Business and Industry

The business and industry sector is a broad category encompassing a diverse range of economic activities related to the production of goods and services for B2B, consumption, trade, and investment. This sector is a cornerstone of modern economies and plays a crucial role in driving economic growth, providing employment opportunities, and fostering innovation.

Climate change can have significant impacts on supply chains, distribution, and sales in a number of ways. Climate change is leading to more frequent and severe extreme weather events, such as floods and droughts. These events can disrupt the production, transportation and logistics networks, causing delays and damage to goods in transit. This can result in shortages or excess inventories, affecting sales and revenue. Increasing temperatures and extreme events can also be a challenge for business and industry sites in terms of occupational health aspects.

Business and industry can also play a role in addressing climate change. Innovative business and industry technologies can deliver solutions to help managing climate change in other policy sectors.

## **Coastal areas**

Coastal areas are at the interface between land and sea, where strong interactions among land and marine socio-economic and environmental processes occur. Climate change is placing additional pressure on European coastal regions which are generally densely populated and already affected by intensive human activity.

Coastal areas are among the most vulnerable areas to climate change, which are especially exposed to sea level rise associated impacts, such as flooding, coastal erosion and loss of low-lying coastal systems. Increased risk of storm surges and of landward intrusion of saltwater may also endanger coastal ecosystems and pose further risk for coastal communities. Expected rises in water temperatures and ocean acidification will contribute to a restructuring of coastal ecosystems; with implications for ocean circulation and biogeochemical cycling.

The European Commission's EU strategy on adaptation to climate change includes a Staff Working Document addressing adaptation for coastal and marine areas. Cross-sector policies relevant for coastal areas include Integrated Coastal Management (ICM) and Maritime Spatial Planning (MSP).

Connections exist with a wide number of sectors, and in particular with Marine and Fisheries and Water management also sharing relevant policy instruments (e.g. Marine Strategy Framework Directive, Water Framework Directive and the Floods Directive).

## **Cultural heritage**

Europe's cultural heritage is a rich and diverse mosaic of cultural and creative expressions, an inheritance from previous generations of Europeans and a legacy for those to come. The UNESCO definition of cultural heritage includes artefacts, monuments, a group of buildings and sites, museums that have a diversity of values including symbolic, historic, artistic, aesthetic, ethnological or anthropological, scientific and social significance. It includes tangible heritage (movable, immobile and underwater), intangible cultural heritage (ICH) embedded into cultural, and natural heritage artefacts, sites or monuments.

The impacts of catastrophic events on this heritage such as extreme precipitation events, flooding, landslides, and droughts have impacts on cultural heritage sites including historical parks and gardens. They are coupled with the slow onset of changes arising from deterioration processes. Continuous increase in temperature and fluctuations in temperature and humidity or fluctuations in freeze–thaw cycles – causes degradation and stress in materials, leading to a greater need for restoration and conservation. Biological degradation caused by microorganisms, for example in the form of mould and algal growth,

and insect infestations attacking the physical fabric of buildings and the collections of galleries, libraries, archives and museums are more likely to occur.

Focusing on cultural heritage can be a key opportunity for transformative climate policies since it can convey a sense of continuity, community, and inclusiveness in the context of transformational policy changes. It can be an important asset for climate adaptation. It can embody historic knowledge and experiences of coping with extreme climatic conditions, from which much can be learned for adaptation. Revitalising and conserving historic buildings not only preserves cultural heritage is also a sustainable practice, meeting both mitigation and adaptation goals (EEA, 2024).

### **Disaster Risk Reduction (DRR)**

DRR is implemented through policy goals or objectives of all the other sectors. DRR therefore include all the strategic and instrumental measures employed for anticipating future disaster risk, reducing existing exposure, hazard, or vulnerability, and improving resilience and preparedness of the communities. Disaster risk is likely to increase due to meteorological and climate related natural hazards which are becoming more frequent and/or intense in Europe, along with socio-economic changes and hazard exposure.

The Sendai Framework for Disaster Risk Reduction, the Paris Agreement and the Sustainable Development Goals provide the foundation for the implementation of disaster risk reduction worldwide. In this context, the European Union adopted a new strategy on adaptation to climate change that incorporates DRR and promotes sustainable growth, climate resilient investment and job creation. Other relevant policy documents and initiatives on DRR are: the EU Civil Protection Mechanism consisting of governmental aid delivered in the immediate aftermath of a disaster; the European Council's Directive on European Critical Infrastructures which sets out an approach for improving their protection; the EU Action Plan 2015-2030 to promote DRR and its integration in EU policies; and the Disaster Risk Management Knowledge Centre aiming to enhance resilience to disasters and capacity to prevent, prepare and respond to emergencies through a strengthened interface between science and policy.

### **Energy**

The energy sector includes the production, storage and transmission of energy, as well as the management of the demand. The energy sector includes both fossil fuels and renewable energy as well as nuclear power.

Climate change affects the energy sector in multiple ways, ranging from changes in seasonal and annual heating and cooling demands to risks and opportunities on energy production and supply conditions. Risks include modifications in power plant efficiency rates, problems with cooling water and damage to energy infrastructures caused by extreme weather phenomena.

The EU strategical instruments for the energy sector were described in 2015 in “Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy” and the yearly reports on the “State of the Energy Union”.

Main overlap exist with the water sector regarding hydropower, cooling water needs and flooding risk to energy infrastructure. Other potential overlap can happen with agriculture and forestry (energy crops, biomass), and buildings and transport sectors (as intensive energy demanding sectors). Mitigation and adaptation are intrinsically linked for most aspects of the energy system.

## **Financial**

Recent extreme weather events have further demonstrated the vulnerability of various European countries to natural disasters. The insurance sector covers a considerable part of weather-related risk in Europe, for example through property insurance that provides cover against damage from storms and rainfall.

In April 2013 the European Commission adopted Green Paper on insurance in the context of natural and man-made disasters. Its objective is to raise awareness and to assess whether or not action at EU level could be appropriate or warranted to improve the market for disaster insurance in the European Union.

European policies that potentially contribute to reducing the sector's financial vulnerability are related to the creation of a single insurance market (for this purpose the EU launched an action plan for a single financial market, the Financial Services Action Plan), and the Solvency II Directive for insurance companies (adopted in December 2009; Directive 2009/138/EC). The latter directive requires firms to hold sufficient capital to reduce the risk of insolvency, including the risks from natural events. The goals of this directive are to reduce the risk that an insurer is unable to meet the claims of policyholders and also to reduce the potential losses of policyholders when an insurer is unable to reimburse all claims in full.

Although there is no specific EU policy dedicated to promote adaptation to climate change in the financial sector there is a collaboration with companies to better consider adaptation to climate change in investment decisions. Furthermore, the European Investment Bank and the European Bank for Reconstruction and Development have set up funding where climate-resilient is mainstreamed into projects to improve adaptation to climate change impacts. The practical application of these standards serves as an example for other public or private financial institutions.

## Forestry

Forestry sector main assets include forest management, products and productivity. Forests not only provide a range of products and resources with great economic value, but also play a key role in climate change mitigation and adaptation.

Climate change, with the increased risk of disturbances such as storms, fire, pests and diseases have severe implications for forest growth and production as well as on the maintenance of environmental forest services. Forests can positively contribute to climate change adaptation since actively act in regulating the climate, protecting against landslides, avalanches, soil erosion and degradation, reducing flood risks, and in increasing carbon storage.

The main EU policy on forestry sector is the EU Forest Strategy (2013), which responds to new challenges facing sustainable forest management. In addition, the Forest Multi-Annual Implementation Plan (Forest MAP) published in 2015 includes a concrete list of actions for the period 2015-2020, the actors and timing of the different activities as well as the expected outcomes. The EU Biodiversity Policy is, together with the CAP, the other European policy pillar for sustainable forest conservation and management.

As shown by policies analysis, the forestry sector is strictly connected with other sectors considered in Climate-ADAPT, specifically Agriculture, Biodiversity and Water Management ones.

## Health

The sector health includes effects on human, plant and animal health due to climate change. These effects can either amplify current health risks or generate new health risks and thus can have negative impact ecological, economic and social aspects in Europe.

The effects of climate change on health can be direct as a result from changes in extreme events in terms of intensity or frequency like heatwaves and floods or indirect through changes in the incidence of diseases transmitted by insects (e.g. vector borne diseases, caused by ticks and mosquitos) rodents, or changes in water, food and air quality. A recent EEA Report (Climate change, impacts and vulnerability in Europe 2016)<sup>1</sup> confirms that observed changes in climate are already having wide-ranging impacts on ecosystems, economic sectors and human health and well-being in Europe, such as changes in forest species, the establishment of invasive alien species and disease outbreaks.

At the EU level, the EU health strategy, 'Together for Health' recognizes climate change as a threat to human health in the EU, the Community's role to coordinate and respond rapidly to health threats globally and to enhance Member States capacities to do so. The EU Health

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<sup>1</sup> <https://www.eea.europa.eu/publications/climate-change-impacts-and-vulnerability-2016>

Programme (2014-2020)<sup>2</sup> includes among its goals the need to protect EU citizens from serious cross-border health threats, including those caused by climate change.

## ICT

The Information and Communication Technology (ICT) sector encompasses a wide range of technologies and services related to the production, transmission, processing, and storage of information. This sector includes telecommunications, internet services, software development, hardware manufacturing, data centers, and various digital technologies. The ICT sector plays a crucial role in shaping the modern global economy and influencing the way individuals, businesses, and governments communicate and operate.

The ICT sector is both a driver of economic growth and a consumer of significant resources, making it susceptible to the impacts of climate change in several ways:

- **Energy Consumption:** Data centers and ICT infrastructure require substantial amounts of energy for their operations. As the demand for digital services increases and changes (e.g. by the introduction of AI), so does the energy consumption of the sector. Climate change mitigation efforts often involve reducing energy consumption and transitioning to renewable energy sources, which directly affects the ICT industry's environmental footprint.
- **Supply Chain Vulnerability:** Climate change can disrupt global supply chains, affecting the production and distribution of ICT components. Extreme weather events, such as floods, hurricanes, or wildfires, can damage manufacturing facilities and disrupt the supply of critical materials, impacting the overall resilience of the ICT sector.
- **Infrastructure Vulnerability:** Physical infrastructure, such as data centers, cell towers, and communication networks, may be vulnerable to increasing temperatures, extreme weather events and rising sea levels. This vulnerability can lead to service disruptions and increased costs for obtaining supply articles, repairing or relocating infrastructure.
- **Role in Climate Change Solutions:** On the positive side, the ICT sector also plays a crucial role in addressing climate change. Technologies such as the Internet of Things (IoT), smart grids, and data analytics can contribute to more efficient resource use, intelligent energy and resources management, and the development of sustainable solutions.
- **Digitalization for Climate Resilience:** ICT tools and platforms can be harnessed to enhance climate resilience efforts. For instance, satellite technology and data analytics including AI, can be used for monitoring and managing climate-related risks, while digital communication facilitates the dissemination of climate information and early warning systems.

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<sup>2</sup> [https://ec.europa.eu/health/funding/programme/2014-2020\\_en](https://ec.europa.eu/health/funding/programme/2014-2020_en)



## Land Use planning

Land use planning is a systematic and participatory process that aims to guide and regulate the development, use and management of land in a way that promotes sustainable development, balances competing interests, and addresses the needs of communities. The primary goal of land use planning is to optimize the use of available land resources while minimizing negative impacts on the environment and ensuring the well-being of present and future generations.

Land use planning is identified as one of the most effective processes to facilitate local adaptation to climate change. Existing processes and tools available through the municipal land use planning process in the EU, including official plans, zoning, and/or development permits, assist in minimizing the development risks to a municipality from the predicted impacts of increased heat, floods, wildfires, landslides, and/or other natural hazards due to a changing climate.

Land use planning also has a strong multi-level governance component, as - depending on the governance structure in country - local land use plans are embedded in regional/national plans or prescriptive rules.

## Marine and fisheries

This sector includes the analysis of climate-related factors affecting the quality of the marine environment and all maritime activities; not only fisheries but also aquaculture, shipping, port activities, offshore energy production, etc.

Climate change is expected to have severe impacts on the marine environment. Increase in water temperatures will contribute to a restructuring of marine ecosystems with implications for ocean circulation, biogeochemical cycling and marine biodiversity. Ocean acidification will affect the ability of some calcium carbonate-secreting species to produce their shells or skeletons, also impacting fishes that depend up on them for food.

Environmental impacts of climate change as well the intensification of extreme events clearly have socio-economic implications, involving the main economic activities performed at sea.

The European Commission's "EU strategy on adaptation to climate change" includes a Staff Working Document addressing adaptation for coastal and marine areas. Furthermore, the EU has defined an articulated framework of cross-cutting and sector policies relevant for the sustainable management and governance of the sea. The "EU Integrated Maritime Policy" seeks to provide a more coherent and coordinated approach to marine and maritime issues, also considering climate change.

Clear inter-sectorial connections exist not only with coastal areas, sharing important common policy instruments, but also with transport and energy sectors.

## Mountain areas

Climate change already affects European mountain regions. By the end of the century, it is projected that European mountains will have changed physically. Large glaciers will have experienced significant mass loss, but changes also impact the lower, mid-hills, and floodplain environments, thereby impacting many policy sectors including water management, agricultural production, biodiversity, forestry, tourism, cultural heritage, transport, disaster risk reduction, buildings, energy, and health sectors.

Mountain systems have a complex topography that changes considerably over short distances, resulting in diversified climate impacts at different elevations. For instance, with increasing air temperature and higher precipitation, seasonal snow lines will be found at higher elevations, and snow seasons will become shorter. Tree lines will move up and forest patterns will change everywhere. In countries with high mountain ranges such as the Alps, climate change will impact the water balance, which will have repercussions on hydropower, urban drainage, navigation, and an increase in the intensity of water-related natural hazards.

## Transport

The transport sector includes the design, development and management of the necessary infrastructure, as well as the associated equipment (particularly vehicles and vessels), and the provision of mobility services for people and goods. Disruptions in the transport systems may impact on economic efficiency and competitiveness, and are likely to affect disproportionately socially disadvantaged groups and less developed regions.

Adaptation plans and stakeholders' actions have focused on the impacts of climate change on transport infrastructure, and their consequences on reliability and costs of transport operations. However, changes in climate can also affect the performance of vehicles and equipment in all transport modes, and may require changes in the traditional way transport systems are managed and operated.

The EU transport policy is defined mainly in the 2011 Transport White Paper (Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system, COM(2011)144), and its 2016 Implementation Report (SED(2016)226).

In Europe, adaptation actions in transport can overlap with those in other sectors, such as energy (as transport is a high consuming sector, critical for the achievement of the European objectives of de-carbonization), water management (as transport systems are highly sensitive to hydrological conditions), and tourism (as a sector heavily relying on convenient mobility services). Depending on the location of transport assets and services, there can be overlap with coastal areas (where transport infrastructure and activities are particularly dense and vulnerable to a changing climate) and the urban sector (as transport is a basic facilitator of urban life and a major user of public space).

## Urban

In contrast to the majority of the other sectors, urban sector is restricted to certain geographical locations. There are many various definitions of 'urban' (see for example Eurostat<sup>3</sup>), based on administrative delineations, population density or proportion of built-up areas, and the understanding of what constitutes a city, town or urban area differs from one EEA member and cooperation countries to another.

For the purposes of Climate-ADAPT, urban sector can be defined as the adaptation planning, implementation and monitoring activities pertinent to heavily built-up, densely populated areas (encompassing cities, towns and suburbs, as well as the surrounding peri-urban areas having functional connections with the urban area). These activities are likely to focus predominantly on people, urban infrastructure or services or the built environment. They may fall under spatial planning or urban design, urban environmental management or sustainable urban development, and/or link to other sectors (water management, coastal areas, disaster risk reduction, transport, buildings, health, biodiversity, financial sector), but within the geographical limits of the urban area.

With regards to adaptation, the most pertinent EU initiatives are the EU Urban Agenda, aiming to deliver better regulation, better funding and better governance for 12 priority themes including climate change adaptation<sup>4</sup> and the Covenant of Mayors for Climate and Energy<sup>5</sup> set up under the EU Strategy on adaptation to climate change. Information about other policies relevant to urban areas can be found here: [https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities/priority-themes/climate-adaptation-cities\\_en](https://ec.europa.eu/info/eu-regional-and-urban-development/topics/cities/priority-themes/climate-adaptation-cities_en) and here <http://climate-adapt.eea.europa.eu/countries-regions/cities>.

## Water management

Water management includes water quality and quantity management as well as hydromorphology. Freshwater management of rivers, lakes and groundwater, but also flood zones or infiltration areas are crucial elements for ecosystems, drinking water supply, wastewater management, agriculture and many economic processes.

Climate change affects water management in multiple ways, ranging from changes in seasonal and annual patterns in floods, water availability or dilution capacity and impacts on our health, the economy (including hydropower capacity and cooling water availability) and freshwater dependent ecosystems. Water management can also increase climate change resilience, by natural water retention measures (as subset of ecosystem-based solutions and green infrastructure measures), flood zone management or bringing water in cities to reduce the heath-island effect.

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<sup>3</sup> <http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:City>

<sup>4</sup> [https://ec.europa.eu/futurium/en/system/files/ged/pact-of-amsterdam\\_en.pdf](https://ec.europa.eu/futurium/en/system/files/ged/pact-of-amsterdam_en.pdf)

<sup>5</sup> <https://www.covenantofmayors.eu/en/>

The EU policies for water management are multiple, with the most important being the “Water Framework Directive” and the “Groundwater Directive”, the “Floods Directive”, the “Water scarcity and drought Communication” and the “Water Blueprint” besides instruments like the “Drinking Water Directive”, the “Urban Waste Water Directive” and many more.

As water is a central driver for most of the other sectors considered in Climate-ADAPT, overlaps with them could happen. Fine and narrow tagging of items is needed to assure the consistency of the database and the focus in searching. Therefore, water management as a sector is only tagged when planned and aimed for changes in water quality and quantity are foreseen and not when improved water management is a co-benefit only.