National climate change adaptation planning and strategies

Legal instrument: Regulation on the Governance of the Energy Union and Climate Action

Obligation: National climate change adaptation planning and strategies – GovReg

General information

EU Member State / EEA member country

Portugal

The information in this reporting is updated until (date: YYYY-MM-DD format)

2021-03-12

Is this reporting the mandatory reporting under Art. 19 and Part 1 of Annex VIII of the Governance Regulation and Annex 1 of the Implementing Act?

Yes

National circumstances, impacts, vulnerabilities, risks and adaptive capacity

National circumstances relevant to adaptation actions

Biogeophysical characteristics relevant to adaptation actions

Annex I: 1.1a

Mainland Portugal's climate, according to Koppen's classification, is divided into two regions: one with a temperate climate with rainy winters and hot, dry summers (Csa - Hot-summer Mediterranean climate) and another with a temperate climate with rainy winters and hot, dry summers (Csb - Warm-summer Mediterranean climate).
The proximity to the Atlantic Ocean and the Mediterranean strongly influences the climate of mainland Portugal. Although the most inland regions are only about 220 km from the coast, some are influenced by the Iberian Peninsula's continental mass, which gives them less rainfall and a greater annual temperature range than the litoral.
The Mediterranean influence is felt mainly in the summer and south and east of the territory, causing high temperatures and low rainfall. The Atlantic influence is felt primarily in winter and in the northwest of the country. It is responsible for high precipitation and the attenuation of the effects of dry and cold winds from the Peninsula's interior.
During winter, the northern region, in particular, is under the influence of subpolar depressions, which circulate to the NE, in a trajectory that follows the axis of the European continent, with frequent weather changes originated by the passage of these depressions. However, their action weakens towards the interior, dominated by higher pressures in winter, decreasing, in this sense, precipitation and average temperatures, the number of rainy days, and relative humidity. Occasionally and still during winter, the territory is under the Azores Anticyclone's influence, with maritime tropical air transformed into warm and dry continental polar air of higher origin.
There are climatic contrasts that result directly from some relief elements, which accentuates the climatic effects caused by the continental character of the Peninsula. Thus, the higher altitude zones also correspond to higher precipitation values, which, on the other hand, decrease as one move towards the interior. In terms of orography, significant areas in the Norte and Centro that exceed 1000 meters of altitude stand out. South of the Tagus River, the scarcity of essential reliefs allows large air masses to reach the Iberian Peninsula's interior without significant loss of humidity. But even in this region, the areas of most considerable precipitation are determined by the influence of small reliefs.
The average annual air temperature is around 14/15ºC, and the average monthly values vary regularly throughout the year, with a maximum in August and a minimum in January. However, there are some regional variations in its distribution. The average annual temperature evolves inversely to precipitation, increasing from North to South and West to East. The highest

temperature in mainland Portugal was registered in Amareleja (46.5 ºC on 23/7/1995), and the lowest temperature was recorded in Miranda do Douro (-13.2 ºC on 7/3/1995).
The general climate conditions in the Azores Archipelago are determined by its geographical situation in the context of the global atmospheric and oceanic circulation and by the effect of the enormous mass of water that surrounds it. Overall, the Azores' climate is temperate maritime, reflected by the low-temperature range, high rainfall, relative humidity, and persistent winds.
The Madeira Archipelago is geographically located in the subtropical region, presenting a mild climate in winter and summer, except in the higher areas, where lower temperatures are observed. The average annual temperature varies between 8ºC in the highest peaks and 19 ºC in the coastal regions.
In the hydrographic network of Mainland Portugal five international rivers stand out (Minho, Lima, Douro, Tagus and Guadiana) that flow in the largest hydrographic basins of the Iberian Peninsula. Its management is coordinated with Spain through an international convention, which conditions the scope of national action in the sustainable management of water resources, in particular taking into account the existing reservoirs, irrigation and transfer infrastructures in Spanish territory.
More than 50% of the Mainland territory is prone to desertification, particularly in the interior of the southern regions of Algarve and Alentejo, due to climate conditions aggravated by climate change and decades of inadequate agricultural practices and cultures.
Portugal has the third largest Exclusive Economic Zone in Europe (1.6 million km2), expected to expand to almost 4 million km2 this decade. The coast of Mainland Portugal has an extension of 943km, is densely populated – concentrates three quarters of the Portuguese population and contributes to 85% of the national GDP – and faces a significant threat from the phenomena of coastal erosion, coastal floods, cliffs instability and landslides.

Demographic situation relevant to adaptation actions

Annex I: 1.1b

Recent demographic dynamics largely determine the priorities for climate adaptation in the country: concentration of the population along the coast between the largest metropolitan areas, increasing exposure to urban heat islands, flash floods, landslides and coastal risks; desertification of the interior population and ageing of the age structure, implying a reduction in agroforestry activity and an increase in the risk of forest fires; intense seasonal population movements, which increase vulnerability in the regions most sensitive to droughts.
In the last century, the resident population in mainland Portugal doubled to 10,047,621 inhabitants in 2011. The interior, increasingly depopulated, has a significantly lower population density than the coast, where it continues to grow. The highest concentration is found in the coastal strip between the country's two main metropolitan areas, where about 40% of the total population resides, despite only 6% of mainland Portugal's entire region.
There is considerable population affluence to the coastal tourist regions during the summer,

especially to the Algarve. It is estimated that the population triples during this period (about a million more people than the resident population). In this period, the affluence to the Inland regions can also be significant, with origin in the residents of the coast, foreign visitors, and Portuguese emigrants who spend their holidays in their hometowns.
The ageing of mainland Portugal's population has been intensifying, both through reducing the young people and the increase of the elderly population. The decrease in birth rates and the rise in longevity has led to an inversion of the standard age structure (pyramid structure), with more elderly than young people. In 2011, there were 1,937,788 residents aged 65 or over in mainland Portugal, which corresponds to approximately 19% of the total resident population, while the population under 15 years old represented 14%.
The Azores Archipelago (246,772 inhabitants in 2011) has grown moderately in recent decades, in the order of 1.8%, although it is highly concentrated on the island of São Miguel. On the other islands, there is a trend of population loss. The population is younger than the national average but is also ageing and has a lower average life expectancy.
With 267,785 inhabitants in 2011, the Madeira Archipelago has a density (about 300 inhabitants per km²) above the average of the country and the EU, but 75% of the population of Madeira Island lives in only 35% of the territory, especially on the south coast, where the city of Funchal is located, which concentrates 45% of the population. In recent decades, a small dynamic of population growth has been registered.

Economic and infrastructural situation relevant to adaptation actions

Annex I: 1.1c

The national economic structure has undergone a progressive process of tertiarization, and, in 2017, 68.9% of the population worked in the tertiary sector. The highest tertiarization rates, above 80%, are registered in the regions of Lisbon and Algarve, mainly due to tourism activity. On the other hand, the secondary sector still has a significant relevance (above the national average) in the Norte and Centro regions (34% and 29% respectively). The primary sector is still relevant in the Centro and Alentejo regions, where the proportion of the active population in this sector is above 10%.
Regarding land use and land cover, the dominant occupations in mainland Portugal are forest (39% of the total area) and agriculture (26% of the total area). The areas of wildwoods, agroforestry systems, and pasture occupy 12%, 8% and 7%, respectively, which attests to the relevance of the rural regions (around 92% of the total area), hence the historical importance of the risk of rural fires in mainland Portugal. Although much less significant in terms of occupied space, urban areas present specific risks and potential human damage higher than those of rural areas.
The main critical factors for the adaptation of agriculture to climate change are: water availability and irrigation capacity, soil fertility and erosion prevention; risk management in the face of extreme events and increased climate variability; changes in phytosanitary and animal health systems; and the availability of animal and plant genetic heritage adapted to new climatic

conditions.
Although Portugal is a country with an average rainfall of circa 900 mm, its spatial-temporal distribution may lead to reduced water availability in certain regions and time of year, generating problems of water scarcity, which seriously affect most of agricultural activity, still highly dependent on weather conditions. Irrigation is a fundamental component to ensure the viability of agriculture, without which it is not possible to enhance the vegetative development of spring-summer crops and, consequently, to obtain income levels that fix agricultural populations, and contrary the progressive depopulation of rural regions of the interior. In Portugal, more than half of farms depend on water for agriculture and irrigation accounts for 60% of national agricultural production. Of the 3.7 million hectares of usable agricultural area, 12% are equipped for irrigation (540,000 ha). However, in periods of continued drought, a significant part of these agricultural explorations loses viability.
One of the most vulnerable agriculture and forest systems is the ‘montado’ (cork oak forest), mostly located in the southern region of Alentejo, an extensive production system that is well adapted to its Mediterranean climate and weak soil conditions, but is endangered by increasing aridity, plagues, and the expansion of irrigation cultures. In the coastal areas to the south of the Tagus river there is also a greater use of greenhouses, which are particularly vulnerable to storms and events of strong winds.
The forestry sector is a significant exporter with high added value that generates significant employment. In addition to their economic importance and as promoters of social cohesion, forests play essential roles in protecting soil and water, supporting biodiversity, and combating desertification. However, the majority of forest areas are not actively managed, and extensive areas are abandoned, which contributed to increase the risk of wildfires, and the spreading of invasive species and plagues. The difficulties in the implementation of forest management policies are aggravated by the fragmentation of rural property, particularly to the North of the Tagus river, where the greater extent of forest is located. About 85% of Portugal's forest is privately owned, and only 3% belongs to the Portuguese State, while the remaining 12% are wastelands and belong to local communities. Currently there are 10 Biomass Thermal Power Plants and 10 Pellet Plants in Portugal dedicated to forest biomass. Together they are responsible for a consumption of more than 2 million tonnes, and make an important contribution to the valorisation of forest waste and the cleaning of forests.
On the other hand, the trade and services sectors have assumed growing importance and weight in the national economy, being equally vulnerable to climate change, as they are mostly located in sensitive areas. The location factor may imply restrictions on citizens' access to certain goods and services, so it is crucial and urgent to safeguard these situations, creating conditions for implementing adequate adaptation to the impacts caused by climate change.
As tourism is an activity subject to intense competition between destinations, which depends on territory and climate as necessary "raw materials", climate change may have an extremely high impact on countries with a strong economic dependence on this sector, such as Portugal. Therefore, the loss of biodiversity, coastal erosion, and consequent landscape degradation, or even the increase in vector-borne diseases, is today a growing concern.
For example, with the rise in the average sea level, "sun and beach" tourism will be strongly

affected by the predicted disappearance of beaches and water scarcity, which could make certain activities unviable. In addition to the direct adverse effects that climate change may have on this sector, it should also be ensured that, in the future, it does not compromise its development and economic growth, so it is necessary to consider strategies that incorporate the most appropriate mitigation and adaptation measures as mechanisms to respond to this challenge.

On the supply side, the energy sector value chains have specific areas of risk and vulnerability, both in terms of fixed infrastructures (related to electricity generation activities, the supply of raw materials and production and dispatch of oil products and natural gas) and linear infrastructures (transport and distribution of electricity and fuels). On the demand side, abnormal increases in energy consumption (e.g., electricity demand for heating and cooling for cold and heat waves) may occur. They will also have to be managed in the context of related adaptation measures.

The possibility of an increased frequency of extreme weather events that may hit essential transport, energy, and communications infrastructures in a continuous or untimely manner and sometimes with real catastrophic effects constitutes a significant risk to the safety of people and properties and the functioning of the economy and Society in general.

On the coast of mainland Portugal, the most important consequences of climate change are the rise in mean sea level and the modification of sea disturbance regime, meteorological upheaval, temperature, and precipitation. These changes have an impact on the sediment balance of the coastal strip. They may result in the establishment or variation of the intensity of erosion, the modification of the frequency and intensity of coastal flooding, and changes in estuaries, lagoons, and coastal aquifers' water quality.

The areas of greatest vulnerability in the coastal zone identified with a tendency to erosion or confirmed erosion and with a record of coastal overtopping and flooding are those where climate change impacts will be most evident. Thus, places with a high density of human occupation, protected or not by coastal protection/defence structures, are of additional concern, with relevance to coastal areas whose morphological content is associated with the soft or mobile and low rocky substrate (beaches, dunes, barrier islands, sand barriers, wetlands).

If necessary, you can upload here an additional document

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Climate monitoring and modelling framework

Main activities on climate monitoring, modelling, projections and scenarios

Annex I: 1.2a

The Portuguese Institute of Sea and Atmosphere (IPMA) is responsible for making observations for meteorological and climatological purposes. IPMA is responsible for deploying, operating,

and maintaining the national network of meteorological stations; it is also responsible for archiving and quality control of meteorological observations. The Portuguese Environment Agency keeps records of historical flood marks and its network of meteorological and hydrological monitoring stations. These data are available on the SNIRH - National Information System on Water Resources.
Additionally, IPMA launched OBSERVA - a voluntary cooperation platform where private individuals can associate their weather stations and report extreme weather events. Also, a register of weather extremes is available.
Within the scope of the active provision of climate services on a global scale, IPMA integrates into its mission the collection and exchange of climate data and the research and creation of climate information products for distribution to more differentiated users. Under the guidance of the Global Framework, the IPMA has already established protocols and the exchange of data between meteorological services and other organisations and the development of products and provision of services, driven by the desire to improve access and benefit of users of climate information. With this purpose – and following a policy of gradual opening of meteorological data to civil society – IPMA is currently creating products and services tailored to users' needs, which will be integrated into its website. Some of the services already provided are drought monitoring and the fire risk index. Another example is the Climate Portal (Portal do Clima), the reference source of information for Portugal's future climate, a platform that includes climate indicators in climate change scenarios based on CORDEX data.
The Climate Portal has over 40 climate variables available on the site aggregated into the following groups: temperature, precipitation; wind speed; relative humidity; global radiation; temperature range, drought index; aridity index; evapotranspiration; fire risk index, and; climate classification.
The National Civil Protection Authority has a national database on disaster response and damage since 2006 and publishes this information on Civil Protection event yearbooks.

Main approaches, methodologies and tools, and associated uncertainties and challenges

Annex I: 1.2b

The development of the Climate Portal was one of the projects resulting from the AdaPT Programme's activities. This programme was designed to financially support activities on "Adaptation to Climate Change" in Portugal guided by the terms established in the Memorandum of Understanding between Portugal, Norway, Iceland, and Liechtenstein, under the European Economic Area Financial Mechanism (EEA Grants).
This project aimed to produce and publish an internet portal on Climate in Portugal, constituting an easily accessible platform for the public to disseminate the results obtained in the project, namely: historical series, climate change at the regional level and climate indicators for specific sectors in Portugal.
The project used past climate data and the IPCC AR5 climate projection data (CORDEX project)

for dissemination through the website. This task involved all necessary calculations for the disaggregation of data at NUTS3 level and different periods and the (eventual) estimation of aggregated indicators (e.g., drought index, meteorological fire risk, etc.).

Different global and regional numerical climate models and their main features were analysed. Global climate models (GCMs) are based on general physical principles of fluid dynamics and thermodynamics and originate from numerical weather prediction. GCMs describe the interactions between the components of the global climate system, the atmosphere, the oceans, and a basic description of the earth's surface (i.e., aspects of the biosphere and lithosphere, relevant to the surface and energy balance). Sometimes they may be referred to jointly as Atmosphere-Ocean GCM (AOGCM). Regional climate models (RCM) have higher resolution over a limited area. A regional climate model is a numerical model for predicting a region's climate; such models are usually determined from GCMs, with horizontal resolutions of tens of kilometres, using the GCMs to define initial time-varying boundary conditions and surface boundary conditions. They include the effect of greenhouse gases and aerosol forcing and are determined statistically or dynamically.

Regional climate models (RCM), forced by global climate models (GCM), allow solving physical processes on smaller scales and therefore with increased detail and realism compared to global model results. The global model, which describes the large-scale effects and atmospheric circulation processes, determines the sequence of meteorological events that characterise a particular region's climate. These features are the result of greenhouse gas emissions, variation in solar activity and volcanic eruptions. RCMs, forced with the consequence of GCMs, allow the study of regional processes and generate information at relevant scales for vulnerability, impact, and adaptation studies.

Each of the regional climate models, RCM, was forced by different model forcers (CNRM-CM5, ICHEC-EC-EARTH, IPSLCM5A- MR, HadGEM2-ES, MPI-ESM-LR). Two RCM (the CCLM and RCA4 models) were forced with three different GCMs, providing information from 1971 to the end of the 21st century.

Using the regional CODEX simulations performed for the European domain (EURO-CORDEX), we identified the simulations' characteristics, namely spatial and temporal resolution. A set of regional simulations from the CORDEX project, performed for the European domain (EURO-CORDEX), with a spatial resolution of 0.11º (~12 km) and a daily temporal resolution: the control period (1989-2008; assessment scenario); the historical period (1971-2005); two emission scenarios from the IPCC AR5 report: RCP 4.5 and RCP 8.5 (2006-2100).

For this portal, the following EURO-CORDEX variables were selected: Maximum surface temperature (K); Minimum surface temperature (K); Precipitation (kg/m2/s); Wind speed m/s; Relative surface humidity (%) (not available in all models); Surface downwelling solar radiation (W/m2); Surface upwelling solar radiation (W/m2).

These variables were used as the basis for all the indicators provided by the project. Using these data, numerical calculation processes were developed and implemented, allowing the generation of results related to estimating the current climate and future scenarios in Portugal. The results presented reflect the analysis defined in different periods, called "climatological normal", represented by a group of 30 years; 1971-2000, 2011-2040 (Near future), 2041-2070

(Intermediate Future) and 2071-2100 (Far Future).
The climate information relating to the observations comes from the matrix information of the Climate Atlas of Continental Portugal 1971-2000. The data used were obtained from the interpolation of the average values in 1971-2000 of the climatological parameters air temperature and precipitation, observed in 61 stations and 260 udometer stations. The multivariate regression method with altitude and distance from the coast and normal kriging of the residuals were used for the average values of minimum, maximum, and average air temperature and total precipitation. Normal kriging was used to interpolate the number of days for the different values indicated in the portal (e.g., minimum, maximum temperature and rain). The manual modelling of the experimental variogram was aided and optimised using the analysis of several types of error obtained by cross-validation.
According to the project requirements and the existing limitations in terms of simulations for climate scenarios, the variables, and indicators to be made available on the climate portal were identified, as well as the associated statistics, covering: temperature; precipitation; wind intensity; relative humidity; global solar radiation; daily temperature range; drought index; aridity index; evapotranspiration; fire risk index.
The uncertainty component was analysed by the project team, even considering that the current generation of climate models can faithfully represent aspects of the climate. However, as the global climate system is overly complex, involving processes in various Spatio-temporal scales, it has become necessary to include different simplifications that give rise to uncertainties in future climate projections.
Uncertainty is inherent in all projections of the future and is not peculiar to climate modelling. Climate change and the impacts associated with uncertainties are related to the future trajectory of emissions, resulting from the global development of technology, the energy consumption of the world's population and many other socio-economic factors, as well as the limitation of climate models, due to the limited knowledge of the climate system and the necessary simplifications in climate models.
One way to validate the results obtained using CORDEX data and the calculations performed on them is to compare the modelled data with the observed data. To this end, we used the empirical data in 4 locations on the mainland. This choice was based on meteorological/climatological stations with records for the study period and the territory's spatial representation, considering the known climatological regions.
The modelled data were obtained using the same methodology adopted in all processes. For this validation process, the mean value of the 4 points of the matrix around the meteorological/climatological station's location were used. The statistics corresponding to the models (modelled history and projections) are calculated from each of the models' average values according to the period indicated (annual, monthly, or seasonal).

If necessary, you can upload here an additional document

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Meteorological Observations (1)

Name of the meteorological service

IPMA - Portuguese Institute of Sea and Atmosphere

Status of the meteorological service

Established

Web link to the meteorological service

https://www.ipma.pt/pt/index.html

Climate projections and services (1)

Description of climate projections and services

Web platform that provides and compares climate data and scenarios for Portugal

Status of the climate projections and services

Established

Web link to the climate projections and services

http://portaldoclima.pt/pt/

Climate change impact and vulnerability assessment (CCIVA) (1)

Title of the CCIVA assessment (preferably translated into English)

SIAM (I e II) – Climate change in Portugal: scenarios, impacts, and adaptation measures

CCIVA status

completed

Year the CCIVA assessment was completed

2006

Link to the CCIVA assessment

http://cciam.fc.ul.pt/prj/siam/

CCIVA part of National adaptation strategy (NAS)

Yes

Focus of the CCIVA

vulnerability

Observed climate hazards

Temperature-related - acute

Temperature-related - acute - Heat wave, Temperature-related - acute - Wildfire

If other, please explain

-

Wind-related - acute

Wind-related - acute - Cyclone, Wind-related - acute - Storm (including blizzards dust and sandstorms)

If other, please explain

-

Water-related - acute

Water-related - acute - Drought, Water-related - acute - Flood (coastal fluvial pluvial ground water), Water-related - acute - Heavy precipitation (rain hail snow/ice), Water-related - acute - Snow and ice load

If other, please explain

-

Solid mass-related - acute

Solid mass-related - acute - Landslide

If other, please explain

-

Temperature-related - chronic

Temperature-related - chronic - Changing temperature (air freshwater marine water), Temperature-related - chronic - Temperature variability

If other, please explain

-

Wind-related - chronic

-

If other, please explain

-

Water-related - chronic

Water-related - chronic - Precipitation and/or hydrological variability, Water-related - chronic - Saline intrusion, Water-related - chronic - Sea level rise, Water-related - chronic - Water scarcity

If other, please explain

-

Solid mass-related - chronic

Solid mass-related - chronic - Coastal erosion, Solid mass-related - chronic - Soil degradation (including desertification), Solid mass-related - chronic - Soil erosion

If other, please explain

-

Overview of existing pressures

Member States shall report existing environmental, economic and social pressures that are likely to be significantly affected by climate change: e.g. loss of biodiversity, poor harvest, energy poverty, unemployment, migration. Annex I: 1.3a Footnote3

Regarding the impact on the distribution of ecosystems, a marked change in vegetation structure and composition is expected with consequences for biodiversity. In the northern and central coastal regions, dominated by mixed hardwood forest, a decrease in species more demanding in moisture is expected, with an increased mortality of older and less resistant trees. The regions of Minho, Douro Litoral and the mountain areas may benefit from a possible

increase in biological diversity. The eucalyptus forests in the interior may be abandoned and replaced by wildwoods due to their low capacity for natural regeneration. The pine forests may persist or tend to be replaced by wildwoods due to fires recurrence, in which case preservation of biodiversity is expected. Regarding cork oak forests, a drastic reduction in biological diversity is anticipated due to the intensification of desertification processes in the most arid regions.
A considerable increase in demand of energy for cooling in the summer months is expected, associated with the projected increase in temperatures and the frequency, duration, and severity of heatwaves and tropical nights. Nevertheless, a significant part of the population - the neediest - may have difficulty adapting to these changes, given the characteristics of a great part of the residential buildings and the lack of financial capacity to invest in their thermal comfort and installation and use of climatization systems.
As for agricultural productivity, a reduction in productivity is expected in any of the projected climate scenarios and in all crops, except pasture and forage.
Regarding migratory movements, climate change may contribute to accentuating the process of population loss in the rural areas of the interior and the progressive concentration of the population on the coastline and in the metropolitan areas of Lisbon and Porto. This trend may also be reinforced by movements originating abroad, with an increase in the influx of immigrant populations from regions more vulnerable to climate change.
The rise in temperature and the prolonged periods of drought are also likely to be responsible for the increase in the number of rural fires, especially the number of large forest fires (>= 10,000 ha), that spread by canopy and become practically uncontrollable under certain atmospheric conditions. The risk associated with these occurrences has increased dramatically, imposing extremely high social and economic costs on the country. 2017 was a landmark year, recording the largest burnt area since 1995 and becoming the most tragic year ever, with more than 100 human lives lost.

Identification of key future climate hazards

Temperature-related - acute

Temperature-related - acute - Heat wave, Temperature-related - acute - Wildfire

If other, please explain

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Wind-related - acute

Wind-related - acute - Storm (including blizzards dust and sandstorms)

If other, please explain

-

Water-related - acute

Water-related - acute - Drought, Water-related - acute - Flood (coastal fluvial pluvial ground water), Water-related - acute - Heavy precipitation (rain hail snow/ice)

If other, please explain

-

Solid mass-related - acute

Solid mass-related - acute - Landslide

If other, please explain

-

Temperature-related - chronic

Temperature-related - chronic - Changing temperature (air freshwater marine water), Temperature-related - chronic - Temperature variability

If other, please explain

-

Wind-related - chronic

-

If other, please explain

-

Water-related - chronic

Water-related - chronic - Precipitation and/or hydrological variability, Water-related - chronic - Saline intrusion, Water-related - chronic - Sea level rise

If other, please explain

-

Solid mass-related - chronic

Solid mass-related - chronic - Coastal erosion, Solid mass-related - chronic - Soil degradation (including desertification), Solid mass-related - chronic - Soil erosion

If other, please explain

-

Secondary effects of the selected hazards, such as forest fires, spread of invasive species and tropical diseases, cascading effects, and multiple hazards occurring at the same time

Annex I: Footnote5

Although there is no exact quantification available to estimate the impacts of extreme weather events and the trends observed in recent years related to climate change, Portugal has estimates of 60-140 million euros in annual costs associated with forest fires, of around 290 million euros associated with the 2005 drought (the most severe this century), and circa 200 million euros from the 2012 drought (mainly in terms of agricultural production losses). Climate change tends to increase or accelerate other risks, where natural and anthropogenic factors combine, for example, in terms of coastal erosion or forest fires.
The reduction in annual precipitation, the increase in its variability and the consequent change in the flow regime will reduce river flows, affect the recharge of aquifers, and even dry out the sources of essential rivers in the Iberian Peninsula for longer or shorter periods. These changes may be accompanied by water quality problems, intensification of drought events and increased pressure for desertification, increasing biodiversity loss associated with altered ecosystem structure and dynamics. This reduction in precipitation will also affect aquifers' recharging, enhancing the degradation of the quality of surface and underground water resources. Even so, the territory will remain vulnerable to flooding, given the projections of an increase of the number of days with heavy precipitation.
The new temperature and precipitation regimes associated with climate change imply: an increase in the number of heatwave occurrences, their duration and intensity; an increase in the number and intensity of major rural fires, and; extreme, unpredictable, intense, and localised meteorological phenomena, such as torrential rain, hail, cyclones and tornados. In addition to the tendency for heatwaves to become more intense and frequent or spatially extensive, it is also predicted that there will be a change in their seasonal distribution. Although heatwaves typically occur in the spring and summer, this phenomenon is expected to gain equal importance in the autumn.
In this context, climate change scenarios predict a significant increase in meteorological conditions conducive to large areas of fire across the Iberian Peninsula, namely the whole of Portugal.
The coastline is also particularly vulnerable to coastal erosion and coastal overtopping with very significant and severe effects. This is due to sea-level rise, hourly rotation of the mean wave direction on the west coast, and storm surge regime (despite uncertainty about the future

evolution on this last point). These factors aggravate coastal swelling and flooding by allowing waves to break closer to the coast and transfer more energy to the beach, in addition to the deficit in river sediment inputs available for coastal drift. The effects of coastal erosion and overtopping are further enhanced by the characteristics of the anthropogenic occupation of the territory's coastal strip, that substantially increases the risk of socio-economic costs of climatic phenomena. Despite the uncertainty, the rise in sea level by the end of the 21st century is expected to be 0.5 meters higher, possibly reaching values in the order of 1 meter above the 1990 level. The rise in sea level also increases the risk of saline contamination of coastal aquifers, estuaries, and the final stretches of rivers, impacting some water supply systems.

Affected Sectors (16)

Title of the sector

agriculture and food

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

medium

Describe your assessment

The assessment results from the existing perspectives on specific hazards: increase in temperature, reduction in precipitation and increase in its variability affecting the recharge of aquifers and the river regime with implications on water quality, drought events and desertification, biodiversity loss, floods, heatwaves, large fires, extreme weather events, diseases, plagues and the spread of exotic species.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

high

Describe your assessment

The assessment results from the existing perspectives for the sector. The Action Plan for Adaptation to Climate Change 2020-2030 – P-3AC (NAP), based on climate scenarios RCP4.5 and RCP8.5, predicts the worsening of a set of vulnerabilities: maximum temperature; extreme precipitation events; quality/quantity of water resources; susceptibility to desertification and biodiversity loss; floods; heat waves; diseases, plagues, and weeds; rural fires.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

medium

Describe your assessment

The assessment results from the existing perspectives on particular vulnerabilities: water for irrigation (droughts and floods); organic matter in the soil (productive capacity, water and CO2 retention); desertification; biodiversity (non-preservation of essential ecosystems for the sector); genetic heritage with plants and animals better adapted to climate change (water stress, temperature, diseases and plagues); alien species, emerging plagues and diseases; knowledge on good practices of adaptation to climate change and their adoption; systems of forecasting, warning and response to risks.

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

The assessment results from the existing perspectives for the sector: reduction of guaranteed water for irrigation; increase of droughts and floods; destruction of infrastructures; reduction of soil organic matter; desertification, an increase of exotic species and the emergence of diseases and plagues; non-resilience of the current crop and livestock practices; increase of fires and reduction of biodiversity. Relocation of some crops and agricultural activities northwards on the mainland, with reduced production and/or productivity; worsening of desertification in the south of mainland Portugal.

Title of the sector

rural development

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

medium

Describe your assessment

The assessment results from the existing perspectives on specific hazards: increase in temperature, reduction in precipitation and increase in its variability affecting the recharge of aquifers and the river regime with implications on water quality, drought events and desertification, biodiversity loss, floods, the occurrence of heatwaves, large fires, extreme weather events, diseases, plagues and the spread of exotic species.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

high

Describe your assessment

The assessment results from the existing perspectives for the sector. The Action Plan for Adaptation to Climate Change 2020-2030 - P-3AC (NAP), based on climate scenarios RCP4.5 and RCP8.5, predicts the worsening of a set of vulnerabilities: maximum temperatures extreme precipitation events; quality/quantity of water resources; susceptibility to desertification and biodiversity loss; floods; heat waves; diseases, plagues and weeds; rural fires.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

medium

Describe your assessment

The assessment results from the existing perspectives on particular vulnerabilities: water for irrigation (droughts and floods); organic matter in the soil (productive capacity, water and CO2 retention) desertification; biodiversity (non-preservation of essential ecosystems for the sector); genetic heritage with plants and animals better adapted to climate change (water stress,

temperature, diseases and plagues); alien species, emerging plagues and diseases; knowledge on good practices of adaptation to climate change and their adoption; systems of forecasting, warning and response to risks.

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

The assessment results from the existing perspectives for the sector: Reduction of guaranteed water for irrigation; increase of droughts and floods; destruction of infrastructure; reduction of soil organic matter; desertification; increase of exotic species and the emergence of diseases and plagues; non-resilience of the current crop and livestock practices; increase of fires and reduction of biodiversity. Relocation of some crops and agricultural activities northwards on the mainland, with reduced production and/or productivity; worsening of desertification in the south of mainland Portugal.

Title of the sector

biodiversity (including ecosystembased approaches)

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

medium

Describe your assessment

Climate change is forcing a range of pressures on ecosystems. Changes in rainfall patterns and significant increases in maximum temperatures cause drought periods with consequences for land degradation.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

high

Describe your assessment

A future framework in which the depopulation of territories emerges as a significant threat to biodiversity and the alteration of natural systems is exacerbated by the proliferation of invasive exotic species. Climate change (increased temperature, reduced rainfall) forces an increase in the area susceptible to desertification, putting at risk a wide range of soil resources, with effects on habitat fragmentation and biodiversity loss.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

high

Describe your assessment

The main environmental threats are climate change processes (temperature increase, precipitation reduction) and biodiversity loss, so articulation is needed for species' objective reality, habitats, and the socio-economic context, creating symbiotic relationships with nature. Simultaneously, the conservation of biodiversity values and nature conservation lead to the preservation of ecosystem services by ensuring the continuity of their functions.

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

Biodiversity and nature conservation has to be seen as an opportunity or a solution for specific territories, playing a crucial role in climate change adaptation processes (temperature increase, precipitation reduction). At the same time, protected areas are understood as strategic assets, in which sustainable management is essential to maintain the values that characterise them.

Title of the sector

tourism

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

medium

Describe your assessment

The following hazards/effects with relevance for the sector are observed: temperature rise/increased drought periods and consequent impact on the attractiveness of the territories; sea-level rise and effects on the territory (changes in coastal erosion dynamics), with relevance for tourism demand; more intense periods of rainfall (alternating with hotter and drier periods).

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

medium

Describe your assessment

It is considered that, under future climatic conditions, the probability of the main hazards will remain the same. However, it is expected that the sector will have a growing capacity to adapt to those hazards, resulting in a reduction in exposure to them, but still at a medium to short-term level.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

high

Describe your assessment

The adaptation capacity of the tourism sector is high. There is intensive work in progress to train economic operators and to create Turismo de Portugal (national tourism board) funding lines. These resources are going to be used to achieve some objectives, such as to increase energy and water efficiency, to reduce waste and to increase sustainable construction, among others that may be identified in the context of environmental sustainability, which should result in an increased capacity of the sector to adapt to climate change.

Risk of potential future impacts

Annex I: 1.3c-iv

medium

Describe your assessment

Despite the focus on capacity building and the financing lines to be created, the country, and the tourism sector in particular, is going through a phase of economic difficulty that may result in a delay in the established timeframe to accommodate the environmental sustainability goals and to ensure a more effective and efficient response to the risks associated with climate change.

Title of the sector

energy

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

medium

Describe your assessment

Based on the experience reported by operators and sectorial agents, in particular, the operators of energy transmission and distribution networks, as well as electricity producers, impacts associated essentially with extreme heatwave events (extreme temperatures and long periods of drought), high precipitation (floods) and storms (strong winds) were observed.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

medium

Describe your assessment

Existing data points out to an increase in the frequency of extreme weather events, namely storms (strong winds) and heat waves (extreme temperatures and long periods of drought), truly relevant and impacting for the sector. These events seem to have a more continuous evolution of their expression, compared with extreme precipitation (floods) that seem to be a more of a one-off nature (which also brings other challenges).

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

medium

Describe your assessment

Vulnerabilities are essentially due to operational issues, consequences of extreme weather events, which may damage specific infrastructures (e.g., overhead electricity transmission and distribution networks). Currently, there is a reduction in vulnerability due to the introduction of technological improvements. Still, it is expected that in the future, with the worsening of climatic conditions, an additional effort in adaptation will be necessary.

Risk of potential future impacts

Annex I: 1.3c-iv

medium

Describe your assessment

Future hazards will be identical to the current ones, but with an aggravated risk, ie, higher due to their greater frequency of events expected in the medium and long term. To reduce the risk and respective impact, it is foreseen the need to reinforce protection to reduce the severity of those events that will occur as well as the use of redundancy in the infrastructures to safeguard supply security.

Title of the sector

forestry

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

medium

Describe your assessment

Fires were recorded with greater frequency and severity, and phytosanitary events also with greater frequency. Extreme weather events occur with strong winds, with impacts on vegetation's stability, such as falling trees. There are also impacts in terms of soil erosion resulting from these extreme events.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

high

Describe your assessment

There is a greater probability of extreme events affecting forestry systems. On the one hand, there is a decrease in the productivity of forest systems. On the other hand, there is less willingness to invest in forests due to risk perception. Also of note is the shortage of raw material for forestry industries, creating more favourable conditions for expanding invasive species and greater difficulty to establish stands during planting periods due to droughts and extreme temperatures.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

medium

Describe your assessment

The systems are highly vulnerable due to their long-life cycle. There may be a reduced adaptive capacity of specific forest systems because of their ecological condition. Based on climate scenarios, the need to adapt to forest ecosystems is estimated with implications on forest distribution and composition to increase resilience.

Risk of potential future impacts

Annex I: 1.3c-iv

medium

Describe your assessment

It is necessary to adapt forest management models and to make use of suitable and improved genetic material. These measures may have an impact on the supply capacity of domestic forest-based industries. Adaptation should encompass specific vocational training, particularly at higher levels. In this context, the interconnection between the production and processing sectors and academia, including research, innovation, and development centres would be significant.

Title of the sector

health

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

high

Describe your assessment

The increased frequency, intensity and duration of heatwaves and droughts with extreme temperature warnings have contributed to the expansion of mortality records. Also, the increased frequency and intensity of precipitation (with floods and storms) and the greater frequency and intensity of radiation intensity events, floods, hurricanes and storms have repercussions on the health of the population as well as on the response capacity of health services.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

high

Describe your assessment

The increased frequency of heatwaves and days with heavy rainfall, droughts, fires due to the combination of lack and higher temperatures will significantly impact. The degradation of air quality will generate an increase in health problems related to respiratory diseases. The high probability of water quality changes and quantity and agricultural production, zoonoses and exposure to radiation will also have repercussions on public health and safety increasing mortality and morbidity.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

high

Describe your assessment

The increase in diseases associated with air pollution, heatwaves and cold spells, distribution and incidence of vectors, availability and quality of water, and food are susceptible to pressure on health services. Vulnerabilities at the level of coastal areas and estuaries, forest areas and buildings in floodplains, saline intrusion, agricultural production, dissemination of vectors that transmit diseases, diseases due to exposure to heat and mortality due to extreme temperatures.

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

It is expected that there will be a worsening in the living conditions and well-being of the population in the medium or long term, increasing mortality and morbidity, infectious diseases, and respiratory diseases resulting from air pollution. Events with a great capacity to affect populations and ecosystems are predicted. The typology of buildings may also be compromised and energy consumption, including at the level of services and health care provision.

Title of the sector

civil protection and emergency management

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

low

Describe your assessment

The impact of the main hazards is assessed low, considering what is set out in the National Risk Assessment, updated in July 2019, in which some anomalous situations that occurred in mainland Portugal in the recent past were identified, which can be considered to be under the effect of climate change, particularly on natural hazards (extreme weather events), such as heatwaves, floods, coastal overflows and on mixed risks, as is the case of rural fires.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

medium

Describe your assessment

The probability of risks in the sector is assessed on average, considering what was set out in the National Risk Assessment (2019), based on climate models for the most severe scenario (RCP 8.5). An evolutionary analysis of the impacts of climate change has been presented about natural and mixed risks, resulting in an increase in frequency and/or intensity in various types of threats and showing a decreasing trend in other cases, such as in cold waves and snowfalls.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

medium

Describe your assessment

It is expected that the vulnerability to climate change will be reduced through the adaptive capacity and measures planned for the sector. In this context, it is essential to highlight that civil protection is responsible for planning and responding to events resulting from meteorological and other risks. Therefore, it is a priority to make the respective readjustment given the potential impact of climate change.

Risk of potential future impacts

Annex I: 1.3c-iv

medium

Describe your assessment

It is considered that potential future impacts resulting from climate change will be expected. However, with the implementation of the sector's measures, it is assumed that a relevant contribution can be made to reduce these impacts.

Title of the sector

transport

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

medium

Describe your assessment

From the conclusions of the sector survey conducted within the Transport Working Group – ENAAC2020 (NAS), in conjunction with the UNECE Group of Experts for Climate Change Impacts and Adaptation for TNN, regarding the impacts on road infrastructure, the meteorological or climatic factors that affect a broader universe of critical infrastructure are the situations of Precipitation/Flooding, followed by episodes of High Temperatures, Rising/Dropping Flows and Winds.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

high

Describe your assessment

The assessment of the impact of climate change was recognised by the Transport Working Group – ENAAC2020 (NAS) as an intermediate level problem for transport services and infrastructures in Portugal. However, despite the apparent sensitivity to the impacts of climate change, there is a significant degree of uncertainty regarding the size of the challenge to be faced.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

high

Describe your assessment

Due to some extreme climate events, these issues have been introduced in the sphere of concern of the concessionaires, and some have adopted measures/actions that, although not structured in a plan/strategy, are somehow related to climate change (e.g., Intensification of Infrastructure Monitoring and Inspection Plans).

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

According to available information, extreme weather events, some of which increase in intensity and frequency, and slower onset climate change (e.g., sea-level rise) and cumulative effects can produce damage to transport infrastructure, operational disruptions and pressures on supply chain capacity and efficiency.

Title of the sector

marine and fisheries

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

medium

Describe your assessment

Portugal is particularly threatened by rising sea levels and increasingly frequent and intense extreme weather events. The coastline's extension, the reduction of dune and marsh systems (and their protective capacity), and the shoreline's occupation by the economic activities that develop there (port activity, recreational boating, maritime transport, among others) justify the implementation of measures to fight climate change.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

high

Describe your assessment

Changes in seawater temperature, salinity and acidity can be expected from models estimating the impact of climate change, affecting biota, producing changes in the species diversity and abundance of individual taxa or populations. In fishing opportunities, which are established based on specific stocks, the impact already felt tends to multiply.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

high

Describe your assessment

The sector is highly vulnerable to climate change producing cascading effects that give rise to discontent among all those involved and demand response at the level of measures to prevent and mitigate climate change. The impact of climate change on marine ecosystems will be severe, with increased pressure not only on the fisheries and aquaculture sectors, but also on the other activities of the sea's economy.

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

The country's marine biodiversity is threatened by climate change and natural phenomena such as coastal erosion and the overexploitation of resources caused by human activities such as fishing, which, if not managed sustainably, can lead to the collapse of stocks and other imbalances in ecosystems. Different activities bring other impacts in terms of oil pollution, such as maritime transport.

Title of the sector

water management

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

medium

Describe your assessment

At national level, there has been an increase in extreme precipitation events of extremely high intensity in short periods, impacting the sector. In continental Portugal, it should be highlighted the prolonged hydrological drought in the south of the country and the sharp decrease in annual precipitation in the last two decades, with a consequent reduction in surface and underground water reserves.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

high

Describe your assessment

Given the climate scenarios available for mainland Portugal, an increase in the frequency and duration of drought events is expected. Water scarcity will be aggravated under future climatic conditions, constituting one of Portugal's major future problems. On the other hand, it is

expected an increase of extreme precipitation events, of short duration, which carry increased difficulties for the timely warning of fast flood risks for the population in urban areas.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

medium

Describe your assessment

There is a high vulnerability to both droughts and floods. There is some adaptive capacity. However, it is still necessary to define and implement adaptation measures, including raising awareness among the population and sectors, particularly in terms of behaviour and risk communication.

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

Since there is a high probability of the main hazards and exposure to them under future climate conditions, it will also imply high future impacts on water management. The need to adopt adaptation measures to minimise the effects arising from extreme events is fundamental.

Title of the sector

buildings

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

medium

Describe your assessment

The main hazards affecting the national territory and significantly affecting the buildings sector are increase the frequency and intensity of precipitation, floods, strong winds, droughts and heatwaves. In the municipalities located along the coastline, coastal landslides and floods are also major hazards for this sector. The impacts mainly damage buildings and their contents.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

medium

Describe your assessment

The National Risk Assessment identifies hazards of natural, technological or mixed origin, likely to affect the national territory, and the impact of climate change scenarios (with the parameterisation of the degree of annual probability of occurrence or the associated return period). For the risks affecting the buildings sector, the assessment points to the following scenarios and degrees of probability of occurrence: i. Heatwaves - In the summer season, heatwaves will occur in most of the area from mainland Portugal, except on the coast between Setúbal and Caminha and the Eastern Algarve (medium-high probability of occurrence); ii. Strong winds - The incidence of strong winds is random throughout the territory. It may affect geographically widespread areas (typically associated with winter depressions) or reach relatively small areas of the territory, and therefore it is not possible to graduate its susceptibility. For the scenario of strong wind with gusts exceeding 120 km/h in several locations, causing the fall of trees, power cuts in thousands of homes, damage to various structures, unfortunately with some human victims and high economic damage to infrastructures and homes (Medium-High Probability of occurrence); iii. Floods and floods - The development of floods and flooding in various parts of the country, as a result of a relatively long period of above-average rainfall during the winter and in several river basins, affecting several urban centres, with the consequent unavailability of some services and causing economic damage to infrastructure and housing (medium-high degree of probability of occurrence, corresponding to a return period between 5 and 20 years).

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

medium

Describe your assessment

The sector's guidelines for adaptive capacity are included in national spatial planning policy documents and city policy documents. There is evidence that they are also pursued in regional

and local strategies and plans. Some adaptation measures that could reduce vulnerability are raising the costs of insurance premiums for buildings located in higher exposure areas; ii. Improved construction techniques to make buildings and infrastructure more resistant; iii. Adoption of urbanistic solutions designed to reduce the urban heat island; iv. Relocating urban centres and industries to less vulnerable areas; v. Improving the energy efficiency of buildings.

Risk of potential future impacts

Annex I: 1.3c-iv

medium

Describe your assessment

The National Risk Assessment mentions the following risks of future climate change impacts, relevant to the sector: i. Heatwaves - The risk of heatwaves will be increased in frequency and intensity by the increase in average and maximum temperature (1.1°C-1.6°C) in the hottest months (June to October) and an increase in the number of hot days (maximum above 35°C) and tropical nights (minimum above 20°C) in summer; ii. Floods and floods - Despite the uncertainty associated with precipitation, the patterns of its evolution are towards a shorter rainy season and more intense rainfall during this period, in contrast with the reduction of rain in spring, summer and autumn. This dynamic may determine the occurrence of a higher number of flooding episodes during winter; iii. Flooding and coastal overflows - The increase in the average sea level, which by the end of the XXI century is expected to be 0.5 m higher, possibly reaching values around 1 m above the class of 1990, and the change in the storms regime are two factors that contribute to the worsening of this risk; iv. Rural fires - Contributing to this risk is the rise in temperature that will give rise to a more significant number of hot days and heatwaves and the growing trend towards periods of drought that will make rural areas more vulnerable to fires.

Title of the sector

urban

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

medium

Describe your assessment

The main hazards affecting the sector include increases in the frequency and intensity of floods, flash floods, heatwaves, rural fires and coastal overflows. Regarding the temperature increase, recent emission records are close to the least severe scenario (RCP 4.5), which is associated with an average temperature increase between 1.1 and 2.6°C, which means that likely the temperature will not exceed 2°C. More uncertainty exists about precipitation, but it is expected to follow the RCP8.5 scenario, with a significant reduction in annual values (in the end of the century, losses between -10% and -50% in spring, summer and autumn). An increase in the number of extreme precipitation events and a reduction in days with low to medium/high precipitation is also expected. The seasonal variability of rainfall is expected to increase. The territory will remain vulnerable to flooding, given the trend towards a more significant contribution to the annual precipitation from heavy rainfall days. New temperature and precipitation regimes associated with climate change bring increased occurrences of extreme weather events such as torrential rain, hail, cyclones and tornadoes. The coastline is also particularly vulnerable to coastal flooding caused by rising sea levels, with high socio-economic costs.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

medium

Describe your assessment

At national level, studies are being developed under the "National Adaptation Roadmap 2100" that aim to update the probability scenarios of some of the relevant hazards. The National Risk Assessment has identified the risks of natural, technological or mixed origin, likely to affect the national territory, the impact of climate change and the scenarios arising from there (being parameterised the degree of annual probability of occurrence). The assessment points out the following scenarios and degrees of probability of occurrence for the risks affecting the urban sector: i. Heatwaves - In the summer season, heat waves will occur in most mainland Portugal (medium-high degree of probability of occurrence); ii. Strong winds - The incidence of strong winds is random through the territory. The scenario of strong wind with gusts exceeding 120 km/h in several locations should cause the fall of trees, power cuts in thousands of homes, cuts in several roads and damage to various structures, with severe economic harm to infrastructure and housing (medium-high probability of occurrence); iii. Floods and floods - The development of floods and flooding in various parts of the country, as a result of a relatively long period of above-average rainfall during the winter and in several river basins, affecting several urban centres, with the consequent unavailability of some services and causing economic damage to infrastructure, housing and agriculture (medium-high probability of occurrence); iv. Coastal

flooding and overtopping - For the scenario of very rough sea coinciding with high amplitude high tides (winter equinox), strong swell at high tide with the destruction of protective jetties leading to the overtopping of the sea and consequent flooding, causing damage to several houses, equipment, infrastructure (medium-high probability of occurrence).

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

medium

Describe your assessment

The planning and construction of urban space began to incorporate the perspective of adaptation, including changing the modes and forms of transport use, reducing the urban heat island effect, managing the water cycle and the efficient use of energy in all activities (by promoting local structures of consumption, for example), buildings and infrastructures therein. These guidelines are included in national spatial planning policy and urban development policy documents, and there is evidence that they are also pursued in local strategies and plans.

Risk of potential future impacts

Annex I: 1.3c-iv

medium

Describe your assessment

The National Risk Assessment mentions the following risks of future climate change impacts, with relevance to the sector: i. Heatwaves - The risk of heatwaves will be increased in frequency and intensity by the increase in average and maximum temperature (1.1°C-1.6°C) in the hottest months (June to October) and an increase in the number of hot days (maximum above 35°C) and tropical nights (minimum above 20°C) in summer; ii. Floods - Despite the uncertainty associated with precipitation, the patterns of its evolution are towards a shorter rainy season and more intense rainfall during this period, in contrast with the reduction of rain in spring, summer and autumn. This dynamic may determine the occurrence of a more significant number of floods during winter; iii Floods and coastal overflows - The increase in the average sea level, which by the end of the XXI century is expected to be 0.5 m higher, possibly reaching values around 1 m above the level of 1990, and the change in the storms regime are two factors that contribute to the worsening of this risk on the coastline and the buildings therein.

Title of the sector

land use planning

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

medium

Describe your assessment

The main impacts are an increase in risk in coastal areas, an increase in areas exposed to rapid flooding, an increase in territory exposed to drought, an increase in regions threatened by the saline intrusion, an increase in the risk of widespread fire, a substantial impact on forest-use habitats.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

medium

Describe your assessment

The mapping of current hazards and the scenario of their future expression in the context of climate change is one of the objectives of the National Programme for Spatial Planning Policies, which aims, from the established macro approach, to foster the detailed mapping of hazards (coastal erosion, flooding, mass movement on slopes, rural fire, water shortage, heat waves, soil desertification and earthquakes) and to deepen their knowledge, within the scope of territorial plans and special or sectoral programmes of various scales. Downstream of this mapping are the land occupations that can induce management concerns and the need to undertake prevention and adaptation actions to reduce vulnerabilities by their nature. To this end mapping was carried out showing the relationship of territories susceptible to specific hazards with the intensities and forms of land use that occur therein.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

medium

Describe your assessment

National documents on spatial planning policy and urban development policy show that vulnerability exists. Still, they offer a growing concern with the capacity to adapt to climate change, and guidelines have been created that should be pursued in the strategies and plans of local and regional scope, with this objective.

Risk of potential future impacts

Annex I: 1.3c-iv

medium

Describe your assessment

Portugal must be better prepared for extreme events - the risks may be increased and costly both in urban areas (heat waves, floods, coastal erosion) and the rural regions (forest fires, loss of biodiversity, reduced agricultural productivity) - and it is essential to ensure solutions for a territorial organisation with the aim at increasing the resilience of natural systems, agriculture, forestry and communities, safeguarding, namely, the sustainability and connectivity of the landscape and food sovereignty.

Title of the sector

business and industry

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

low

Describe your assessment

The main vulnerability for the areas where the industry is located is flooding due to heavy rainfall events. Another threat appears to be extreme meteorological events of strong wind and storm, by the fall of coating materials and structures on buildings. In summary, the maximum direct negative impacts (threats) concern the following types of extreme events: i. Intense precipitation; ii. Strong winds and storms; iii. Heatwaves.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

medium

Describe your assessment

The climate sensitivity of industrial activities seems also to result from the impacts of extreme climate events on buildings, infrastructures and other economic assets. The main hazards for industry esulting from climate change are associated with i. availability of water resources - degradation of quantity and quality; ii. vulnerability to flooding, and; iii. vulnerability to extreme weather events, of strong wind and storm. The indirect negative impacts (threats) include damage to transport infrastructures, particularly roads. Concerning industry located in the Lisbon Metropolitan Area and due to industrial establishments' concentration, there is a strong potential for generating significant accidents involving hazardous substances, emphasising chemical and fuel establishments. The danger of technological accidents associated with industrial establishments that handle or store hazardous substances has also been identified.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

medium

Describe your assessment

The location of commercial activities, particularly, on the ground floors of buildings, and service activities in the central and consolidated areas are sensitive to the potential occurrence of flash floods, which can result from episodes of intense and concentrated rainfall in a few hours, due to the accumulation of rainwater or deficiencies in drainage systems. The flooding of underground urban structures - with these uses - can also be observed with shortcomings and difficulties in the drainage of urban systems, particularly, during high tide periods. Institutional cooperation and the mechanisms defined between the entities responsible for the planning and executing actions have enabled a globally effective response to the consequences observed in the sector arising from extreme climate events.

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

It is estimated that the sectors where the incidence of climate change may be felt the most will be in the universe of industrial sectors covered by the following legal regimes: European Union – Emissions Trading Scheme (EU-ETS), Industrial Emissions Regime (Environmental Permit) and Prevention of Major Accidents involving hazardous substances, which coincide with the technological risks inherent to the respective activities and the vulnerability resulting from the greater frequency and magnitude of extreme weather events.

Title of the sector

coastal areas

If sector is 'Other', please explain

-

Observed impacts of key hazards, including changes in frequency and magnitude

Annex I: 1.3c-i

medium

Describe your assessment

The increase in the magnitude and frequency of the phenomena affecting the low, dune-supported coastline induced average retreat rates of 0.5 to 9 m/year between 1958 and 2010, representing an approximate loss of territory of 12 km2. Based on the COSMO programme results, the loss between 2010 and 2018 can be estimated at 1 km2. The retreat is not so relevant on cliff coasts, although instability movements and block falls may induce significant risk.

Likelihood of the occurrence of key hazards and exposure to them under future climate

Drawing upon the best available climate modelling science, Annex I: 1.3c-ii

high

Describe your assessment

The available climate modelling indicates a high probability of a change in the wave climate off mainland Portugal's coast, with a rotation of 5-10º in the wave direction for the 2100 time

horizon. Regarding the significant wave height, a minor increase is expected. There is also a high probability of sea-level rise between 25 and 110cm by 2080, leading to an increase between 15 and 25% of the current erosion rate.

Vulnerability, including adaptive capacity

Adaptive capacity is defined as 'The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences', Annex I: 1.3c-iii

high

Describe your assessment

The available forecasts regarding the rise in the average sea level and the modification of the sea agitation regime that reaches the Portuguese coast indicate that the coastal zones present a high vulnerability to climate change, namely in the low sandy sections and in the low rocky coast supported by dunes. The insufficient sediment supply aggravates the coastal vulnerability, which reduces coastal systems' capacity to adapt to the predicted changes.

Risk of potential future impacts

Annex I: 1.3c-iv

high

Describe your assessment

The potential future impacts of sea-level rise are mainly related to the coast's geological nature and its altimetry. Thus, impacts are expected to be negligible on rocky coastlines and significant on sandy stretches, external elevation, such as the coasts of central Portugal and the eastern Algarve.

Legal and policy frameworks and institutional arrangements

Legal and policy frameworks and regulations

Annex I: 2.1

National Energy and Climate Plan 2021-2030 (PNEC 2030) is the next decade's primary national energy and climate policy instrument. The Ministerial Commission for Climate Action is responsible for the political coordination of PNEC 2030, in charge of supervising and monitoring its implementation and the achievement of the established targets.
The Portuguese long-term vision has been set in the Carbon Neutrality Roadmap 2050 (RNC2050), which constituted the Portuguese Long-Term Strategy submitted to the European Commission and to United Nations Framework Convention for Climate Change (UNFCCC).
Portugal also has a National Adaptation to Climate Change Strategy (ENAAC 2020), focusing on improving the articulation between domains (particularly those of transversal nature), on the integration in sectoral policies, and the implementation of adaptation measures.
The Action Plan for Adaptation to Climate Change, approved by the Resolution of the Council of Ministers No. 130/2019, of August 2, complements and systematises the work carried out in the context of ENAAC 2020, focusing on its second objective: to implement adaptation measures.

National Adaptation Strategy (NAS) (1)

NAS title

National Adaptation to Climate Change Strategy (ENAAC 2020)

NAS status

actual NAS - adopted

Year the NAS was adopted

2015

Period covered by the NAS

2015-2025

Link to the NAS

https://dre.pt/application/file/69906414

National Adaptation Plan (NAP) (1)

NAP title

Action Plan for Adaptation to Climate Change (P-3AC)

NAP status

actual NAP - adopted

Year the NAP was adopted

2019

Period covered by the NAP

Until 2030

Link to the NAP

https://dre.pt/application/conteudo/123666112

National Adaptation Plan (SAP) (5)

SAP title

AGRI-ADAPT2020 (Action Programme)

SAP status

completed and submitted for adoption

SAP sector

agriculture and food

SAP sector (other)

-

Year the SAP was adopted

2018

Period covered by the SAP

From 2018-2020

Link to the SAP

-

SAP title

Forest Adaptation Plan to Climate Change

SAP status

completed and submitted for adoption

SAP sector

forestry

SAP sector (other)

Silviculture

Year the SAP was adopted

2013

Period covered by the SAP

From 2013-2020

Link to the SAP

http://www2.icnf.pt/portal/florestas/ppf/resource/doc/alt-clima/rel-florest-enaac

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SAP title

Regional Strategies of Adaptation to Climate Change - Health

SAP status

completed and submitted for adoption

SAP sector

health

SAP sector (other)

-

Year the SAP was adopted

2019

Period covered by the SAP

From 2019-2020

Link to the SAP

-

SAP title

National Strategy for Preventive Civil Protection

SAP status

completed and submitted for adoption

SAP sector

civil protection and emergency management

SAP sector (other)

-

Year the SAP was adopted

2017

Period covered by the SAP

2017-2020

Link to the SAP

https://data.dre.pt/eli/resolconsmin/160/2017/10/30/p/dre/pt/html

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SAP title

Infrastructure Resilience Plan for Climate Change (PRIAC), from Infraestruturas de Portugal

SAP status

being developed

SAP sector

transport

SAP sector (other)

-

Year the SAP was adopted

-

Period covered by the SAP

From 2022-2030

Link to the SAP

-

Overview of institutional arrangements and governance at the national level

Climate vulnerability and risk assessment

Annex I: 2.2a

The first integrated assessment of impacts and adaptation measures in Portugal – SIAM - Climate Change in Portugal. Scenarios, Impacts and Adaptation Measures – was completed in 2006. With the approval of the NAS (Council of Ministers Resolution no. 56/2015, of July 30), a monitoring and reporting system of adaptation actions was established. It is the competence of each of the NAS sectorial working groups to identify and assess each sector's significant impacts, vulnerabilities, options, and adaptation measures. In the Interim monitoring reports of the NAS, it is possible to evaluate the evolutionary dynamics associated with climate impacts, risks, and vulnerabilities. In 2014, the National Risk Assessment was carried out.

Planning, implemention, monitoring, evaluation and revision of adaptation policy

Aspects to consider include decision making, planning and coordination related to adaptation strategies, policies, plans and goals, addressing cross-cutting issues, adjusting adaptation priorities and activities, implementing adaptation actions, including facilitating action to avert, minimise and address the adverse effect of climate change. Annex I: 2.2b

The Climate Action Commission (CAC) seeks to enhance the involvement and promote the accountability of the various sectors to greater integration of climate policy in sectoral policies. It is composed of government departments from relevant sectors, promoting policy coordination, a greater dynamism and sectorial responsibility. It is chaired by the Minister of the Environment and Climate Action, and includes government departments from the areas of energy, spatial planning, finance, agriculture, sea, economy and innovation, transport, health, tourism, civil protection, regional development, local administration, foreign affairs and cooperation, education and science, and representatives of the regional governments of the Azores and Madeira. CAC is responsible for: a) Providing political guidelines in the context of climate change; b) Promoting the articulation and integration of climate change policies in sectoral policies; c) Monitoring the implementation of sectoral measures, programmes, and actions.

At the level of the NAS governance structure, the aim is to promote greater involvement of the relevant authorities and articulation with the Autonomous Regions of the Azores and Madeira, a better interaction between sectoral groups and between the various administrative levels. The NAS coordination group is composed by: a) the Portuguese Environment Agency, which chairs; b) The coordinators of thematic areas; c) the coordinators of sectoral working groups; d) the representatives of the Autonomous Regions of the Azores and Madeira; e) the representatives of the National Association of Portuguese Municipalities.

The operationalisation of the NAS required the creation of a flexible and dynamic structure, organised into six thematic areas and nine priority sectors. The thematic areas promote coherent vertical integration of the different scales needed for adaptation (from international to local) and horizontal integration (between sectors and organisms) through the coordination and development of specific work of multisectoral nature (cross-cutting approaches). The coordination of each one is shared between the Portuguese Environment Agency (NAS general coordinator), and the entities with specific thematic competences, acting as facilitators. In addition to the entities that coordinate the sectoral groups of the different priority sectors, other entities or personalities identified as relevant for the implementation of the NAS also participate in the work, contributing to a broader co-responsibility and the co-construction of the priority measures to be developed. The priority sectors correspond to strategic domains for the promotion and implementation of adaptation in Portugal. They are structured in 9 working groups, each one coordinated by the respective central administration organisms with sectoral competences.

Integration of climate change impacts and resilience into environmental assessment procedures

Annex I: 2.2c

The EA procedures consider national and territorial adaptation planning instruments; current and future climatic vulnerabilities through historical data on the climate and the occurrences of extreme weather events; environmental, social and economic impacts and consequences, considering CC scenarios; key risks/impacts of CC in the project; assessment if pre-existing vulnerabilities to CC will be exacerbated; alternatives more resilient to climate pressures and/or allowing a more significant climate vulnerability reduction; critical thresholds that compromise the project or the environment, forcing the adoption of adaptation measures; minimisation measures based on NAP for the relevant vulnerabilities or impacts.

Collection, ownership and re-use of relevant data and access to it

Relevant data: such as climate-related disaster loss data or risk data. Annex I: 2.2d

The Climate Portal promoted by IPMA provides climate indicators in climate change scenarios, based on the processing of past climate data and climate projections data from IPCC AR5 (CORDEX project). The portal provides more than 40 climate variables: temperature, precipitation, wind speed, relative humidity, global radiation, temperature range, drought index, aridity index, evapotranspiration, fire risk index and climate classification.
The Portuguese Environment Agency records historical flood marks and its network of meteorological and hydrological monitoring stations (National Water Resources Information System), important to have historical flood data and improve the planning and adaptive capacity of the territories.

Integration of climate change impacts and adaptation planning into disaster risk management frameworks and vice versa

Including Article 6(1) of Decision No 1313/2013/EU of the European Parliament and of the Council of 17 December 2013 on a Union Civil Protection Mechanism (OJ L 347 I, 20.12.2013, p. 924). Annex I: 2.2e

The National Risk Assessment was prepared in 2014, following the "Risk Assessment and Mapping Guidelines for Disaster Management" issued by the European Commission (document SEC (2010) 1626 final, 21.12.2010), which aims to promote the better application of the precautionary principle, contributing to the adoption of measures to reduce the risk of major accident or disaster inherent in each activity. In this assessment, the natural, technological, or mixed hazards that may affect the national territory were identified and characterised. The National Risk Assessment took into consideration, for the applicable risks, the impact of climate change and the resulting scenarios, indicating tendencies to worsen or mitigate risks.

Overview of institutional arrangements and governance at the sub-national level (where "sub-national" refers to local and regional)

Legal requirements and strategic documents

Annex I: 2.3a

The Council of Ministers Resolution no. 56/2015, of July 30, which approves the NAS, empowered regional and local stakeholders, assisting sectors, public administration and policymakers in its implementation (integration of adaptation in sectoral policies and territorial programs and plans). Regional governments and the association of Portuguese municipalities participate in the NAS governance structure, considering their specific competencies and the importance of sub-national levels in terms of climate change impacts, and the respective adaptation response. The thematic area dedicated to the integration of adaptation into spatial planning also enables governance arrangements at subnational level.

Networks or other collaborations on adaptation across national authorities

Annex I: 2.3b

One of the main objectives of the Portuguese climate policy is to ensure participation in international negotiations, responding to international commitments of cooperation and support to developing countries in this field, privileging priority countries, according to the principles and priorities defined in the Strategic Concept of Portuguese Cooperation (2014 - 2020).
The Unit for the Coordination of Operational Strategy for Humanitarian and Emergency Action promotes action in the case of Portugal's public aid to developing countries that require humanitarian and emergency action following losses and damage resulting from natural disasters caused by extreme weather events.

Good practice examples of networks or other collaborations on adaptation across local and regional authorities

Annex I: 2.3c

Created in December 2016, adapt.local - Network of Municipalities for Local Adaptation to Climate Change constitutes a partnership led by municipalities but involving higher education institutions, research centres, non-governmental organisations, and companies. Recently, Intermunicipal Climate Change Adaptation Plans have been developed, promoted by sub-regional structures. The networks formed in their elaboration integrate multiple local, sub-regional and, in some cases, national actors, contributing to a closer working relationship and partnership between authorities of different scales of action.

Adaptation strategies, policies, plans and goals

Adaptation priorities

Annex I: 3.1

The main priorities for Adaptation are: Strengthen resilience and national capacities through greater involvement of the various sectors, in a logic of integration (mainstreaming) and implementation of concrete measures; Stimulate research, innovation and knowledge production on climate change and develop a knowledge base to support public policymaking; Involve society in the challenges of climate change, promoting individual and collective action; Increase the effectiveness of information, report and monitor systems, and ensure the active participation of relevant entities; Secure financing conditions and increase investment levels, ensuring self-sustainability of climate policy funding.

Challenges, gaps and barriers to adaptation

Including those institutional, governance-related and other barriers that restrict the adaptive capacity as identified in the vulnerability assessment. Annex I: 3.2

In Agriculture and rural development, the main challenges are to guarantee water for multiple uses, to reduce knowledge gap of risks and water availability, and to improve the programme coordination and governance.
In Forest, the main challenges are lack of financial and human resources specialised in adaptation to face the scale of the climate risks.
In Tourism, it is fundamental to improve training of technicians/decision-makers and to produce adequate risk mapping and legislation.
In Energy, new requirements and planning are needed. Screening of policy measures through climate-proofing could be used to test alignment with adaptation. Continue to work on climate-sensitive energy supply and demand models and energy system scenarios on time scales consistent with climate change.
In Health, it is essential to create adequate indicators and train professionals to establish correlations between risk/preventive measures/mitigation.
In People and goods' safety, it is essential to promote better coordination and involvement of the relevant entities and in-depth knowledge of data on damage and losses associated with extreme weather events.
Adaptation can occur in anticipation of impacts through spatial planning and by adapting urban spaces to climate events. Urban spatial planning and construction will incorporate adaptation responses: restrictions on new construction, planned setback(s) and accommodation measures, reduction of the urban heat island effect, urban water cycle management and energy and water use efficiency in all activities, buildings and infrastructure.
Lack of sectoral and intersectoral coordination in the sense of operational articulation to fulfil strategies, programmes and plans, registering a reduced sharing of data, systematised and

updated information on actions and projects under development. Implementing the measures recommended in the plans and strategies for adaptation requires adequate funding.

Summaries of national strategies, policies, plans and efforts, with a focus on goals and objectives, foreseen actions, budget and timeline

Including nature-based solutions and actions leading to mitigation co-benefits and other relevant co-benefits. The summaries shall cover also efforts to build resilience and avert, minimise and address the adverse consequences of climate change, and include an explanation how gender perspectives have been taken into account. Annex I: 3.3

National Climate Policy PNAC 2020/2030 (Council of Ministers Resolution No. 56/2015 of July 30) established the first national climate policy's vision and objectives until 2030. The National Climate Policy establishes an integrated, complementary, and articulated framework of climate policy instruments in the 2030 horizon, intending to institute a more dynamic planning approach, and to enhance the involvement and promote the various sectors' accountability to integrate climate policy in sectoral policies.

The National Climate Policy identified policy options to fulfil the need to promote a resilient economy to the effects of climate change. Thus, it has the following objectives, among others: i. Strengthen resilience and national adaptation capacities; ii. Involve society in the challenges of climate change, increasing individual and collective action; iii. Guarantee adequate governance conditions and ensure the integration of climate objectives in sectorial domains.

The National Climate Policy included National Programme for Climate Change – PNAC 2020/2030 and National Strategy for Climate Change - ENAAC 2020 (NAS). PNAC 2020/2030 aims to ensure a sustainable path for the reduction of national GHG emissions to achieve a target of -18% to -23% in 2020 and -30% to -40% in 2030, (baseline 2005), ensuring compliance with national mitigation commitments and bringing Portugal in line with the EU targets. It establishes guidelines for sectoral policies and measures, defines sectoral targets for reducing emissions, and identifies a set of options for sectoral policies and actions to be developed together with the relevant policy sectors such as transport, energy, agriculture, and forestry. This promotes the integration of mitigation objectives into sectoral policies and advocates a dynamic planning approach, giving sectors more responsibility to identify policies and measures. During 2020, PNAC 2020/2030 is revoked, with effect from January 1 2021 onwards, by the Resolution of the Council of Ministers nº. 53/2020, of July 10, 2020, which approves the National Energy and Climate Plan 2030 (PNEC 2030), which is the main instrument of national energy and climate policy for the next decade towards carbon neutrality in 2050. PNEC 2030 also has extended the validity of the NAS until December 31, 2025. PNEC 2030 has a chapter dedicated to “Resilience and capacity to adaptation to climate change” as a co-benefit of decarbonisation and energy transition and stressing the symbioses between adaptation and mitigation.

It shall be recorder that the Portuguese carbon neutrality goal in 2050 has been established in the Resolution of the Council of Ministers n.º 107/2019, July 1 2019, which approved the Carbon

Neutrality Roadmap 2050 (RNC2050), which constituted the Portuguese Long-Term Strategy submitted to the European Commission and to United Nations Framework Convention for Climate Change (UNFCCC). The strategic vision of RNC2050 is based in 8 premises from which should be stressed: “Contribute to national resilience and capacity to adapt to vulnerabilities and impacts of climate change”.

NAS proposes to improve the level of knowledge on climate change, promote the integration of climate adaptation in the various public policies and operationalisation instruments, placing greater emphasis on the implementation of adaptation measures. The NAS promotes, through working groups and thematic areas, the coherent vertical integration of the different scales necessary for climate adaptation, from international to local, and prioritises its mainstreaming in various sectoral policies and the implementation of adaptation measures, based on technical and scientific knowledge and acceptable practices that are being developed.

NAS is guided by three main objectives:

- Improving the level of knowledge on climate change - updating, developing, and promoting understanding on climate change and assessing its potential risks, impacts and consequences, including those related to extreme weather events.
- Implement adaptation measures - assess current adaptive capacity and prioritise the implementation of adaptation options and measures that moderate future negative impacts and/or help take advantage of opportunities arising from climate change.
- Promote the integration of adaptation into sectoral policies - promote the integration and monitoring of the climate change adaptation component (mainstreaming) in the most relevant public and sectoral policies, including spatial planning and sustainable urban development policies and their territorial planning and management instruments.

Action Plan for Climate Change Adaptation - P-3AC (NAP), approved by the Resolution of the Council of Ministers No. 130/2019, of August 2, complements and systematises the work done in the context of the NAS, aiming at its second objective, the implementation of adaptation measures. NAP elects eight direct intervention lines in the territory and infrastructures, complemented by a string of transversal nature, seeking to respond to Portugal's significant impacts and vulnerabilities. The definition of these intervention lines resulted from the screening and prioritisation of the various adaptation measures listed in sectoral, municipal, and inter-municipal planning exercises. The lines of action and measures to reduce vulnerabilities to climate change recorded in the NAP constitute the benchmark for national action on climate change adaptation, without prejudice to the guidelines contained in the NAS, and should integrate, among others, the sectoral planning and preparation of financing instruments to be developed under the Multiannual Financial Framework 2021-2027.

National Adaptation Plan (SAP) (21)

Title of the measure or action

Study to assess water needs for the agricultural sector in the context of Climate Change (Plan for the Adaptation of Water Resources Management to Climate Change for the Agricultural Sector)

Key Type Measure (KTM)

A: Governance and Institutional

sub-KTM

A1: Policy

Specification

Revision of policies; laws and strategies

Short description of the measure or action

This action focuses on preparing a study to assess water needs for the agricultural sector in the context of Climate Change, as part of a broader exercise called "Water Management Adaptation Plan to Climate Change for the Agricultural Sector".

Climate threat

Water-related - chronic - Precipitation and/or hydrological variability

Sectors affected

agriculture and food

Status

studies ongoing

Administrative level the measure is implemented

Regional (sub-national)

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Risk management (included in Initiative 4 - Adaptation to Climate Change)

Key Type Measure (KTM)

B: Economic and Finance

sub-KTM

B2: Insurance and transfer instruments

Specification

Revision of existing insurance scheme/products

Short description of the measure or action

This measure, called "Risk management", is included in Initiative 4 - Adaptation to climate change and corresponds to a review of the existing insurance schemes to integrate the risk associated with climate events.

Climate threat

Temperature-related - acute - Other

Sectors affected

agriculture and food, finance and insurance

Status

being implemented

Administrative level the measure is implemented

National

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Study on adaptation and mitigation measures (Plan for the Adaptation of Water Resources Management to Climate Change for the Agricultural Sector)

Key Type Measure (KTM)

A: Governance and Institutional

sub-KTM

A1: Policy

Specification

Revision of policies; laws and strategies

Short description of the measure or action

This action focuses on elaborating a study on adaptation and mitigation measures, integrated into a more comprehensive exercise called "Water Management Adaptation Plan to Climate Change for the Agricultural Sector".

Climate threat

Water-related - acute - Other

Sectors affected

agriculture and food, water management

Status

planned

Administrative level the measure is implemented

Regional (sub-national)

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Forest Risks (includes the actions "Prevention of forests against biotic and abiotic agents and "Restoration of forests damaged by biotic and abiotic agents or catastrophic events")

Key Type Measure (KTM)

E: Knowledge and behavioural change

sub-KTM

E3: Practice and Behaviour

Specification

Revisions or expansion of practices and on the ground behaviour e.g. soil or land management techniques; climate-resilient crops or livestock practices; rainwater collection; improving integrated pest management; individual preparedness

Short description of the measure or action

This "forest risks" measure includes actions associated with the prevention of forests against biotic and abiotic agents and the restoration of forests affected by biotic and abiotic agents or catastrophic events.

Climate threat

Temperature-related - acute - Other

Sectors affected

biodiversity (including ecosystembased approaches), forestry, land use planning, water management

Status

being implemented

Administrative level the measure is implemented

Regional (sub-national)

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Climate change adaptation measures associated with freshwater and coastal species and habitats.

Key Type Measure (KTM)

D: Nature based solutions and ecosystem-based approaches

sub-KTM

D2: blue

Specification

Improvement of blue infrastructure (e.g. buffer strips and shelter belts; flood storage areas and reservoirs; re-open connection to flood plains; restauration of rivers; basins; ponds and wetlands; improved water areas in cities)

Short description of the measure or action

The aim is to begin implementing 50% of the climate change adaptation measures defined in the sectoral plan, giving priority to those relating to freshwater and coastal species and habitats.

Climate threat

Temperature-related - acute - Other, Water-related - acute - Other

Sectors affected

biodiversity (including ecosystembased approaches)

Status

being implemented

Administrative level the measure is implemented

National

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Survey of typical native species and establish key reference (indicator) species for arid and semi-arid areas.

Key Type Measure (KTM)

D: Nature based solutions and ecosystem-based approaches

sub-KTM

D1: green

Specification

Changed land-use management (e.g. forest management; avoidance of soil sealing)

Short description of the measure or action

Carry out a survey of typical native species and establish key reference (indicator) species for arid and semi-arid areas. This survey will be especially important for better land use management, particularly in terms of forest management.

Climate threat

Solid mass-related - acute - Landslide

Sectors affected

biodiversity (including ecosystembased approaches), land use planning

Status

planned

Administrative level the measure is implemented

National

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

System of sustainability indicators for the sustainable management of destinations.

Key Type Measure (KTM)

E: Knowledge and behavioural change

sub-KTM

E1: Information and awareness raising

Specification

Decision support tools and databases

Short description of the measure or action

Implementation throughout the country of a system of sustainability indicators of international reference for the sustainable management of destinations, in partnership with the World Tourism Organisation.

Climate threat

Temperature-related - acute - Other

Sectors affected

ICT (information and comunications technology), tourism

Status

implemented/completed

Administrative level the measure is implemented

National

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Inclusion of the sustainability dimension in the enterprise classification system

Key Type Measure (KTM)

A: Governance and Institutional

sub-KTM

A1: Policy

Specification

Revision of policies; laws and strategies

Short description of the measure or action

Inclusion of the sustainability dimension, for example in terms of management of the water resource, as a valuing element in the classification system of the undertakings.

Climate threat

Temperature-related - acute - Other, Water-related - acute - Other

Sectors affected

buildings, tourism

Status

studies ongoing

Administrative level the measure is implemented

National

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Implement mosaics of fuel management plots.

Key Type Measure (KTM)

D: Nature based solutions and ecosystem-based approaches

sub-KTM

D1: green

Specification

Creation of new green infrastructure (e.g. afforestation; revegetation; riparian woodland; protection forest in mountainous areas; increased landscape cover; creation of landscape elements and hedges; urban greening)

Short description of the measure or action

Implement mosaics of fuel management plots in order to improve response capacity and reduce the impact of forest fires.

Climate threat

Temperature-related - acute - Other

Sectors affected

forestry

Status

being implemented

Administrative level the measure is implemented

Multilevel

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Definition and implementation of measures and strategies of adaptation of the health sector to climate change

Key Type Measure (KTM)

A: Governance and Institutional

sub-KTM

A2: Management and Planning

Specification

Mainstreaming (institutional; organisational; administrative) into existing programs and plans (e.g. agricultural programs and plans; water plans and programs; NAP)

Short description of the measure or action

This measure focuses on the definition and implementation of various actions and strategies to adapt the health sector to climate change.

Climate threat

Temperature-related - acute - Heat wave

Sectors affected

buildings, civil protection and emergency management, health

Status

planned

Administrative level the measure is implemented

Regional (sub-national)

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Update of the National Risk Assessment

Key Type Measure (KTM)

A: Governance and Institutional

sub-KTM

A2: Management and Planning

Specification

Revision of technical rules and standards

Short description of the measure or action

This action focuses on updating the National Risk Assessment to carry out a current identification and characterisation of hazards of natural, technological or mixed origin, likely to affect the Portuguese territory, considering, for the applicable risks, the impact of climate change and the resulting scenarios, indicating tendencies to worsen or mitigate the risks.

Climate threat

Solid mass-related - acute - Landslide, Temperature-related - acute - Other, Water-related - acute - Other

Sectors affected

civil protection and emergency management

Status

implemented/completed

Administrative level the measure is implemented

National

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Strengthening risk monitoring and warning systems.

Key Type Measure (KTM)

C: Physical and technological

sub-KTM

C2: Technological

Specification

Technologies for hazard mapping and monitoring

Short description of the measure or action

This measure focuses on strengthening monitoring and warning systems on risks to improve the responsible entities' response capacity and as an essential tool to ensure the population's awareness of self-protection and thus promote the better application of the precautionary principle and anticipation of the response.

Climate threat

Temperature-related - acute - Other

Sectors affected

civil protection and emergency management

Status

implemented/completed

Administrative level the measure is implemented

Multilevel

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Public warning systems

Key Type Measure (KTM)

A: Governance and Institutional

sub-KTM

A2: Management and Planning

Specification

Creation of technical rules and standards

Short description of the measure or action

This measure focuses on the implementation of warning systems for the population, an essential tool for raising the population's awareness of self-protection and thus promoting the better application of the precautionary principle, contributing to the adoption of measures to reduce risk.

Climate threat

Temperature-related - acute - Other, Water-related - acute - Other, Wind-related - acute - Other

Sectors affected

civil protection and emergency management

Status

implemented/completed

Administrative level the measure is implemented

Multilevel

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Water retention systems to be used in periods of drought.

Key Type Measure (KTM)

C: Physical and technological

sub-KTM

C1: Physical

Specification

Improved physical infrastructure (strictly technical in nature – e.g. technological systems for flood protection; sea walls; slope stabilization; water supply/irrigation systems)

Short description of the measure or action

This measure comprises actions that consider water retention capacity, safe storage, so that it can be used in periods of drought.

Climate threat

Temperature-related - acute - Other

Sectors affected

water management

Status

being implemented

Administrative level the measure is implemented

River Basin District

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Clearance, river regulation and flood control

Key Type Measure (KTM)

C: Physical and technological

sub-KTM

C1: Physical

Specification

Improved physical infrastructure (strictly technical in nature – e.g. technological systems for flood protection; sea walls; slope stabilization; water supply/irrigation systems)

Short description of the measure or action

This measure comprises a set of structural interventions for clearing, river regulation and flood control in areas of frequent flooding and high damage.

Climate threat

-

Sectors affected

water management

Status

being implemented

Administrative level the measure is implemented

River Basin District

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Good Practice Guidelines for Disaster Risk Reduction and Promoting Resilience

Key Type Measure (KTM)

E: Knowledge and behavioural change

sub-KTM

E3: Practice and Behaviour

Specification

Revisions or expansion of practices and on the ground behaviour e.g. soil or land management techniques; climate-resilient crops or livestock practices; rainwater collection; improving integrated pest management; individual preparedness

Short description of the measure or action

This measure comprises the development of Good Practice Guides for Disaster Risk Reduction and Resilience Promotion, translating the best lessons from experience to prevent or mitigate disaster risks and their effects.

Climate threat

-

Sectors affected

civil protection and emergency management

Status

implemented/completed

Administrative level the measure is implemented

Multilevel

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Adequate management of extreme flows in areas of frequent flooding with high damage

Key Type Measure (KTM)

C: Physical and technological

sub-KTM

C1: Physical

Specification

Improved physical infrastructure (strictly technical in nature – e.g. technological systems for flood protection; sea walls; slope stabilization; water supply/irrigation systems)

Short description of the measure or action

The aim of this measure is to provide a framework for the hydraulic works required for the proper management of extreme flows in areas of frequent flooding with high damage.

Climate threat

-

Sectors affected

civil protection and emergency management

Status

being implemented

Administrative level the measure is implemented

Multilevel

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Resilience of ecosystems, species, and habitats to the effects of climate change

Key Type Measure (KTM)

D: Nature based solutions and ecosystem-based approaches

sub-KTM

D1: green

Specification

Improvement of green infrastructure (e.g. afforestation; revegetation; riparian woodland; protection forest in mountainous areas; increased landscape cover; creation of landscape elements and hedges; urban greening)

Short description of the measure or action

This measure comprises a set of actions contributing to increase the resilience of ecosystems, species, and habitats to the effects of climate change.

Climate threat

Temperature-related - acute - Other

Sectors affected

transport

Status

being implemented

Administrative level the measure is implemented

Multilevel

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Removing constructions

Key Type Measure (KTM)

A: Governance and Institutional

sub-KTM

A2: Management and Planning

Specification

Mainstreaming (institutional; organisational; administrative) into existing programs and plans (e.g. agricultural programs and plans; water plans and programs; NAP)

Short description of the measure or action

Removal of constructions on the coastline, located in flood-critical territories

Climate threat

-

Sectors affected

buildings, coastal areas

Status

planned

Administrative level the measure is implemented

Local

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Monitoring of critical areas, including cliffs, to know the evolution of the territory, its occupation and the state of coastal systems

Key Type Measure (KTM)

E: Knowledge and behavioural change

sub-KTM

E1: Information and awareness raising

Specification

Decision support tools and databases

Short description of the measure or action

Monitoring of critical areas, including cliffs, to know the evolution of the territory, its occupation and the state of coastal systems

Climate threat

-

Sectors affected

coastal areas

Status

being implemented

Administrative level the measure is implemented

National

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Title of the measure or action

Maintenance of the coastline, through artificial feeding of sediments

Key Type Measure (KTM)

D: Nature based solutions and ecosystem-based approaches

sub-KTM

D2: blue

Specification

Improvement of blue infrastructure (e.g. buffer strips and shelter belts; flood storage areas and reservoirs; re-open connection to flood plains; restauration of rivers; basins; ponds and wetlands; improved water areas in cities)

Short description of the measure or action

Maintenance of the coastline, through artificial feeding of sediments

Climate threat

-

Sectors affected

coastal areas

Status

being implemented

Administrative level the measure is implemented

National

If 'other', please explain

-

The cost of implementing the measure

-

Weblink

-

Additional document on the actions and (programmes of) measures reported

-

Overview of the content of sub-national strategies, policies, plans and efforts

Annex I: 3.4

NAS (ENAAC 2020) seeks to promote and assist the various sectors, the central, regional and local administration and policymakers in finding the means and tools for the implementation of climate adaptation and to promote its integration in the various sectoral policies and territorial programmes and plans (at lower scales - NUTS II, NUTS III, municipal).
On the other hand, the thematic area dedicated to integrating adaptation into spatial planning seeks to promote and stimulate, among its stakeholders, the introduction of the adaptation component in policy and territorial management instruments at all relevant scales for a coherent implementation of ENAAC 2020. It also develops capacity building initiatives for sectoral actors regarding the territorial integration of specific adaptation measures, considering threats and opportunities associated with the effects of climate change. It is within the scope of the work of this Thematic Area, which integrates territorial and sectoral stakeholders, that truly relevant dynamics are promoted to enhance that, in the institutional and governance arrangements at the subnational level, the concerns associated with climate change can be accommodated, as well as to place the planning process as a priority action.
In the work exercises developed in the thematic area, the following should be noted: i) Dissemination of information and other resources that guide the various sectoral agents in the active management of adaptation to climate change in their activities in a way that fits in with local and regional specificities; ii) Analysis and mapping of hazards with climate origin and the consequent modification and adaptation of the main instruments of territorial policy and management; iii) Elaboration of technical guidelines to ensure adaptation to climate change in territorial management instruments; iv) Integration of adaptation in the Action Programme of the National Programme for Land Use Management Policy - PNPOT; v) Integration of adaptation in the Sustainable Urban Development Agendas.
The AdaPT Programme, supported by the European Economic Area Financial Mechanism, was the pilot programme for adaptation in Portugal and originated landmark projects in the national adaptation process, in particular the ClimAdaPT.Local project (under which 27 municipal adaptation strategies were developed) and the Climate Portal. This programme was a driver of adequate action in adaptation to climate change and a significant contribution to raise

awareness, increase the ability to assess vulnerabilities, and promote awareness and education on this issue at the local level.
The current Cohesion Policy national support framework – Portugal 2020, in particular the Programme for Sustainability and Efficient Use of Resources (POSEUR) -, includes several funding opportunities for climate adaptation, and has allowed the following of the path initiated by the AdaPT Programme, through support to municipal and inter-municipal adaptation planning, and the implementation of adaptation measures, particularly in the areas of coastline, water resources and nature conservation. As a result, most of the territory is now covered by intermunicipal climate change adaptation plans, including the Lisbon and Porto metropolitan plans, promoted by sub-regional structures (Intermunicipal Communities and Metropolitan Areas), in which there was a broad participation and involvement of municipalities (including capacity building of their technical structures).
The structure of these plans is generally based on 2 phases. According to the climate scenarios previously analysed, a step associated with 'Impacts and vulnerabilities' identifies the territories' adaptive capacity and the current and future vulnerabilities, which allows the prioritisation of adaptation. A phase associated with adaptation options' focused on identifying and planning the realisation of adaptation options and measures, establishing the respective priorities and deadlines, and defining the institutional management, monitoring, and communication models to support their implementation.
At the end of 2020, 271 municipalities in Mainland Portugal, Azores, and Madeira (a total of 308) were covered by a municipal, intermunicipal or metropolitan planning instrument (plan or strategy) on climate adaptation.
Recently, funding has been approved to prepare several municipal climate change adaptation plans (EEA Grants). In May 2019, under the European Economic Area Financial Mechanism for the period 2014-2021, Portugal and the Financial Mechanism Committee (Financial Mechanism Committee) created by Iceland, Liechtenstein, and Norway, signed the Environment, Climate Change and Low Carbon Economy Programme. In 2020, they opened tenders in the programme areas of Environment and Ecosystems (PA11) and Climate Change Mitigation and Adaptation (PA13), which will fund the missing municipal adaptation plans in Portugal. The plans will seek, in most cases, to promote the integration of the intermunicipal plans at the municipal scale, to define municipal climate adaptation planning, to strengthen the role of land use planning in adaptation, to establish municipal adaptation action programmes to be implemented until 2030, to empower municipal officials and technical staff, and to prepare communities for the challenges of climate change.

Overview of efforts to integrate climate change adaptation into sectoral policies, plans and programs, including disaster risk management strategies and action

Annex I: 3.5

Portugal has made increasing efforts to promote adaptation to climate change in sectoral policies, plans and programmes.

In the agriculture and food/rural development sector, the sectoral plan, AGRI-ADAPT develops the monitoring of the integration and implementation of adaptation measures foreseen for the sector and supports the development of studies on climate change on ecosystem services. Terra Futura 2020-2030 integrates an initiative exclusively dedicated to the sectors' adaptation to climate change and other measures that impact it.

In the Biodiversity sector, one line of action is to "promote the integration and monitoring of biodiversity adaptation measures to climate change in the various sectoral policies, plans and programmes". The process of reconfiguring the Protected Areas Management Plans to Special Programmes incorporates structural changes that consider the increase in coastal erosion, the occurrence of extreme weather events or flooding.

Both the Tourism Strategy 2027 and the Sustainable Tourism Plan 20-23 aim to transform climate challenges into opportunities. As part of the monitoring of the preparation of Territorial Management Instruments, indications have been given to incorporate adaptation requirements for the installation of tourist resorts. One of the guiding principles is to act to minimise the impact of climate change. Identifying risk areas in terms of climate change and adaptation measures through the definition of the tourism load of the most sensitive territories (coastline, inland waters, and classified areas) should be highlighted.

In the energy sector, aiming to rehabilitate and make buildings more efficient, in convergence with the adaptation needs, the long-term strategy for the renovation of buildings was approved and published. Regarding the security of supply and resilience of infrastructures, the networks' Development and Investment Plans have particular relevance. Some actions and investments aimed at adaptation to climate change are already defined. In studies such as the Preventive Action Plans and Emergency Plan for the National Gas System, environmental risk factors are considered and studied, namely extreme events, risk scenarios were also defined for the electricity sector related to extreme weather events.

In Forests, legal frameworks for the forest-fire protection system were amended. The Regional Forestry Management Programmes were revised, with scenarios based on climate models and the integration of measures to prevent and protect forests and the population. Rural fires risk management mechanisms were created, namely the platform for the registration of requests for burning authorisations and the production of weather warnings.

In the health sector, it is essential to monitor the state of health of the population, considering diseases transmitted by water, food, vectors and pathologies aggravated by air quality and exposure to extreme climate.

In the National Strategy for Preventive Civil Protection, climate adaptation was integrated into disaster risk reduction. A set of adaptation measures were identified (as for the 17 District Civil Protection Emergency Plans). Disaster risk management strategies are already the "core business" of Civil Protection for the various types of risk, where climate risks are included. However, this situation may imply a greater responsibility to integrate into planning and with greater detail the potential impacts of climate change.

In transport, the vulnerability of projects to climate change has been assessed, changing how

project risk is analysed to consider the probability of major accidents or disasters occurring and the project's ability to withstand such significant accidents or disasters.
The National Programme for Spatial Planning Policies identifies guidelines for territorial management instruments that promote adaptation. Regional plans must develop integrated sustainability strategies and approaches at a regional scale, namely in risk and adaptation to climate change. Furthermore, municipal master plans must delimit areas of susceptibility to hazards and risk, considering climate change scenarios and define measures of precaution, prevention, adaptation and reduction of exposure to risks, including the identification of sensitive elements to be managed and relocated, considering their hazard and risk analysis and at the appropriate scale.
The Hydrographic Region Management Plans integrate climate change adaptation measures directed to the sectors to manage the existing water scarcity aggravated in periods of drought. Regarding the risk of floods, the implementation of hydrological and hydraulic forecasting models will enable timely warnings to the population and better civil protection actions.

Overview of measures in adaptation policy at the national level and good practice examples from the sub-national levels to engage with stakeholders particularly vulnerable to climate change impacts

Annex I: 3.6a

In the agriculture and food/rural development sector, the AGRI-ADAPT was designed in a participatory manner with representatives of the main stakeholders, developing a series of proposals to be implemented, which meet the needs felt by the various actors in the sector, complementing the measures provided by sectoral strategy, which are being implemented, with financial support from the Rural Development Programme. The National Competence Centre for Climate Change in the Agroforestry Sector has been set up, a partnership involving the productive sector, advisory entities, R&D entities and the public sector. Among its objectives are assessing the response capacity and vulnerability to Climate Change and the development and evaluation of adaptation measures given the need to ensure the sustainability of Portuguese agriculture and forestry in productive, environmental and social aspects.
The Sustainable Tourism Plan 20-23 includes over 70 actions/projects that aim, fundamentally, to ensure the empowerment of professionals in the sector as agents of change to make the sector more resilient to climate challenges. It contemplates specific actions/projects such as identifying risk areas in terms of climate change and adaptation measures through the definition of the tourist load of the most sensitive territories (coastline, inland waters and classified areas).
In the Energy sector, the primary stakeholders associated with the respective energy systems are contacted and consulted when preparing studies related to risk scenarios, where risks associated with extreme weather events are considered. The protection of infrastructures against such events is assessed.
In the Forestry sector, national and regional awareness campaigns have been promoted to implement a more resilient forest to fires and plagues, thus changing climate change. Guidelines

have been produced for municipalities to implement the Aldeia Segura (Safe Village) and Pessoas Seguras (Safe People) programmes to adopt acceptable practices when faced with imminent rural fires.
The implementation of health sector strategies is based on the networking of health services with other security, environmental and/or social support entities.
In the context of the work developed in various working groups under the Sub-Commission of the National Platform for Disaster Risk Reduction, we highlight the preparation of several useful practice guides in recent years, namely the Guide "Resilient Cities in 2018" and the Guide "Flood Management. Support document for good practices".
The Action Plan of the National Programme for Land Planning Policies includes the measure of "Preventing risks and adapting the territory to climate change". This measure aims to deepen the knowledge about the areas subject to natural hazards to give particular expression to situations where land use and occupation increase their vulnerability or are affected by it. But other recommended measures contribute to adaptation, such as the need to safeguard the quality and quantity of water resources, to promote the protection and enhancement of soil resources, to integrate approaches to ecosystems and ecosystem services, to plan and manage geological and mining resources in an integrated manner, to promote the reordering and revitalisation of forest territories and to protect against fires. Following these measures and explicitly directed to the territories with vulnerabilities arising from the conflict between danger and land occupation and use, the Landscape Transformation Programme was created (it was approved by the Resolution of the Council of Ministers no. 49/2020, of June 24), which established as programmatic intervention measures the Landscape Reordering and Management Programmes, the Integrated Landscape Management Areas, the Integrated Support Programme for Villages designated as "Village Condominiums" and the Programme "Land Consolidation for Land Use Planning". In this context, the Programme for Reordering and Landscape Management of the Monchique and Silves Mountains was drawn up, a priority territory among the potential ones that present specific vulnerabilities associated with the organisation of the territory to prevent risks and adapt to climate change through landscape planning and management and the adoption of particular intervention measures.
At the local level, the main challenge is to integrate new sources of information, references, methodologies and acceptable practices that help the analysis and consideration of the various territorial planning options.
The Action Plan of the National Programme for Spatial Planning Policies identifies 10 commitments for the territory and 50 policy measures structured and organised into 5 areas of intervention, namely Natural, Social, Economic, Connectivity and Territorial Governance. Framed within the natural domain, the measure "Prevent risks and adapt the territory to climate change" is the one that directly contributes to adaptation. This measure has the following operational objectives: i. Fostering greater coordination and articulation between the entities involved and the sectoral, territorial and financing policies and plans; ii. According to the territories ' vulnerabilities, to produce and to update risk prevention and reduction cartography, considering, when relevant, climate scenarios; iii. Prepare and disseminate technical guidelines on risks and climate change for territorial programmes and plans, with a view to the

convergence of principles, understandings and solutions, taking advantage of the experience of projects funded by the AdaPT programme, such as the Climate Portal and ClimAdaPT.Local, among others; iv. Implement a culture of risk awareness, enhancing access to information, exchanging experiences and disseminating acceptable practices of prevention and risk reduction and adaptation to climate change; v. Foster a culture of territorial resilience through the collaboration of public and private entities and the involvement of communities; vi. To promote actions to prevent and reduce risks and adapt territories to climate change, favouring participative and natural-based solutions as the most appropriate.
Finally, in a country where water scarcity is increasing, the incentive to use alternative water sources becomes urgent. In this sense, one of the major national issues for reducing quantitative pressures on water bodies is the promotion of water reuse from treated wastewater from any source for multiple purposes. Decree-Law No. 119/2019 of August 21 was published to control the practice, which advocates an approach similar to that provided for Regulation EU 2020/741, supported by the case-by-case definition of quality standards (fit-for-purpose) and risk management on health and environment. Thus, water reuse projects involving irrigation of urban green spaces are defined to maximise the reuse of nutrients and minimise negative impacts on water's respective bodies. There are some pilot projects in Portugal with EU funding.

Overview of measures in adaptation policy at the national level and good practice examples from the sub-national levels to engage with the private sector

Member States shall provide an overview of available information on private sector plans, priorities, actions and programmes, public/private partnerships, and other relevant private adaptation initiatives and/or projects. Annex I: 3.6b

In Portugal, in recent years, several actions have been developed to involve the private sector in adaptation policy measures.
In the agriculture and food/rural development sector, support for innovation and the development of solutions has been strengthened, using participatory approaches and partnership projects between public and private entities. The private sector, supported by its associations and R&D entities, has adopted acceptable management practices (e.g., precision management). Warning systems have been developed (irrigation, among others). Regarding risk management, the Integrated System of Protection against Climate Randomness has been revised and improved, allowing better control of the risk associated with climate change by the private sector.
In the Biodiversity sector, of particular note is the "Best Practices in the Vineyard" project run by Vinhos do Alentejo, which aims to adopt innovative approaches that lead to the conservation of natural resources and biodiversity, contributing to adapting to climate change, generating opportunities for growth and valorisation of the vineyard, and promoting the maintenance of public goods (water, air and soil quality).
Regarding the Tourism sector, several stakeholders have been adopting measures with a view to

climate transition. Within the scope of the Plan Turismo + Sustentável 20-23, several partnerships were established, namely with sector associations, with a view to a faster climate transition of the sector, which reflects the direct involvement and concern of the private sector in accommodating/ adopting acceptable practices in terms of adaptation to climate change. The following actions/projects stand out as the most relevant at this level: "AQUA+ Hotéis", through which the aim is to create a national reference for water efficiency in hotel buildings and infrastructures; and, "Plataforma "Por um Turismo sustentável", which aims to monitor the consumption of hotels and disseminate information and good practices for increasingly efficient consumption.

In energy, we essentially highlight the actions and investments defined in the operators' Investment Plans. Besides, we refer to the participation in the consultations carried out by some stakeholders within the scope of their climate change adaptation strategies and plans by identifying potential actions to be implemented for the resilience of the territories and energy networks. The participation of operators as partners in the European project RESCCUE (Resilience to deal with climate change in urban areas, which developed a model for planning urban resilience to climate change) is also worth mentioning. Implementing internal adaptation plans for companies to promote an integrated and transversal action to all activities with identified climate risk is also pointed out.

In the Forestry sector, the private sector contributed to the implementation of discontinuity networks in areas with easements associated with infrastructure (electricity distribution networks) and the Implementation of R&D projects (e.g. REPLANT). On the other hand, there are measures relating to selecting clones and improved plants more resistant to drought by foresters.

In the context of the work developed within the Sub-Commission of the National Platform for Disaster Risk Reduction, a Working Group named "Resilience of Critical Infrastructures of the Private Sector and the State Enterprise Sector" was created, whose main objective is to promote the incorporation of the management of sectorial interdependencies in the increase of resilience of critical infrastructures providing essential care. In this context, the Guide "Good Practices for Critical Infrastructure Resilience" was produced, which aims to promote acceptable practices to reduce risk and increase critical infrastructures' resilience in the Private Sector and the State Business Sector.

Given the high number of flood and inundation situations recorded in the country, the Portuguese Insurers Association and the Faculty of Science of the University of Lisbon developed the CIRAC project to assess flood risk and vulnerability in mainland Portugal. A high-resolution risk analysis was carried out to characterise the potential impacts and damage for Lisbon, Algés, Coimbra and Porto/Gaia, namely in the buildings located there, according to climate change scenarios. This project was an important risk assessment tool for the insurance sector assisting local stakeholders in making strategic decisions.

Finally, it should be noted that the private sector is increasingly concerned with the efficient use of water and the reuse of nutrients, contributing to a circular economy. Also, in terms of water use for reuse in urban services, the application of treated wastewater of urban origin in the irrigation of green spaces, has been developed through the framework of the Lisbon Strategic

Plan for Water Reuse, developed by public and private entities.

Monitoring, reporting and evaluation of adaptation actions and processes

Monitoring, reporting and evaluation (MRE) methodology related to reducing climate impacts, vulnerabilities, risks, and increasing adaptive capacity

Member States shall report on approaches, systems used, transparency and indicators. Annex I: 4.1a

The MRE at national level is mainly ensured by the biannual Progress Reports of ENAAC 2020 (NAS) and the Monitoring of P-3AC (NAP).
The biannual progress reports of the NAS are intended to respond to the provisions of chapter 2.5 of ENAAC 2020 (Annex III of the RCM 56/2015, of July 30). The progress for two years is reported for each of the NAS objectives and recommendations are presented to remedy difficulties or gaps and propose improvements. The reports focus on the various thematic areas and priority sectors, the current state of the art, the degree of integration of adaptation in the various public and sectoral policies, and the implementation of adaptation measures.
It is the responsibility of the NAS Coordination Group to ensure the elements for adequate reporting on climate change adaptation to comply with international obligations, namely to the following entities and in the following scopes:
a) UNFCCC, in the context of National Communications and other reports on international cooperation.
b) European Commission, in the framework of the implementation of Regulation (EU) No 525/2013 of the European Parliament and of the Council of May 21, 2013.
c) European Commission, in the framework of the implementation of the EU Strategy on Adaptation to Climate Change and in particular its Scoreboard.
d) European Commission, in the MMR framework regarding methodologies for climate change support in the various EU funds.
Reporting is developed through the contributions produced by the various thematic areas and working groups, particularly the thematic area dedicated to funding, implementation, and reporting, to respond to the various international commitments within the established deadlines.

MRE methodology related to the implementation of adaptation actions

Member States shall report on approaches, systems used, transparency and indicators. Annex I: 4.1b

It is the responsibility of the entities that make up the NAS Coordination Group, in conjunction with the Portuguese Environment Agency, to contribute to the preparation of monitoring reports and proposals for the review of actions, indicators and targets and to collaborate in the annual monitoring of P-3AC (NAP), providing relevant sectoral information for indicators and targets, and in the preparation of proposals for coordination mechanisms to be established with third-countries.
The entities responsible for the financial instruments that provide funding for the measures

identified in P-3AC (NAP) share with the Portuguese Environment Agency information about their implementation, on an annual basis and accordingly with the appropriate indicators, during the first quarter of the year following their performance.

Sources for monitoring, reporting and evaluation (MRE) indicators and methodologies (1)

Name or short description for the MRE indicators or methodologies

Monitoring of the P-3AC (NAP)

Status of the MRE indicators and/or methodology

Being developed

Link to the MRE indicators and/or methodologies

https://www.apambiente.pt/index.php?ref=16&subref=81&sub2ref=118&sub3ref=1375

State of play of the implementation of measures planned under 'Strategies and Plans', including an overview of the subnational level and the disbursement of funding to increase climate resilience

Annex I: 4.2

In recent years we have seen important progress in the implementation of adaptation measures. Community support has contributed significantly to this fact. In a first moment, through the definition of eligibility and development of selection criteria for the financing of adaptation projects through EU funds of Portugal 2020 (in the Operational Programme Sustainability and Efficiency in Use of Resources - POSEUR) and, in a second moment, with the implementation of projects financed by AdaPT and P-3AC (NAP). Before the performance of the adaptation measures it was necessary an extensive preparation work of the calls to municipal, inter-municipal and regional plans for adaptation to climate change (within the POSEUR), as well as the evaluation grids and training actions on adaptation to climate change-oriented to the completion of the same grids.
In addition, to funding the preparation of numerous Intermunicipal and Local Climate Change Adaptation Plans, many other sectoral measures have been implemented at quite a high cost.
In the case of the agriculture and food/rural development sector, the Rural Development Programme (PDR 2020) supported with €1746.5 million the adaptation of agriculture/forest to Climate Change (54.5% of total funding to agriculture and forests). This amount was distributed as follows: 0.5% (Knowledge); 12.2% (Investments); 1.6% (agricultural risks); 13.4% (forestry); 48.8% (agri-environmental measures and climate); 23.5% (Areas with constraints). In the case of

the P-3AC (NAP) the relative support translated into 31% (Fires); 16% (Soil); 16% (Water); 18% (Biodiversity); 8% (Diseases/plagues); 6% (Floods); 6% (Knowledge).
In the case of biodiversity, two measures shall be stressed: i. Restoration, preservation and enhancement of biodiversity, including in "Natura 2000" areas, and areas subject to natural or other specific constraints, and in the agricultural systems of EVN, as well as the state of European landscapes; ii. Erosion prevention and improved land management supported through the EEA Grants Portugal 2014-2020 - Environment, Climate Change and Low Carbon Economy Programme.
Regarding the Tourism sector, the project "Sustainable Tourism: a better future for [with] everyone" should be highlighted. This project includes 6 actions: "Re-Educar para uma Restauração circular"; Circular economy practices in coastal tourist destinations; Carbon neutrality in tourist resorts; Sustainable construction in tourist resorts; Water efficiency in golf courses in Portugal; and reduction of plastic in hotels.
In the energy field, POSEUR has supported Energy Efficiency projects in buildings, the same happening with protect energy infrastructures. In the private sector, it is worth highlighting investments associated with: i. emergency plans; ii. business continuity plans (with the effect of Climate Change); iii. Identification of infrastructures subject to risks related to climate change and definition of investments.
In the case of Forests, the PDR2020 is being implemented with forestry actions/operations that contribute to adapting to Climate Change, namely efforts to prevent and defend forests against fires.
At national, regional, and local levels, there are guidelines to help ensure that the inclusion of climate change resilience is incorporated into territorial plans where the buildings sector is addressed in more detail.
The Autonomous Region of the Azores proceeded with the Regional Programme for Climate Change (PRAC – Portuguese acronym), approved by the Regional Legislative Decree No. 30/2019/A, of November 28, which encompasses mitigation and adaptation. PRAC allowed improving the level of knowledge on climate change in the Region through the studies of current and future vulnerabilities and the definition of adaptation measures for the most relevant sectors. PRAC Implementation is still at an early stage, so there are few adaptation measures under implementation.
The Autonomous Region of Madeira has continued the regional policies and programs that promote the increase in the improvement of the level of knowledge of climate change, having implemented, throughout this period, several measures and concluded vital projects to improve adaptation to climate change, making the Region more resilient and better prepared for the challenges posed by climate change. Regarding the promotion of the integration of adaptation in sectoral policies, during this period, several plans were produced, directed to various sectors, elaborated following the need for adaptation and integration of climate action policies, which will regulate the future development of those specific sectors.

State of play of the implementation of measures planned under 'Strategies and Plans': spending earmarked for climate adaptation including in disaster risk management

Annex I: 4.2a

The Thematic Objective 5 of the Operational Programme for Sustainability and Efficiency in the Use of Resources (POSEUR) included in Portugal 2020, aims to strengthen national adaptive capacity. Its Priority Axis 2 - Adaptation to climate change and risk prevention and management, includes two investment priorities (IP): 5.1. Support for investment for adaptation to climate change; 5.2. Promoting investments to address specific risks, ensure disaster resilience and develop disaster management systems.
In 2019, 8 calls for proposals were opened in these two IP. 34 applications were approved, absorbing a total Cohesion Fund amount of €48 million. At the end of 2019, 413 operations were supported, with a total eligible cost of €485 million and a Cohesion Fund allocation of €398 million. The financial implementation rate of Axis 2 at the end of 2019 was 47% of the programmed fund, translating into €231 million and CF of €198 million. Climate change adaptation measures and prevention and management of climate-related risks such as erosion, fires, floods, storms, and drought were supported, including awareness-raising, civil protection and disaster management systems and infrastructure.
The Environmental Fund finances adaptation operations aimed at implementing material measures recommended in local or regional planning exercises, namely that reduce or minimise climate risks associated with flood events and increase the resilience of infrastructures and ecosystems, species, and habitats.

To the extent possible, state of play of the implementation of measures planned under 'Strategies and Plans': the share of spending used to support climate adaptation in each sector

Share of spending used to support climate adaptation as the additional investment that makes a project (that would have been realised anyway) climate resilient. Annex I: 4.2b

The expenditure programmed and committed in the PDR2020 for the priorities of adaptation to Climate Change, between 2018 and 2020 (as of September 30), in the field of agriculture and food/rural development, was increased (15% and 18%, respectively), with an additional execution of €728 million towards the targets set in the P-3AC (NAP). The share of investment supporting adaptation to climate change (additional investment making a project - which would have been carried out anyway - climate change resilient) translates in absolute terms to €2.412 million (total programmed for Climate Change Adaptation Priorities), calculated following Reg.
The project "Sustainable Tourism: a better future for [with] everyone" has a total investment of €0.2 million, 100% fundable by the Environmental Fund. During the period of validity of the Plan Turismo +Sustentável 20-23, other measures and projects aimed to increase the resilience of the

sector to climate change, with significant volumes of investment.
Greater availability of EU funds is noted to increase forests' resilience with particular focus after the fires that occurred in 2015 and 2017.
Considering the 2019 implementation report of Mar2020 regarding measures to increase resilience to climate change in the marine and fisheries sector, the significant contribution of the selected operations to the fight against climate change is worth highlighting, translating into €54.7 million. The part of the investment supporting adaptation to climate change (an additional investment that does a project - which would have been carried out anyway - resilient to climate change) translates, in relative terms, into about 26%.
With the specific objective of rehabilitating and improving buildings' energy and water performance, the support programme "More Sustainable Buildings" was created in 2020 and it having been financing 890 applications, amounting to €1.75 million.
In 2020, the Environmental Fund financed applications with the objective to implement adaptation measures that guarantee the improvement of the adaptive capacity and increase the territory's resilience to the impacts of climate change and applications made under the "Village Condominium", the Integrated Support Programme for Villages located in forest territories, to ensure the management of fuels around settlements in areas of high forest density and increased number and dispersion of small rural settlements.
The Environmental Fund is the main Portuguese Fund created to support environmental policies pursuing sustainable development goals, contributing to the fulfilment of objectives and commitments associated with climate change, supported interventions in urban green spaces that mitigated the effects of heat islands and allowed the intervention of obsolete irrigation systems, leading to water savings.

Progress towards reducing climate impacts, vulnerabilities and risks

Based on the MRE methodology reported above. Annex I: 4.3a

Regular assessments of impacts, vulnerabilities, and risks to assess progress in reducing them have not yet been implemented.
So far, it has not been possible to update the indicators and values of the monitoring parameters of P-3AC (NAP). The indicators and most of the targets of P-3AC (NAP) come directly from funding programmes (e.g., those funded by the European Structural and Investment Funds) and sectoral plans and strategies (e.g., PNUEA - National Plan for Efficient Water Use). The updating of some of the indicators will be carried out in collaboration with the sectoral working groups in the context of the NAS.

Progress towards increasing adaptive capacity

Based on the MRE methodology reported above. Annex I: 4.3b

Regular evaluations of adaptive capacity to assess progress in increasing it have not yet been implemented.
Nevertheless, it is essential to highlight the very positive evolution of the national territory coverage by climate change adaptation strategies and plans. Until 2015 only three municipalities had elaborated adaptation plans and strategies. Since then, this coverage has expanded considerably, first as a result of the ClimAdaPT.Local project funded by EEA Grants and the Environmental Fund, followed by the ERDF funding provided by the Operational Programme for Sustainability and Efficiency in the Use of Resources, along with strategies and plans funded by the municipalities themselves. At the end of 2020, the number of municipalities covered by climate change adaptation plans or strategies (of municipal and/or inter-municipal or metropolitan scope) was 271, corresponding to 88% of Portuguese municipalities.

Progress towards meeting adaptation priorities

Based on the MRE methodology reported above. Annex I: 4.3c

Regular assessments of compliance with adaptation priorities to evaluate progress have not yet been implemented.
The main progress in achieving the three main objectives of ENAAC are: (i) for 'Improving knowledge', the publication of the Climate Change Research and Innovation Agenda, which reflects on the challenges for Climate Change Research and Innovation activities, considering multiple chains of complex interactions between natural and human systems; (ii) for 'Implementing adaptation', the publication of P-3AC (NAP); iii) for 'Mainstreaming Adaptation', the publication of the PNPOT - National Programme for Spatial Planning Policy, in which climate change was taken as a transversal theme and integrated into the different themes diagnosed, in the environmental, social and economic areas, assessing the impact of global scenarios applied to the national territory, and seeking to indicate the direction that some variables take in the region.

Progress towards addressing barriers to adaptation

Based on the MRE methodology reported above. Annex I: 4.3d

There are regular assessments of how and what to extent the adaptation barriers are being overcome and which ones have not yet been implemented. However, the main obstacles to adaptation are identified.
Regarding the lack of funding for adaptation, P-3AC (NAP) has defined priorities and mobilised financing and it can be used as a reference for preparing the next Multi-Annual Financial Framework and other funding instruments (e.g., the Environmental Fund and the EEA Grants Environment Programme).
Regarding the lack of information, very significant progress has been made with the publication of the Climate Portal and the beginning of the development of the National Roadmap for

Adaptation 2100, a large-scale exercise to assess the impact, vulnerability, and risk of climate change in the national territory.
As for the lack of adaptive management capacity, Portuguese municipalities' coverage by adaptation strategies and plans has increased from only 1% to 88% in the last six years.

Steps taken to review and update vulnerability and risk assessments

Annex I: 4.4a

The National Roadmap for Adaptation 2100 (ongoing until December 2023) will update and deepen for the XXI century the first assessment of risk and vulnerability of the Portuguese territory carried out under the SIAM I and II projects (2002 and 2006). These served as a basis and were complemented by the sectoral reports of the 1st NAS and its respective progress report. The Portuguese Environment Agency also promoted the Flood Risk Studies, associated with the Flood Risk Management Plans, which allowed updating the information on the susceptibility to flooding risks.
The National Authority for Emergency and Civil Protection published in 2019 the update of the National Risk Assessment, which generally maintains the structure of the previous 2014 assessment and was prepared following the "Risk Assessment and Mapping Guidelines for Disaster Management" issued by the European Commission (document SEC (2010) 1626 final, 21.12.2010).

Steps taken to review and update national adaptation policies, strategies, plans, and measures

Annex I: 4.4b

In 2010 Portugal approved its National Strategy for Climate Change Adaptation – ENAAC (NAS). The first phase of ENAAC's work took place between 2010 and 2013 with the following objectives: i) Information and knowledge: to keep up-to-date and available scientific knowledge; (ii) reducing vulnerability and increase responsiveness: in an integrated manner, defining measures to minimize the effects of climate change; iii) Participate, raise awareness and disseminate: raise awareness of climate change and its impacts; (iv) International cooperation: supporting the most vulnerable countries, in particular within the framework of the Community of Portuguese-Speaking Countries. The work of the various sectoral groups and a progress report were developed that highlighted the strategic nature of the work carried out, but also identified its limitations.
The first review of ENAAC (NAS) was promoted in 2015, bridging the gaps and capitalizing on the strengths and opportunities identified. The ENAAC 2020 (NAS) defines an organisation model that clearly promotes articulation between various sectors and stakeholders, pursuing priorities of certain thematic areas and the three objectives of the strategy: i) Improving the level of knowledge on climate change; (ii) Implement adaptation measures; iii) Promote the integration

of adaptation into sectoral policies. ENAAC 2020 (NAS) will be into force until 2025.
The same applies to the Action Programme for Climate Change Adaptation – P-3AC (NAP), which was published in 2019. It complements and systematizes the work carried out in the context of ENAAC 2020 (NAS), focused on its second objective: to implement adaptation measures.
The subnational strategies are all relatively recent.

Overview of good practice with regard to steps taken to review and update subnational adaptation plans, policies, strategies and measures

Annex I: 4.5

The sub-national strategies are all relatively new. Thus, they were not reviewed yet, but it will be important to establish a regular assessment of their implementation in order to evaluate the need of that revision.

Cooperation, good practices, synergies, experience and lessons learned in the field of adaptation

Good practices and lessons learnt (11)

Area of good practices

Annex I: footnote 19

Efforts to integrate climate change adaptation into development and sectoral policies; plans and programs

Good practices and lessons learnt, including at sub-national level

Annex I: 5.1

Sector "Agriculture": The definition of adaptation priorities carried out in a participatory manner; the creation of knowledge transfer platforms and the National Competence Centre for Climate Change in the Agroforestry Sector (knowledge coordination and dissemination); the effort made by public actors responsible for the definition of policy and management of community support to improve the quality of monitoring and evaluation of the measures of the funding instruments for adaptation.

Area of good practices

Annex I: footnote 19

Institutional arrangements and governance at the national level

Good practices and lessons learnt, including at sub-national level

Annex I: 5.1

Sector "Biodiversity": The various sectoral strategic instruments promote an intricate relationship between biodiversity protection and ecosystem restoration, with the achievement of climate change adaptation objectives, halt and reverse biodiversity loss and achieve neutrality in land and soil degradation.

Area of good practices

Annex I: footnote 19

Stakeholder engagement

Good practices and lessons learnt, including at sub-national level

Annex I: 5.1

Sector "Tourism": The good practices underway in the sector, and which we hope will be densified in the future, contribute directly towards attracting more sustainable tourism, insofar as, as we know today, the tourists themselves are also increasingly sensitive to these issues.

Area of good practices

Annex I: footnote 19

Efforts to integrate climate change adaptation into development and sectoral policies; plans and programs

Good practices and lessons learnt, including at sub-national level

Annex I: 5.1

Sector "Energy": Good practices and lessons: an increasing focus on increasing the resilience of infrastructures by operators; greater integration of adaptation in sector emergency planning (operators' contingency plans, more significant capacity building); consideration and greater visibility of adaptation to climate change in plans and programmes associated with national policies.

Area of good practices

Annex I: footnote 19

Integration of indigenous; traditional and local knowledge into climate adaptation

Good practices and lessons learnt, including at sub-national level

Annex I: 5.1

Sector "Forests": following the fires, the development of various actions to produce forest reproductive material, reinforcing the focus on more adapted native species (strengthening the respective harvest and production in public nurseries); the implementation of primary and

secondary networks of fuel management strips; the implementation of symbolic initiatives, such as the CELPA Projects: Best Eucalyptus; Clean & Fertilise Programme and the Replant Programme.

Area of good practices

Annex I: footnote 19

Climate risk communication

Good practices and lessons learnt, including at sub-national level

Annex I: 5.1

Sector "Health": Improved risk communication, information and training for the population. The progressive participation of the various public health services and departments, especially the financial area and the area of projects and applications, in collaboration with other entities, has allowed for the maximisation of results (health gains resulting from the better articulation of services).

Area of good practices

Annex I: footnote 19

Disaster risk reduction and management; innovative adaptation solutions and innovative financing mechanisms

Good practices and lessons learnt, including at sub-national level

Annex I: 5.1

Sector "Safety of people and goods": Creating the Sub-Commission of the National Platform for Disaster Risk Reduction, where several good practice guides were produced: i. Handbook "Resilient Cities in Portugal 2018" with measures to promote resilience at the local level; ii. Guidance Guide for the Constitution of Local Platforms for Disaster Risk Reduction"; iii. Guide "Good Practices for Resilience of Critical Infrastructures"; iv. Guide Flood Risk Management. Good Practice Support Document

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Area of good practices

Annex I: footnote 19

Disaster risk reduction and management; innovative adaptation solutions and innovative financing mechanisms

Good practices and lessons learnt, including at sub-national level

Annex I: 5.1

Sector "Transport": Good practices and lessons: i. Increase the frequency and areas of deforestation and vegetation cutting around infrastructure; ii. increased frequency of inspections carried out on transport infrastructure; iii. Increase in the frequency of maintenance interventions, namely in engineering structures and hydraulic crossings; iv. increased frequency of maintenance interventions in stabilising slopes and controlling water runoff.

Area of good practices

Annex I: footnote 19

Efforts to integrate climate change adaptation into development and sectoral policies; plans and programs

Good practices and lessons learnt, including at sub-national level

Annex I: 5.1

Sector "Buildings": Good practices and lessons: creating the publication "PDM GO Good practices for Municipal Master Plans", with a thematic section dedicated to climate change that identifies some good national practices: i. Sustainable Construction and Energy Efficiency in Belas Club de Campo, Sintra; ii. Passive House in Ílhavo; iii. Casas em movimento - Arquitetura em Movimento in Matosinhos; iv. Municipal Regulation of Urbanisation and Building in Lisbon.

Area of good practices

Annex I: footnote 19

Efforts to integrate climate change adaptation into development and sectoral policies; plans and programs

Good practices and lessons learnt, including at sub-national level

Annex I: 5.1

Sector "Land use planning": Good practices and lessons: the creation of the publication "PDM GO Good practices for Municipal Master Plans", which points out guidelines and methodologies that should be taken into consideration in the planning processes at the local scale, especially in the PDMs, concerning themes such as "the adaptation to climate change".

Area of good practices

Annex I: footnote 19

Efforts to integrate climate change adaptation into development and sectoral policies; plans and programs

Good practices and lessons learnt, including at sub-national level

Annex I: 5.1

Sector "Urban": The publication "PDM GO Good practices for Municipal Master Plans" identifies the creation of green and blue multifunctional axes for climate adaptation in Amadora, Sintra, and Oeiras. Lessons of experiences: i. adhesion of local actors and the population to new ways of adapting to climate contexts; ii. assume the structural role of green infrastructure for adaptation; iii. enhance learning capital and collaborative experimentation in city networks

Synergies of adaptation actions with other international frameworks and/or conventions

In particular the Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction, Annex I: 5.2

The development cooperation actions that can be reported as official development assistance have demonstrated their contribution to the Sustainable Development goals and presented risk matrices. All Portuguese Cooperation actions that can be marked as adaptation and reported as official development assistance has, by definition, an international dimension as an aid to developing countries. In terms of integrating adaptation to climate change into development cooperation, Portugal, as a Member State of the OECD Development Assistance Committee, defines the degree of integration by applying the Rio marker adaptation to climate change.
In this field, the various activities and actions developed by the Cooperation Working Group of the National Strategy for Adaptation to Climate Change 2020 (GT Cooperação) should also be noted.
Thus, this WG has reported to the European Commission on development support activities related to adaptation (Article 16 of the MMR), namely by participating in the report's

preparation, including CTF in 2019 and 2020. It has also been following up on meetings under the UNFCCC and Paris Agreement, particularly SB, on methodologies and approaches to reporting financing for development.
In October 2020, the WG accompanied the 7th EU Expert Meeting on Climate Change and Development and contributed to the reporting on development support for adaptation (7th NC and 3rdRB).
Adopting the Sendai Declaration and the Framework for Disaster Risk Reduction 2015-2030, Portugal has developed efforts and actions that contribute towards the seven goals, four priorities and the guiding principles, namely reducing disaster risk. Recognising the potential impact of disasters and their complexity, Portugal has made increased efforts to reduce the possible effects of disaster risks.
Within the theme of resilient cities, National Authority for Emergency and Civil Protection and the Municipality of Amadora are part of the U-SCORE project, co-financed by the European Commission, which aims to promote good practices between 5 resilient cities. Stoke-on-Trent and Salford, in the United Kingdom, and Jönköping and Arvika, in Sweden, accompany Amadora in this challenge, whose objectives are to prepare cities for an eventual disaster scenario better, to be a platform for the exchange of knowledge and experiences between experts in this field, and also to involve other municipalities in action for disaster risk reduction.

Cooperation with Union Member States, international cooperation, and with regional and international organisations to share information and to strengthen science, institutions and adaptation knowledge

Excluding information on support to developing countries referred to in Part 2 of Annex VIII of Regulation (EU) 2018/1999. Annex I: 5.3a

One of the main objectives of the National Climate Policy is to ensure the committed participation of the Portuguese State in international negotiations and cooperation, contributing to the achievement of the Paris Agreement, pursuing ambitious policies consistent with the objectives set at the EU level and responding to international commitments to cooperate and support developing countries in the area of climate change and, in particular, climate adaptation.
In this context, the National Climate Policy promotes the integration of the stakeholders of the International Cooperation thematic area in international networks focused on adaptation to climate change, as well as the exchange of knowledge and the establishment of project development partnerships (sharing of information on acceptable practices and experiences has contributed to strengthening expertise and facilitating the exchange of relevant actors - for example, university professors, researchers, grant holders,...).
Also noteworthy in this area, in addition to the numerous contributions prepared and made available by the thematic area within the biannual reports of the EU and OECD, within the scope of PCD (Policy Coherence for Development), is the participation in the LIFESHARA project - Sharing Awareness and Governance of Adaptation to Climate Change in Spain, which among

other actions provides for the establishment of an Iberian cooperation system between the Adaptation Units to climate change in Spain and Portugal for the identification of risks, vulnerabilities, priorities and joint actions. In addition to cooperation with the activities of the European Strategy for Adaptation, the European Climate-Adapt platform (http://climate-adapt.eea.europa.eu/), and with national adaptation platforms in other countries, it should be noted the promotion of bilateral relations with Norway, Iceland and Liechtenstein under the AdaPT Programme and the National Roadmap for Adaptation 2100, in which one of the project partners is DSB - Norwegian Civil Protection.

Cooperation with Union Member States, international cooperation, and with regional and international organisations to enhance adaptation action at the sub-national, national, macro-regional and international level

Including the area, scale and types of cooperation. Excluding information on support to developing countries referred to in Part 2 of Annex VIII of Regulation (EU) 2018/1999. Annex I: 5.3b

Portugal has been implementing climate change policies that have successfully guaranteed compliance with the objectives established under various international commitments. International cooperation on climate change is aimed at responding to international commitments to support developing countries under the UNFCCC and its Kyoto Protocol, and the Paris Agreement, focusing on priority countries for Portuguese cooperation, according to the principles and priorities set out in the Strategic Concept of Portuguese Cooperation (2014-2020), approved by the Council of Ministers Resolution No. 17/2014 of March 7). In this framework, the thematic area dedicated to international cooperation on adaptation has been promoting cooperation work with other countries on the issues necessary for implementing ENAAC 2020 (NAS) and equivalent strategies in those countries and regions of the world.
Benchmarking and cooperation for exchanging knowledge on acceptable adaptation practices with countries from southern European (particularly with Spain) and the Maghreb, among others, has enabled the finding of innovative and appropriate solutions to the climate and national context. Under the priorities defined for the thematic area of International Cooperation, it is essential to establish an Iberian cooperation system for adaptation, which supports the articulation of adaptation strategies of Portugal and Spain, enhances an integrated intervention in border regions, and boosts the current mechanisms for managing water resources in river basins shared by both countries.

Any other information related to climate change impacts and adaptation

Key contact details of national coordinator and organisation (2)

Organisation

Annex I: 6.1

Agência Portuguesa do Ambiente, I.P. (APA)

Department within the organisation

Climate Change Department

Role of the organisation

Coordinating adaptacion policies and responsible for reporting

Contact person

Eduardo Santos/ Ana Daam

Role of the contact person

Head of Department/ Head of Unit

Email address

enaac2020@apambiente.pt

Website

https://apambiente.pt/index.php?ref=16&subref=81&sub2ref=118

Organisation

Annex I: 6.1

-

Department within the organisation

-

Role of the organisation

-

Contact person

-

Role of the contact person

-

Email address

-

Website

-

Relevant websites and social media sources (1)

Title

Title of relevant website or social media source used for communication on adaptation action at national and sub-national level, Annex I: 6.2

No relevant websites and social media sources

Type

-

National or sub-national level

-

Weblink

www.norelevantwebsitesandsocialmediasources.pt

Adaptation portals and platforms (2)

Name

Name of the climate, hazards, vulnerability, impact or adaptation portal or platform

Portuguese Environment Agency Portal (Adaptation)

Status

Established

Focus of the portal or platform

Climate change adaptation (measures and solutions), Climate change hazards; impact and/or vulnerability

Weblink

https://apambiente.pt/index.php?ref=16&subref=81&sub2ref=118

Name

Name of the climate, hazards, vulnerability, impact or adaptation portal or platform

Climate Portal

Status

Established

Focus of the portal or platform

Climate change hazards; impact and/or vulnerability

Weblink

http://www.portaldoclima.pt/

Key reports and publications at national and sub-national level (9)

Title

Annex I: 6.3

Project Catalogue of the RIAAC-AGRI Project - Network on Impact and Adaptation to Climate Change in Agriculture, Agro-Food and Forestry

Year of publication

2019

Publisher

Online publication

Weblink

https://inovacao.rederural.gov.pt/26-alteracoes-climaticas-riaac-agri?start=16

Title

Annex I: 6.3

emRede" Magazine - No 8 - "Climate Change Answers - Agriculture, Forestry and Territories

Year of publication

2018

Publisher

Directorate-General for Agriculture and Rural Development/National Rural Network

Weblink

http://www.rederural.gov.pt/images/Noticias/2019/RRrural_n8_final_26jul.pdf

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Title

Annex I: 6.3

Algarve Regional Water Efficiency Plan

Year of publication

2020

Publisher

MAAC, MA and SET

Weblink

https://apambiente.pt/ajaxpages/destaque.php?id=1440

Title

Annex I: 6.3

National Risk Analysis

Year of publication

2019

Publisher

ANPC

Weblink

www.prociv.pt

Title

Annex I: 6.3

Good Practice Guides

Year of publication

2018

Publisher

ANPC - NATIONAL PLATFORM FOR DISASTER RISK REDUCTION

Weblink

www.pnrrc.pt

Title

Annex I: 6.3

Metropolitan Plan of Adaptation to Climate Change of the Metropolitan Area of Lisbon (PMAAC-AML)

Year of publication

2019

Publisher

Lisbon Metropolitan Area

Weblink

https://www.aml.pt/index.php?cMILID=SUS5B26D38C7E6F8&cMILL=3&mIID=SUS5B26D2AD40BAF&mIN=Elementos%20do%20Plano%3A%20conte%FAdo%20documental%20constituinte%20%28downloads%29&mILA=&cMILID1=SUS57DBD63E8B375&mIID1=1&mIN1=%C1reas%20de%20atividade&cMILID2=SUS5B26D08452B6F&mIID2=SUS5B26D0019A515&mIN2=PMAAC-AML&cMILID3=SUS5B26D38C7E6F8&mIID3=SUS5B26D2AD40BAF&mIN3=Elementos%20do%20Plano%3A%20conte%FAdo%20documental%20constituinte%20%28downloads%29

Title

Annex I: 6.3

Intermunicipal Climate Change Adaptation Plan of Central Alentejo (PIAAC-AC)

Year of publication

2020

Publisher

Intermunicipal Community of Central Alentejo

Weblink

https://www.cimac.pt/relatorios/

Title

Annex I: 6.3

Spatial Planning in Response to Climate Change: Contribution to the PDMs

Year of publication

2019

Publisher

Lisbon and Tagus Valley Coordination and Regional Development Commission

Weblink

http://www.ccdr-lvt.pt/files/e85da0b52d3e72c3a6aa739bf8b8fc997d87f83c.pdf

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Title

Annex I: 6.3

PDM GO Good practices for Municipal Master Plans

Year of publication

2021

Publisher

National Land Commission

Weblink

https://cnt.dgterritorio.gov.pt/system/files/grupos_trabalho/NormasEspecificacoesREN_08-02-2020_versao%20a%20publicar%20na%20CNT.pdf

Any other relevant information

Annex I: 6.4

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Additional document

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