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Nexus Thinking to
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REXUS

MANAGING RESILIENT NEXUS SYSTEMS THROUGH PARTICIPATORY SYSTEMS DYNAMICS MODELLING

Deliverable 6.4 - Climate risk assessment results in pilots

WP6 – Pilot Implementation

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Abbreviations	Definition
AHP	Analytic Hierarchy Process
C3S	Copernicus Climate Change Service
CMIP5	Coupled Model Intercomparison Project Phase 5
CORDEX	Coordinated Regional Climate Downscaling Experiment
ESGF	Earth System Grid Federation
GCM	Global Climate Models
GDD	Growing Degree Days
GDP	Gross Domestic Product
GHG	Green House Gases
IPCC	Intergovernmental Panel on Climate Change
km	Kilometres
m	Meters
MCA	Multicriteria Analysis
mm	Millimetres
MWh	Mega Watt per hour
PSDM	Participatory System Dynamics Modelling
PV	PhotoVoltaics
RBD	River Basin District
RCM	Regional Climate Models
RCP	Representative Concentration Pathways
RV	Return Value
SH	Stakeholders

SPV	*Solar PhotoVoltaic power*
WCRP	*World Climate Research Program*
WEF	*Water, Energy, Food*
WEFC	*Water, Energy, Food and Climate*
WEI	*Water Exploitation Index*

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Executive Summary

The water and food systems are inextricably linked so that actions in one policy area commonly have impacts on the other, as well as on the energy system that natural resources and human activities ultimately depend upon**.** All three elements – water, food, energy – are crucial for human well-being, poverty reduction and sustainable socio-economic development. Climate is strongly connected to the Water-Energy-Food (WEF) systems as it provides vital sources for their functionality while a changing climate may have adverse effects on them. The thorough analysis of the WEF and Climate Nexus not only needs to account for the interactions taking place today, but also to consider how future climate will affect the three sectors in isolation or in combination (e.g., compounding/cascade effects).

This deliverable is entitled "Climate Risk Assessment results in pilots" (D6.4) and is aimed to provide the REXUS project partners (scientific and pilot teams) as well as the broader project stakeholders with valuable information on the expected changes on the fit-for-Nexus climate risk assessment for the five project pilot areas (Pinios river basin, lower Danube river basin, peninsular Spain, Isonzo-Soča river basin, Nima-Amaime subwatershed).

In the framework of this deliverable, a methodology for the assessment of climate risks on the Water – Energy – Food Nexus was developed based on the conceptual framework set by the Intergovernmental Panel on Climate Change. Specifically, risks are assessed as the result of the dynamic interactions between the climate-related hazards with the levels of exposure and vulnerability of the affected systems to the hazards. Each risk component constitutes a composite indicator consisting of one or more sub-indicators. For each WEF system, a set of hazard, exposure and vulnerability indicators is employed to assess risk, with clear interconnections between the systems reflecting the Nexus dependencies. In particular, some of the indicators are used for the assessment of more than one systems so as to effectively take into account the WEF Nexus. A set of hazard indicators is used to reflect the climate related hazards for the WEF systems based on the climate projections for the relevant climate variables. The assessment of hazards is carried out for the period 2031-2090 based on the RCP4.5 and RCP8.5. For estimating the exposure of elements in an area where hazard events might occur, geospatial data on the exposed elements are used as indicators. For assessing vulnerability in relation to the propensity of the exposed elements and systems to suffer adverse effects when impacted by hazard events, several socio-economic indicators were used as well as indicators that reflect the level of existing stress of the WEF systems. Once the climate risk is estimated, adaptive capacity is evaluated based on the institutional capacity and the larger economic and social context prevailing at the pilot areas.

The results of the risk assessment for the period of 2031-2050 for the Pinios river basin show that, according to both future climate scenarios RCP4.5 and RCP8.5, the aggregated at pilot level overall risk for the Water system is expected to be "Medium-High", for the Food system "Medium" and for the Energy system "Low". Furthermore, when climate risk is considered at the administrative level, the expected risk reaches the "Medium-High" level on several municipalities for the Food systems.

The results of the risk assessment for the period of 2031-2050 for the lower Danube River basin show that, according to both climate scenarios RCP4.5 and RCP8.5 the aggregated at pilot level overall risk is expected to be "Medium" for the Water and Food systems and for the Energy system "Low". According to RCP8.5 the overall risk in average is expected to be slightly higher for the Water and Food systems, but still in the same classification level. Furthermore, when climate risk is considered at the administrative level, the expected risk reaches the "Medium-High" level on several administrative units on RCP8.5 scenario for the Food systems.

The results of the risk assessment for the peninsular Spain pilot show that, according to both climate scenarios RCP4.5 and RCP8.5 the aggregated at pilot level overall risk is expected to be “Medium” for the Water and Food systems and for the Energy system “Low”. According to RCP8.5 the overall risk in average is expected to be slightly higher for the Water and Food systems, but still in the same classification level. Furthermore, when climate risk is considered at the administrative level, the expected risk reaches the "Medium-High" level in several provinces in both scenarios for water and food systems.

The results of the risk assessment for the Isonzo-Soča river basin pilot show that, according to RCP4.5 the aggregated at pilot level overall risk for the Water system is expected to be “Low-Medium”, for the Food system “Low-Medium” and for the Energy system “Low”. According to RCP8.5 the overall risk is expected to be slightly higher for the Water system estimated at “Medium” level. Furthermore, when climate risk is considered at the administrative level, the expected risk reaches higher levels in several administrative units in both scenarios for water and food systems.

The results of the risk assessment for the Nima-Amaime subwetershed pilot show that, according to RCP4.5 and RCP8.5 the overall risk for the Food system is expected to be “Low”, for both two scenarios.

1. Introduction

Over the last decade, significant efforts have been made to improve the understanding of the Nexus interactions between Water, Energy, Food and Climate (WEFC) as a framework for resource security and sustainable development. Thus, the general objective of the REXUS project is to co-develop and co-validate knowledge and tools that facilitate the transition from the stage of "Understanding the Nexus" to "Nexus Doing" in order to strengthen resilience. The strong linkages between WEFC are at the root of the challenges addressed in the REXUS project. The functionality of the Water, Energy and Food (WEF) sectors directly depends on the climate, since its effect can be both positive (e.g., precipitation that affects the growth of crops), but also negative (e.g., flooding events due to heavy precipitation). Furthermore, the study of the climate and its changes in the future is of vital importance in the decision-making process concerning all three sectors. More specifically, evidence shows that in Europe there will be an increase in extreme rainfall (Myhre et al., 2019), which will affect, among others, flood risk, with effects on both agriculture and energy production infrastructure (Solaun et al., 2019). Similarly, studies have shown that the temperature in Europe will rise rapidly in the coming decades (Carvalho et al., 2021; Nikulin et al. 2011), again affecting both agriculture (e.g.,, increase in heat days) (Teixeira et al., 2013; Vogel et al., 2019) and the water and energy systems (e.g.,, higher evaporation from the reservoirs of water used for the production of hydropower) (Demeke et al., 2013).

The current report is entitled "Climate risk assessment results in pilots" and is produced as Deliverable 6.4 under the Subtask 6.2.3 "Climate risk assessment" of WP6 "Implementation in Pilot cases" of the REXUS project. In this task, which is led by DRAXIS, the climate change information is used in combination with other relevant information on exposure and vulnerability for the WEF Nexus sectors, in order to produce the climate risk assessment for the pilot areas.

The Subtask 6.2.3 is strongly linked to many other tasks of the REXUS project. Firstly, the data that was generated in the framework of Task 3.5 "fit-for-Nexus climate projections", were used also in the climate risk assessment analysis. After the finalization of this subtask, the results of the analysis will become available to all partners through the REXUS Observatory platform (Task 3.1). In the latter, the outcomes of the current analysis will be also visualized, in order to guide and enable stakeholders to evaluate the outcomes of different solutions, in the framework of the Task 6.3 "Tailoring solutions to pilots". Additionally, the results will inform the LAA process (Task 2.5 and Task 2.6), as well as the PSDM exercise and scenario development. More specific, the results of the climate risk assessment will be integrated in PSDM through the elaboration of policy and alternative pathways analysis (Task 4.1 and Task 4.2).

This deliverable is structured upon four main chapters. In **Chapter 1** (current chapter), an introduction to the scope and aim of this deliverable is provided along with an overview of the pilot areas. In **Chapter 2**, the methodology and the conceptual framework for carrying out the climate risk assessment is laid out. In **Chapter 3**, the outputs of the climate risk assessment are presented per pilot and discussed. **Chapter 4** summarizes the main findings of the assessment.

Following, an overview of the project pilot areas is provided in relation to the climate risk assessment.

1.1 Pilot areas overview

As shown in Figure 1, five pilot areas have been selected to represent Nexus situations, potentials, and implementation conditions on the European level. Sub-catchments (Pinios river, Greece; Lower Danube River, Romania-Serbia-Bulgaria), tributary catchments (Nima river, Colombia), full catchments (Isonzo-Soča river, Italy/Slovenia), as well as national territory (peninsular Spain), are all included.

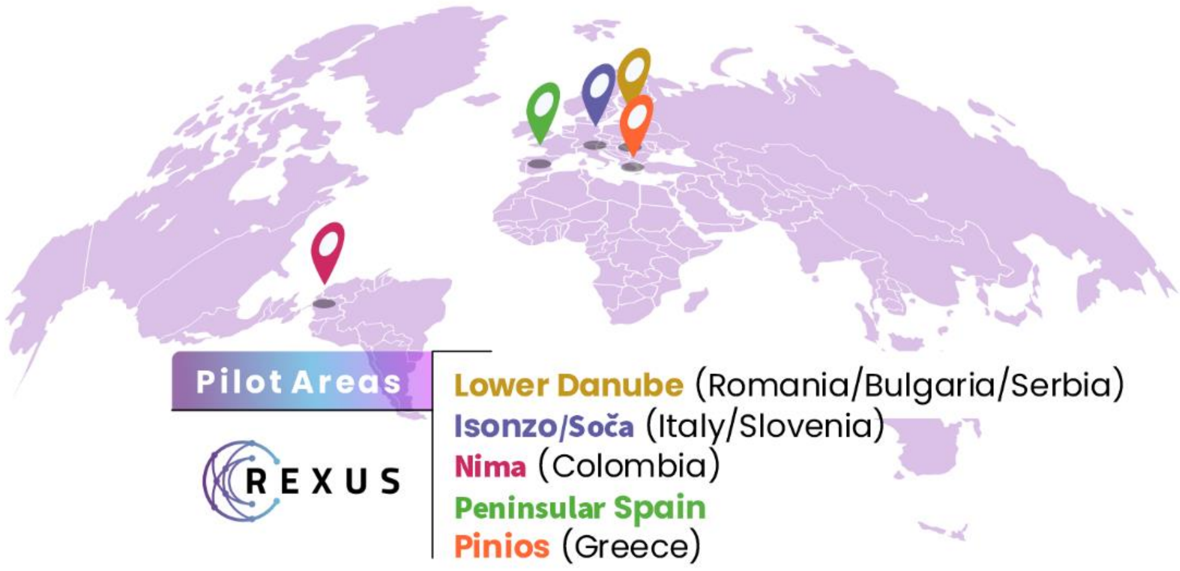

Figure 1: REXUS pilot areas overview

In the table that follows, the countries where the pilots are located as well as the pilot coordinates are provided.

Table 1: Pilot area description by coordinates

Pilot area name	Country	Coordinates
Isonzo-Soča River Basin	Italy-Slovenia	46.6°N, 45.57°N, 12.94°E, 14.37°E
Lower Danube River Basin	Romania, Bulgaria & Serbia	45°N, 43°N, 22°E, 25.7°E
Pinios River Basin	Greece	40.28°N, 38.85°N, 21.02°E, 23.23°E
Peninsular Spain	Spain	44 °N, 35.8°N, 9.5°W, 4.53°E
Nima – Amaime subwatershed	Colombia	3.78°N, 3.44°N,76.44°W, 75.93°W,

1.1.1 Pinios river basin

Pinios river basin is located within the Thessaly river basin District of Central Greece and is composed of two sub-catchments. Pinios River drains the entire watershed of Thessaly, which includes the largest plain in Greece. It is the third-longest river in Greece. On the north and north-western sides of the area, mountains range in height from 1,548m to 2,917m, while there is a flat agricultural land in the central and southern parts of the watershed, where the elevation is below 100 meters and at the coast there is no elevation. Two climate types are identified at the Pinios river basin: continental conditions dominate on the western and central sides, while Mediterranean conditions prevail on the eastern side. During the summer months (June to August), precipitation is rare (Psomas et al., 2016). The highest temperature is observed at the center of the basin where there is arable land and urban areas, while towards the mountains the temperature is significantly lower.

The area's main economic activities include agriculture, tourism, livestock and fisheries. Pinios river basin is one of the most intensively cultivated and productive agricultural regions of Greece, with 51.7% of the area covered by agriculture. Other major land uses include urban areas (2.5%), and forests (45%). Water quality and quantity problems are mainly caused by agricultural activity, which uses 92.8% of the water supply.

The area’s challenges and conflicts are listed below:

Challenges

- Maintain sufficient water quantity and quality.
- Satisfy the needs of all the competitive water users.
- Maintain the environmental flow for ecosystems.
- Adapt to the decreased water availability indicated by the climate change scenarios.
- Deal with climate extremes (mainly droughts, but also floods).
- Maintain or increase renewable resources based on energy production to decrease emissions (transition to the post-lignite era is a critical symbolic target of the Greek state).
- Satisfy the energy needs of several uses (agricultural, industrial, domestic, etc.).
- Maintain the high level of agricultural production of the most productive basin in Greece.

Conflicts

- Water supply and distribution is directly affected by the energy supply.
- Food production is increasing, thus increasing water demand.
- Water availability is vulnerable to climate conditions, water infrastructure risk due to climate extremes.
- High water abstraction may lead to infrastructure destruction.
- Hydroelectric energy production is directly connected to water availability.
- Increasing food production is rising energy demands.
- Climate change can potentially increase water demand, thus energy demand.
- Food production is related to irrigated agriculture and thus to water availability.
- Photovoltaic parks are substituting agricultural land, thus decreasing food production.
- Agriculture, and food production are vulnerable to climate change.
- The air temperature increase may increase physiological stress to the crops and reduce production.

The topography and the land use/land cover of the pilot area are provided in Figure 2 and Figure 3 respectively.

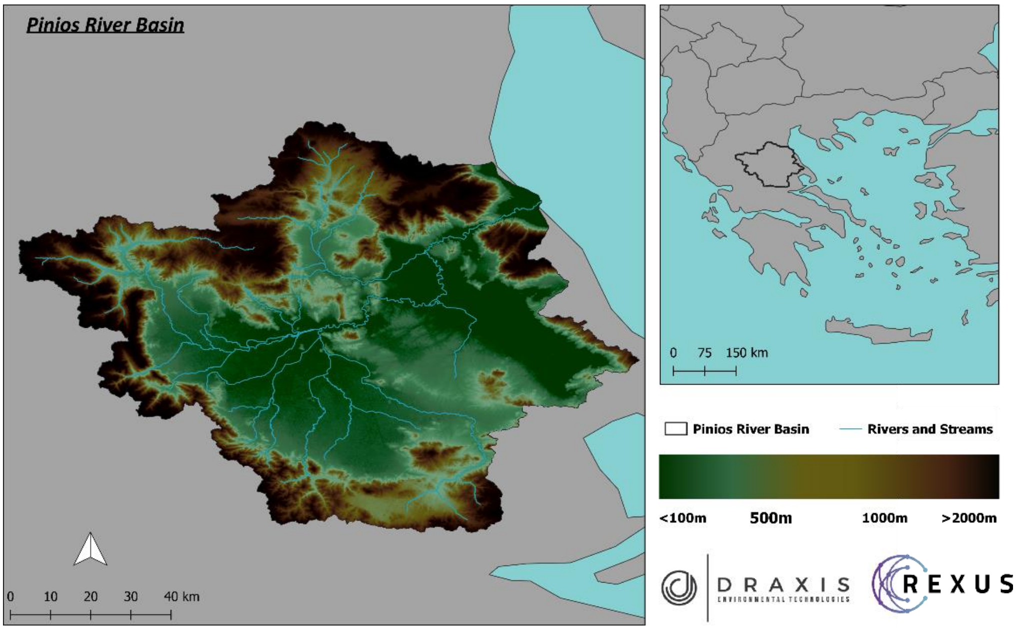

Figure 2: Topographic map of the Pinios river basin

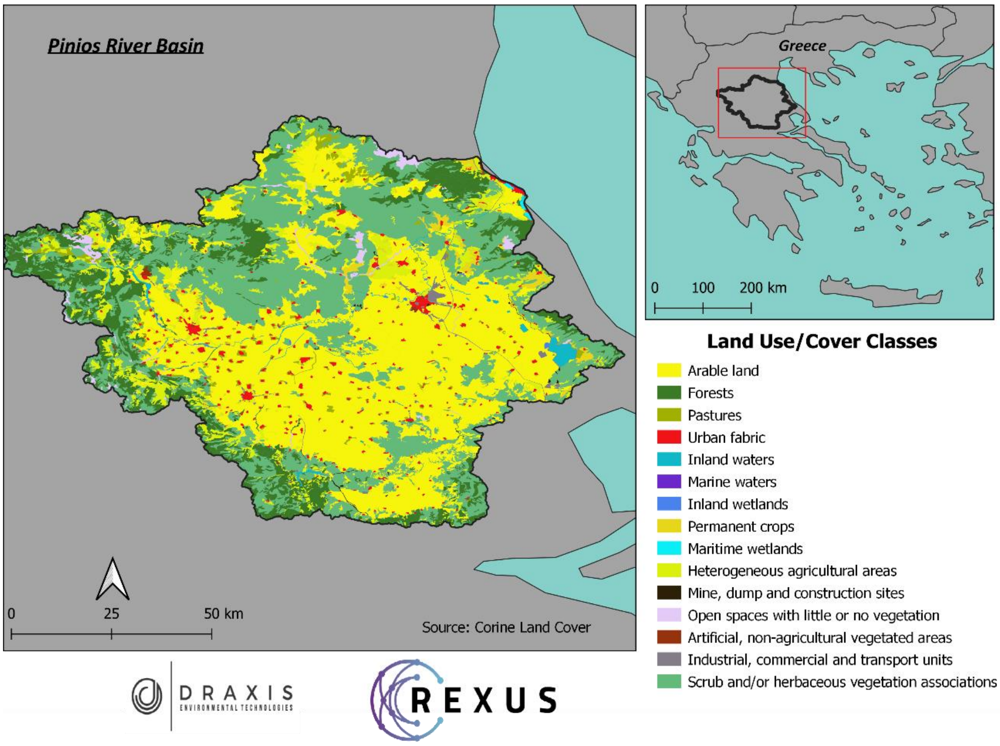

Figure 3: Land use/Land cover map of the Pinios river basin

1.1.2 Peninsular Spain

This pilot area includes the peninsular territory of Spain, the continent's fourth largest country. Spain is located at the south-western part of Europe occupying about 82% of the Iberian Peninsula with a total area of

505,990km^2. The country has lowlands, as well as and large mountain ranges, some of which have high altitudes, such as Mulhacén (3,479m). The country is crossed by five major mountain systems: Pyrenees, which form a natural frontier between Spain and France, Betic Mountain Ranges, along the southern and eastern parts of Spain, the Cantabrian Mountains, across northern Spain, the Meseta Central System, in the center of the peninsula and the Iberian System which extends from the eastern foothills of the Cantabrian Mountains to the Betic System (del Rio et al., 2011). Water resources in Spain are managed by autonomous communities and river basin districts, the latter having the authority for the design, planning, and supervision on the use of these resources. The country has over 1,800 rivers and streams, however only the Tagus is more than 960km long. The major rivers flowing westward through the Meseta Central include the Duero, the Tagus, the Guadiana, and the Guadalquivir rivers (REXUS, 2021). Due to its complex orography and geographic location, Spain has great climatic variability. Interannual climatic variability is high and is conditioned to a great extent, specifically with respect to precipitation, by atmospheric circulation patterns in the Northern hemisphere, in particular by the North Atlantic oscillation (Moreno et al., 2005).

The area's challenges and conflicts are listed below:

Challenge

- Move from comprehensive analysis to implementing exemplary and sustainable practices in Nexus management.
- Link national and regional climate adaptation plans.
- Promote integration in management across regional and watershed boundaries.

Conflicts

- Between regions and watersheds, the main socioeconomic conflict is the inter-basin water transfer.
- Decision making powers are devolved to 17 regional governments, with different geographic distribution than river basins, with shared and overlapping competencies on environmental and water resources.
- Increasing temperatures and decreasing precipitation provoke water stress episodes on crops and lead yields below the threshold of economic profitability.

In Figure 4, there is a topographic map of the area, while Figure 5 shows the land use/land cover of peninsular Spain.

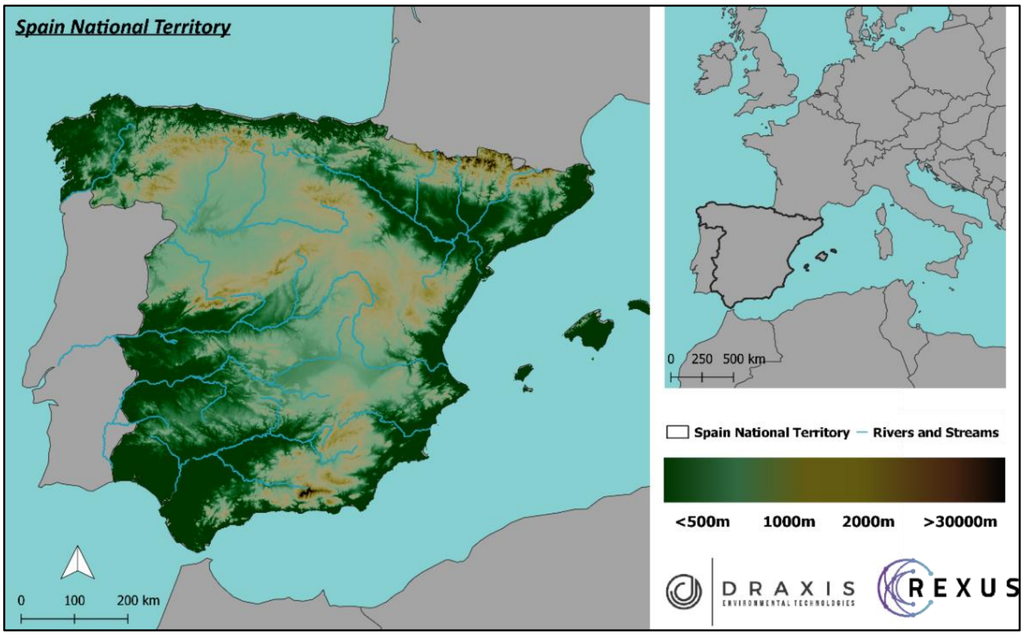

Figure 4: Topographic map of the peninsular Spain

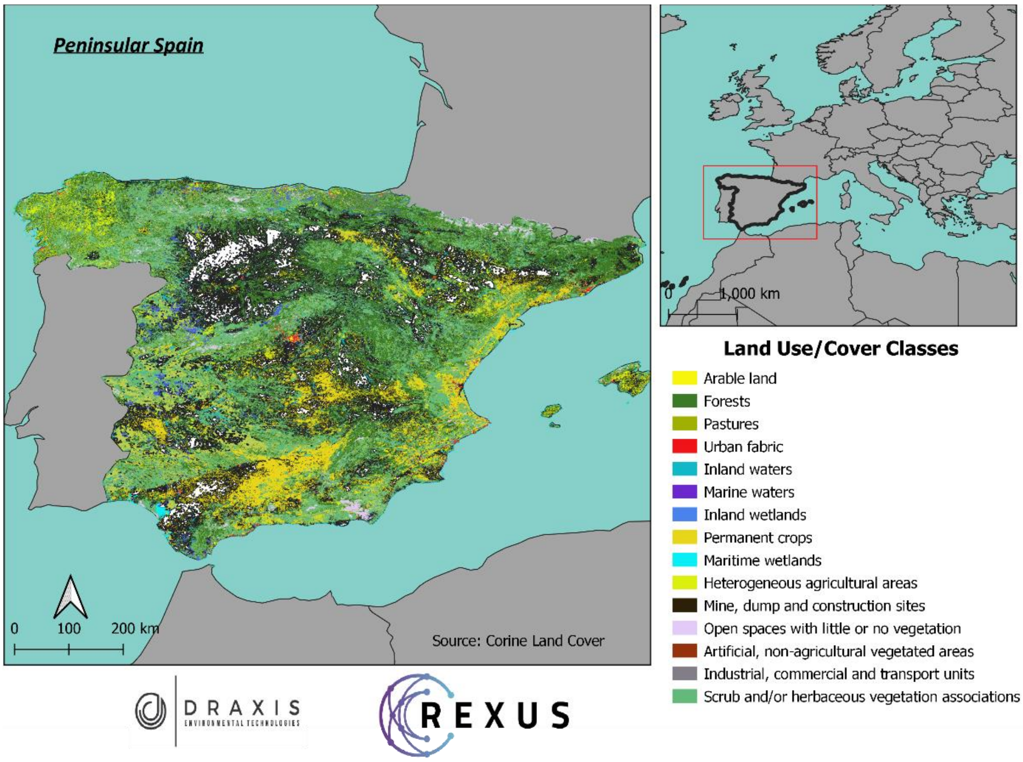

Figure 5: Land use/Land cover map of the peninsular Spain

1.1.3 Lower Danube river basin

After squeezing through the Iron Gates gorge and dams between Serbia and Romania, the Danube river, which is the second-longest river in Europe, flows free for 1,000 kilometres before emptying into the Black Sea. The Lower Danube, which is the study area of this project, is one of the last free flowing stretches of river in Europe. Dependent on this part of the river are not only some of Europe’s greatest natural treasures, but also the 29 million people who live in the Lower Danube River basin – people who directly benefit from the many services that the river provides, from drinking water to natural resources and recreation (WWF, 2012).

The Lower Danube river basin experiences a temperate climate and compared to the other regions of Romania, it experiences the highest temperatures, both in winter and in summer due to its location which is in the south and closer to areas characterized by the Mediterranean climate type. Climate change is expected to further increase flood risk all over the Danube basin, in terms of intensity, duration and frequency of events. There is also a higher possibility of flash flood events during dry periods. However, there is considerable uncertainty in the quantification of future flood events due to shortcomings in the estimation of future precipitation. During the second half of the 20th century, close to three-quarters of the Lower Danube's floodplains were cut off from the main river by dikes and were transformed into agricultural areas, with subsequent impacts on flooding regimes. Specifically, conversion of floodplain forest to agriculture and monoculture hybrid poplar plantations has led to more extreme flood events, such as those in 2002, 2005, 2006, 2009, 2010, 2013 and 2014 (WWF, 2015; Mansourian et al., 2019).

As for the topography of the area, at the northern part, there is a very large part of the Carpathian Mountains, called the Southern Carpathian Mountains, with the highest altitude reaching about 2544 m. The Balkan Mountains border the lower Danubian Plain on the south. Their rounded summits have an average height of 722 m and rise to 2376 m at Mount Botev, the highest peak (Danforth et al., 2021). Figure 6 and Figure 7 show, the topography and location, as well as the land use and land cover of the pilot area.

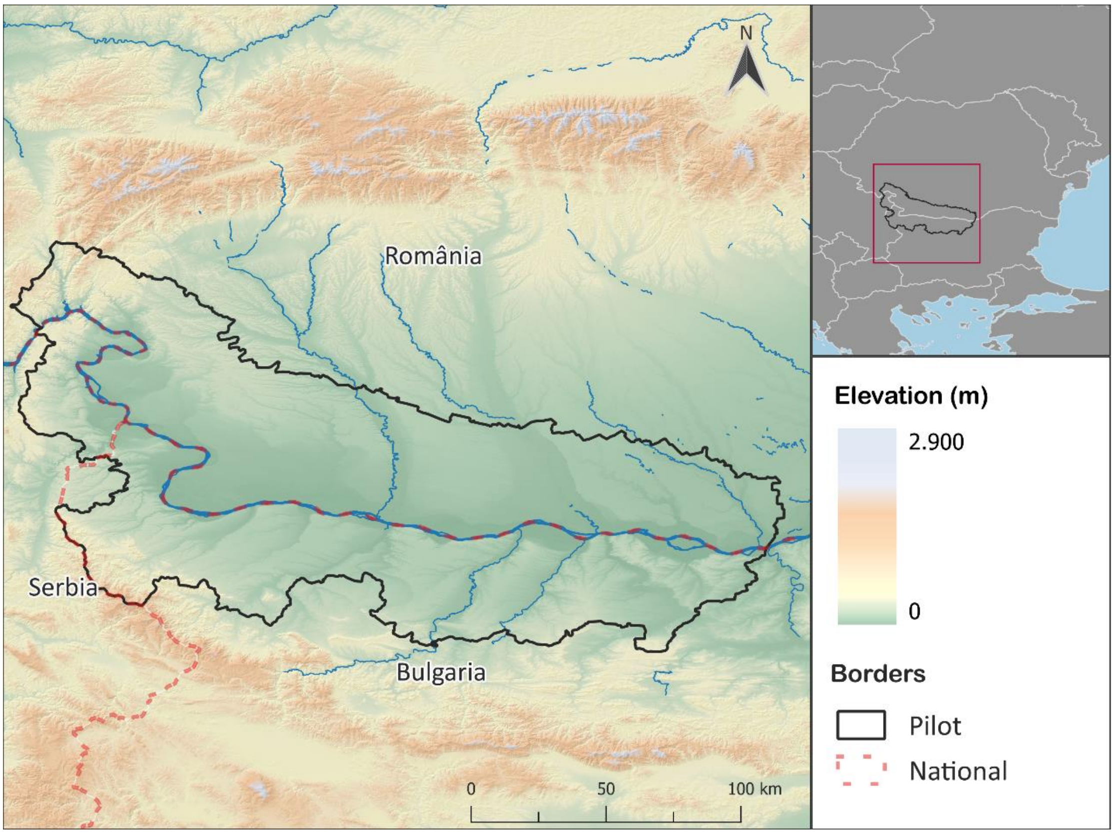

Figure 6: Topographic map of the lower Danube river basin

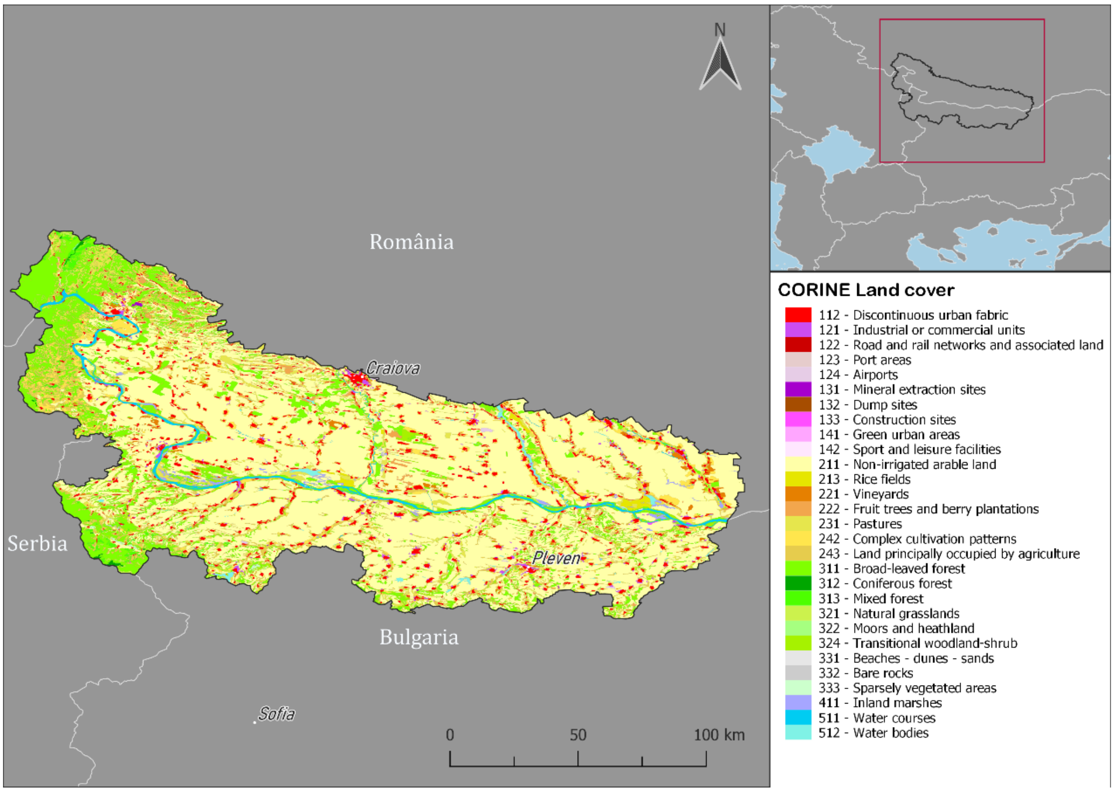

Figure 7: Land-use/land-cover map of Lower Danube river basin

The area's main conflicts and challenges are listed below:

<u>Challenges</u>

- Promote sustainable exploitation which provides a lower degree of financial benefits with the advantage of a smaller impact on the natural environment.
- Protect urban settlements and the broader region from intense flood risk.

<u>Conflicts</u>

- Continuous exploitation of the Danube River stretches resources to the maximum, including for navigation.
- Human interventions have generated high bank erosion processes, floods and droughts. They affect sediment balance and navigation, as well as the existing natural ecosystems and economic activities (agriculture, aquaculture, forestry etc.)
- Urban areas developed on the Danube riverbank are very susceptible to floods and riverbank collapse.

1.1.4 Isonzo-Soča river basin

The Isonzo (in Italian) or Soča (in Slovenian) river originates in the Julian alps in Slovenia and after flowing for 140 km, then empties into the Gulf of Trieste at the Northern Adriatic in Italy near Monfalcone, where it forms a delta that tends, over time, to move from west to east. Its catchment area (~3400km2) consists of mid altitude mountains (70%), a piedmont (22%), and a coastal plain (8%). From the total area of approximately 3400km², about 1150km², are in Italian territory and the rest is Slovenian. The Isonzo-Soča river collects and discharges the waters of the southern side of the Alps Giule, which separate this basin from that of the Sava. It is a fact that, the

Italian portion of the Isonzo-Soča river basin coincides for more than 90%, with the sub-basin of the Torre. The mountainous part of the study area is, of low to moderate altitude with mean elevation about 1030 m (highest point is Triglav - 2860 m). This area is the interface between two Alpine structural units: (i) the Torre and Natisone basins falling within the Julian Pre-alps (Southern Alps) and (ii) the Isonzo-Soča basin in Slovenia which is part of the Julian Alps. Regarding the climate of the Isonzo-Soča river basin, it has a temperate oceanic climate with influences from the Mediterranean, while at the same time it is presented as zoned. The hydrological regime of the Isonzo-Soča river is determined by precipitation, with a dry season in February and July and two precipitation maxima in fall and spring (Siché & Fassetta, 2014).

The area's main conflicts and challenges are listed below:

Challenges

- Understand the status of the actual management plan concerning climate change.
- Find and test the best transboundary solution/best practices to guarantee sustainability.
- Find a transboundary equilibrium between several uses of water (flood/food/energy).
- A complete vision for the basin is urgently needed because climate change could create fractures in the current agreements.

Conflicts

- Flood risk is considerable and the safety of the whole basin depends on the management of large Slovenian dams.
- The main pressures on water resources from both countries are agriculture and hydropower with significant concerns over the impact of climate change.
- A shared framework between Italy and Slovenia for managing the whole basin with specific focus on Nexus issues is critically missing.

In Figure 8 and Figure 9, the topography and location of the pilot area, as well as, the main land uses/land covers are provided.

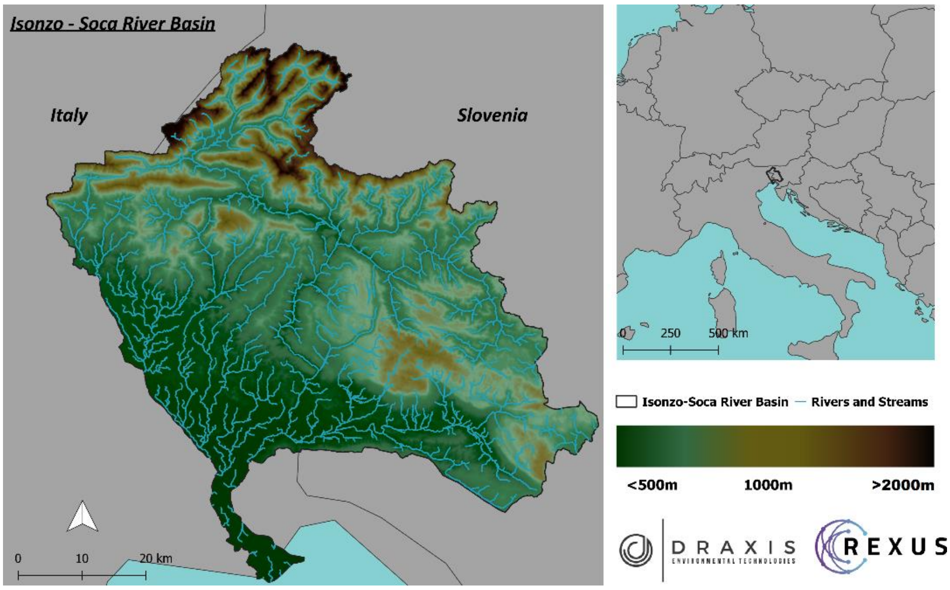

Figure 8: Topographic map of the Isonzo-Soča river basin.

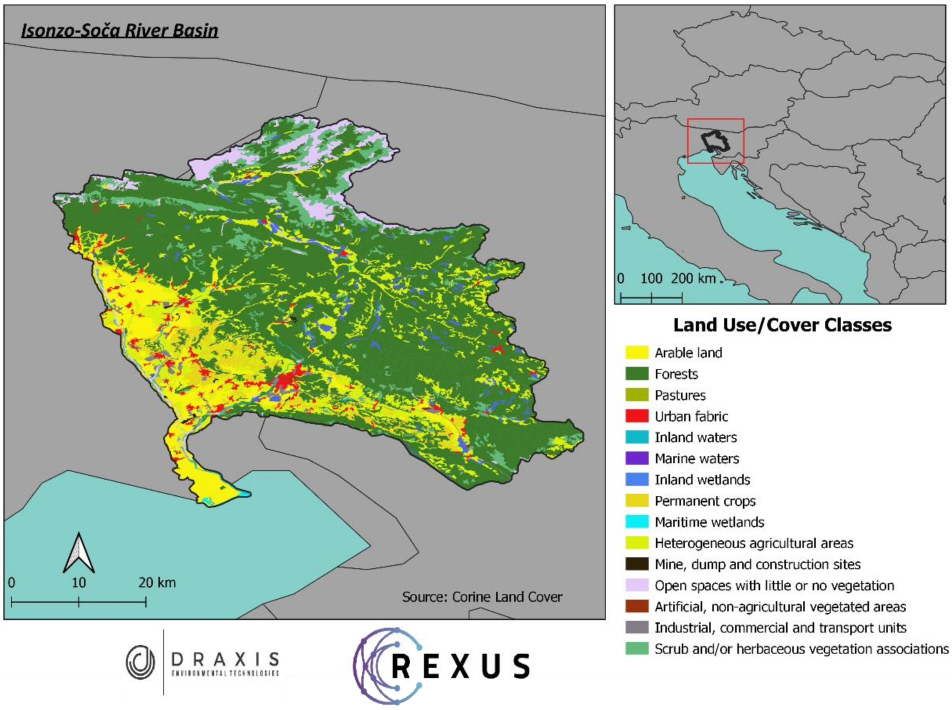

Figure 9: Land use/Land cover map of Isonzo-Soča river basin

1.1.5 Nima-Amaime subwatershed

The Nima river is a tributary of the Amaime river that drains into the Cauca river, one of the most important rivers of Colombia. The Nima-Amaime subwatershed includes nineteen tributary streams which drain into the Nima river and covers an area of 167 km^2, at the southeast of the Department of Cauca Valley. The altitude of the area ranges from 1,050 m up to 4,100 m at the mountains of the Colombian Andes. The Nima-Amaime subwatershed has a bimodal precipitation regime, with few variations, due to the Pacific equatorial current's convergence of the north-easterly and south-easterly winds. This bimodal pattern is characterised by a rainy season from April to June and September to December, separated by dry seasons in January to March and from June to September (Berrío et al., 2002). The climate of the study area is classified as tropical and has a significant amount of precipitation during the year, even for the driest month. The Köppen-Geiger climate classification for the Nima-Amaime subwatershed is Tropical rainforest climate (Af) ("Climate-data.org", n.d.).

The area's challenges and conflicts are listed below:

<u>Challenges</u>

- The sugarcane cropping system is intensive and uses supplemental irrigation during the dry season. There is a need to increase water use efficiency in this system.
- There is a need to explore other crop systems and agricultural management alternatives to reduce the environmental impacts of agriculture in this watershed and efficiently use water sourced by upstream areas.
- The watershed requires more conservation, restoration, and sustainable use to balance hydrological, biophysical, and socioeconomic asymmetries that need to be addressed to maximize the water-related benefits provided by this watershed.
- Incentive mechanisms are required to align land use/management decisions in the watershed to common environmental and socioeconomic goals of actors in this watershed.

- Secure future water supply for the human population and ensure water availability for agriculture and industry (including the hydropower generation industry).

Conflicts

- Basin water is channelled almost entirely downstream where the sugarcane crops are located and this creates a water shortage in the ecosystems that live upstream.
- In the plain, water is largely used for crops and is limited for other users.

In the following maps, the topography and location of the pilot area, as well as the main land uses/land covers are provided.

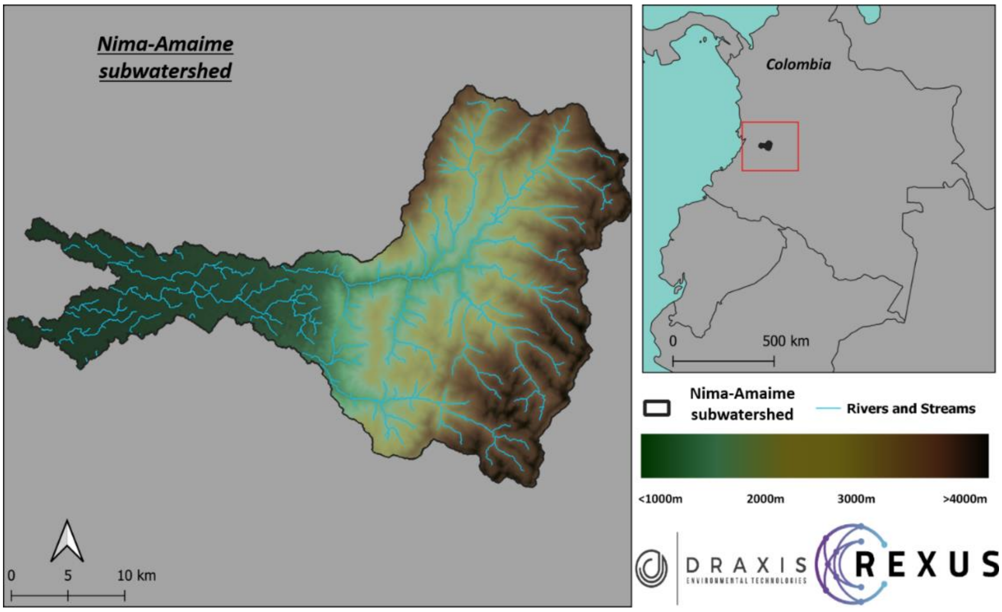

Figure 10: Topographic map of the Nima-Amaime subwatershed study area

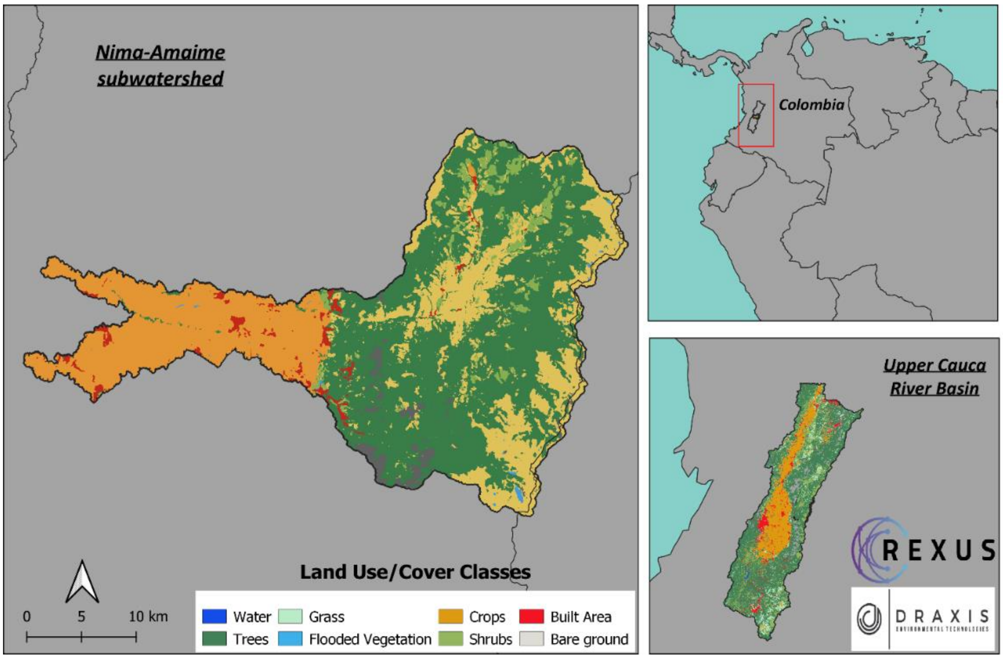

Figure 11: Land use/Land cover map of the Nima-Amaime subwatershed

2. Methodology

2.1 Climate risk assessment

In the framework of the REXUS project, a methodology for the assessment of climate risks on the Water – Energy – Food Nexus was developed based on the conceptual framework set by the Intergovernmental Panel on Climate Change (IPCC). Specifically, risks are assessed as the result of the dynamic interactions between the climate-related hazards with the exposure and vulnerability of the affected systems to the hazards (Reisinger et al., 2020). This relationship can also be expressed through the following qualitative formula.

Risk =f(Hazard, Exposure, Vulnerability)

In the framework of the current assessment, each risk component of the above equation constitutes a composite indicator consisting of one or more sub-indicators. Specifically, a set of hazard indicators is used to reflect the climate related hazards for the WEF systems (e.g., heat stress, floods, aridity) based on the climate projections for the relevant climate variables. For estimating the exposure of elements in an area where hazard events might occur (IPCC, 2018), geospatial data on the exposed elements (e.g., crops, renewable energy plants) are used as indicators. For assessing vulnerability in relation to the propensity of the exposed elements and systems to suffer adverse effects when impacted by hazard events (IPCC, 2018), several socio-economic indicators were used (e.g., agricultural income) as well as indicators that reflect the level of existing stress of the WEF systems (e.g., water exploitation index, energy import dependency).

Once the climate risk is estimated, adaptive capacity is evaluated based on the methodology proposed by World Bank (The World Bank, 2021). Specifically, for assessing adaptive capacity, the institutional capacity and the larger economic and social context are taken into account for assessing how these may influence the level of risk.

The formulation of the indicators includes the stages of normalization, weighting and aggregation. In the normalization stage, the values of indicators expressed in different measurement units are adjusted to a common scale, in order to be comparable. The normalization scale is set within the numerical range 0-5 with the different values expressing five different risk levels ranging from low to high, as shown in Table 2. It is noted that in the case of the hazard sub-indicators, negative values are also used where a climate trend turns to have beneficial effect for the WEF system under examination (e.g., increase in the number of days with temperature conditions suitable for crop growth).

Table 2: Rating scale of risk indicators

Qualitative scale	Numerical scale
Low	**0 < Risk ≤1**
Low to Medium	**1 < Risk ≤2**
Medium	**2 < Risk ≤ 3**
Medium to High	**3 < Risk ≤ 4**
High	**4 < Risk ≤ 5**

The indicators were normalized and rescaled to the new range [0-5]**,** by applying the min-max method (OECD 2008) according to the following formula.

$$x' = a + \frac{(x - \min(x))(b - a)}{\max(x) - \min(x)} \quad (1)$$

where x' is the normalized value, x the original value and a, b are respectively the minimum and maximum values of the selected new range.

The weighting stage includes the assignment of weights to the variables in order to express the contribution and the relevant importance of the individual risk components and of their sub-indicators in the composite risk index. For the aggregation of the risk components, it was considered appropriate to select the geometric aggregation method (OECD, 2008), according to which each sub-indicator is raised to its weight and then multiplied with the other indicators, to form the composite indicator, as shown in the following formula:

$$R = \prod_{q=1}^{Q} C_R^w \quad (2)$$

where R is the composite risk indicator, C_R the individual risk components (i.e. hazard, exposure, vulnerability), Q the number of indicators comprising the composite indicator (i.e. 3) and w the weight assigned to each risk component. The sum of the weights for all risk components equals to 1. This method was selected as, based on the conceptual framework of IPCC (2014), there is no compensability in the performance of the risk components, i.e. a zero exposure of elements cannot be compensated for by a high hazard.

$$R = H^a \cdot E^b \cdot V^c \quad (3)$$

where H stands for the hazard component, E for exposure and V for vulnerability, while a, b and c are the weights, which are set to 0.6, 0.25 and 0.15 respectively for the current assessment.

For the aggregation of the risk component sub-indicators, it was considered more appropriate to apply a method which allows for compensability. This is achieved with the linear, or else, *weighted arithmetic aggregation method* (OECD 2008), which is recommended also in the Vulnerability Sourcebook of GIZ (Fritzsche et al., 2014). According to this method, individual indicators are multiplied by their weights and then summed to form the composite indicator, as indicated in the following formula:

$$C_R = \sum_{q=1}^{Q} w \cdot I_C \quad (4)$$

where C_R is the composite risk component, I_C the individual sub-indicators of the risk components (i.e. heat stress, frost), Q the number of sub-indicators comprising the composite risk component (i.e. 3) and w the weight assigned to each sub-indicator. The sum of the weights for all sub-indicators equals to 1. In the current assessment, equal weights are assigned to each-sub-indicator.

For each WEF system, a set of hazard, exposure and vulnerability indicators is employed to assess risk, with clear interconnections between the systems reflecting the Nexus dependencies. In particular, some of the indicators are used for the assessment of more than one systems so as to effectively take into account the WEF Nexus. For the assessment of risk for the water system, hydrological indicators and indicators related to water consumption are used. For the food system, indicators related to crop growth, cultivated areas and agricultural income are used. The crops examined in the framework of this assessment are indicated by the pilot partners as main crops of high importance for each pilot and are presented in Table 3. Finally, for the energy system, indicators related to renewable energy production as well as energy crop production, are used.

Table 3: Main crops examined for each pilot area.

Pinios river basin	Peninsular Spain	Lower Danube river basin	Isonzo-Soča river basin
Oilseed rape	Maize	Wheat	Green Maize
Cotton	Barley	Maize	Cereals
Wheat	Wheat	Sunflower	Vineyard
	Olives		

In the following figure, the indicators used for the climate risk assessment of each WEF system are presented per hazard component. The Nexus WEF interconnections are represented with different colours related to each system.

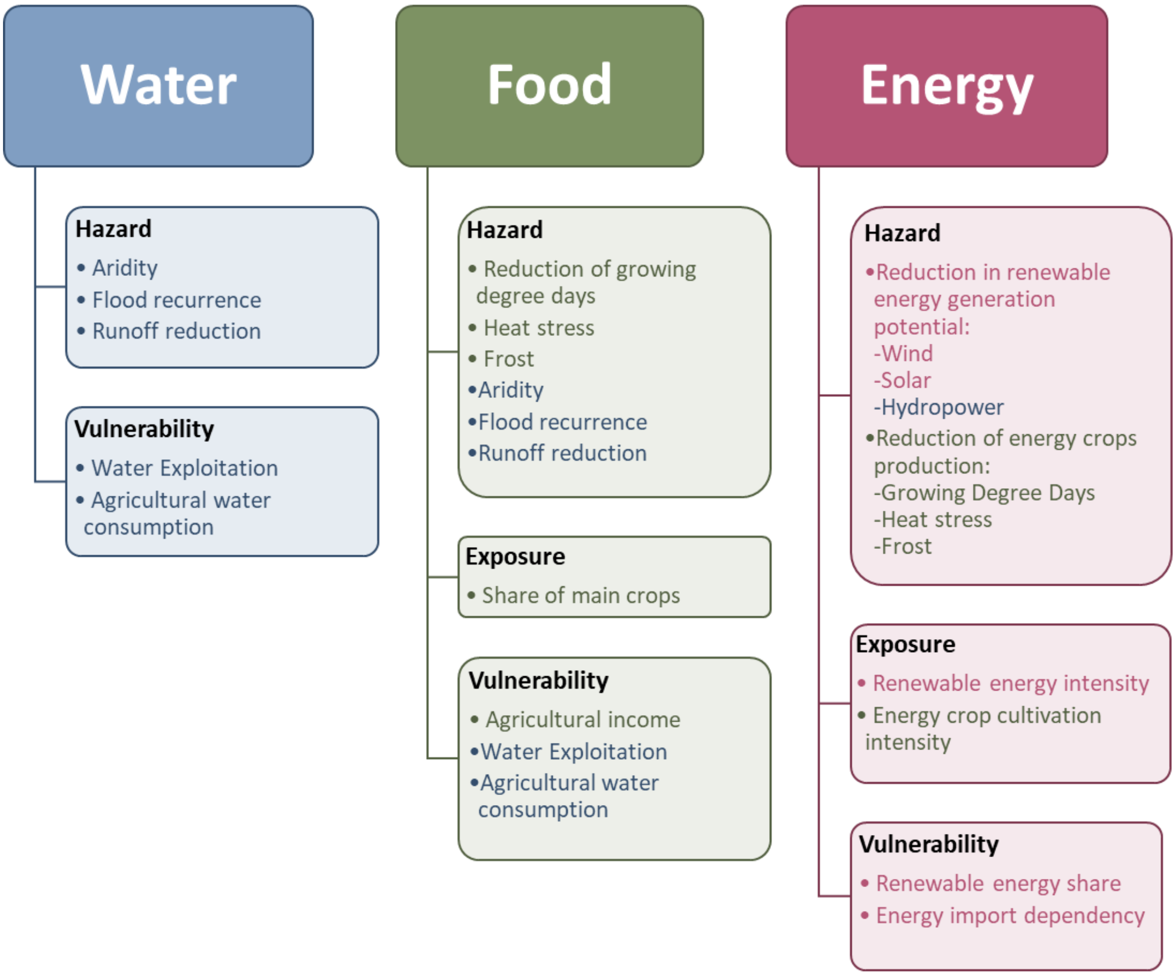

Figure 12: Climate risk indicators per WEF system and their Nexus interconnections

The individual risk components, their sub-indicators and the methodology for calculating them are presented in more detail below.

2.2 Assessment of hazard

The data used in order to generate the hazard indicators, are retrieved from the Copernicus Climate Change Service (C3S, 2019). These datasets are products that have been estimated using a range of algorithms and models. The relevant datasets are presented next:

- CORDEX regional climate model data
- Downscaled bioclimatic indicators
- Global bioclimatic indicators
- Hydrology-related climate impact indicators dataset
- Climate and energy indicators for Europe

The temporal and spatial resolution as well as the spatial coverage differs among the available products, fact which played an important role in the selection of the datasets for the present study. It is worth noting that the critical values of the climate indicators provided by some of the aforementioned datasets are predetermined, however, in the cases that this was possible, the indicators were calculated based on the case-specific critical values with the use of raw data and so the thresholds reflect the areas' unique characteristics. Following, more information with respect to the datasets and products used, is provided.

The CORDEX dataset provides Regional Climate Model (RCM) data from a number of experiments, models, domains, resolutions, ensemble members, time frequencies and periods computed over several regional domains all over the world in the framework of the Coordinated Regional Climate Downscaling Experiment (CORDEX). High-resolution RCMs can provide climate change information on regional and local scales in relatively fine detail, which cannot be obtained from coarse scale Global Climate Models (GCMs) (ECMWF, 2019). In the framework of this report, data for the following variables were retrieved: minimum temperature, maximum temperature and total precipitation. The spatial resolution of these data is 12.5 x 12.5km and the temporal resolution is daily, for the reference period 1986-2005 and for the future period 2031-2090.

The hydrology-related climate impact indicators are fundamental for a wide range of users that study not only the water sector but also the other WEF Nexus systems. These indicators have been estimated using different models, however for the current study, the E-HYPEgrid model was selected (Berg et al., 2021). As input data, the aforementioned models consider an ensemble of EURO-CORDEX for the variables of daily mean temperature and precipitation that were further bias-adjusted using EFAS-Meteo and a new bias adjustment method developed and applied by the Swedish Meteorological and Hydrological Institute (SMHI). The dataset includes a set of water-related climate impact indicators and for the purposes of REXUS project, the variables of actual aridity, flood recurrence and mean runoff were selected. The data covered both the reference period 1971-2000 and the future period 2011-2100 as well as on an ensemble of hydrological models at grid scale (Berg et al., 2021). Finally, the spatial resolution of the datasets is 5km x 5km.

The downscaled bioclimatic indicators dataset provides bioclimatic indicators based on CMIP5 climate projections for selected regions, such as Europe. Using a statistical downscaling methodology that takes into account the relationship between orography and climate state variables, the indicators have been downscaled to 1 x 1 km resolution. Furthermore, the data have been bias-adjusted against ERA5 reanalysis data (Eline Vanuytrecht et al., 2019). In the present study, the data for the Growing degree days indicator is used from this dataset. The temporal resolution of the indicator is 20-year average values for the reference period 1990-2009 and for the future period 2031-2090.

The global bioclimatic indicators dataset provides a global complete set of bioclimatic indicators derived from CMIP5 climate projections at a resolution of 50 x 50km. These bioclimatic indicators describe how climate affects ecosystems, the services they deliver and nature's biodiversity. The dataset contains essential climate variables, which have been calculated based on daily or monthly CMIP5 climate projections from 10 different Global Climate Models and the data have been additionally bias-corrected against ERA5 reanalysis data. In the current report this dataset is used to retrieve the data for the indicators Growing degree days and Frost days, for the Nima pilot in South America.

The climate and energy indicators dataset provides climate-related renewable energy indicators for Europe at national, regional and grid (approximately 30x30 km) level for most European countries. The spatial aggregation of data over land uses the Eurostat NUTS0 & NUTS2 (Nomenclature des unités territoriales statistiques, 2016) regions. Data is provided for the European domain, in a multi-variable, multi-timescale view of the climate and energy systems. This is useful for assessing important climate-driven changes in the energy sector, through either long-term planning or medium-term operational activities. For the current report, the variables that are retrieved from this dataset are the wind power generation, the solar photovoltaic power generation and the hydropower generation, for the reference period 1986-2005, as well as for the future period 2031-2090. In this dataset, reference climate variables are produced using the CORDEX experiment for European regional climate modelling. Energy variables are generated by transforming the climate variables using a combination of statistical models and physically based data. A comprehensive set of measured energy supply and demand data has been collected from various sources such as the European Network of Transmission System Operators. These data provide a crucial reference to assess the robustness of the models used to convert climate into electric energy variables.

It is important to mention that there is a variety of uncertainty sources in climate projections, such as, model uncertainty, sampling uncertainty and scenario uncertainty. Sampling uncertainty practically entails the uncertainties in statistics due to limited data while model uncertainty refers to low resolution of available spatial data, incorrectly simulating features of the climate system. Scenario uncertainty is the imperfect knowledge about the socio-economic and technological developments in the future, resulting in different emissions causing the emission of greenhouse gasses and the natural variability or internal variability of the climate system (e.g., solar intensity, volcanic eruptions, El Niño/La Niña) (Tebaldi & Knutti, 2007). In the present study, to address the uncertainty due to climate model selection, an ensemble of climate models is utilized, as the ensemble average usually tends to perform better than individual model runs (Wilcke & Bärring, 2016; IPCC, 2007; Reifen et al., 2009). The models that compose the ensemble, for each indicator are different as presented in Table 4.

Table 4: List of models composing the ensemble for each indicator.

MODELS		HAZARD INDICATORS									
Global Climate model	Regional Climate model	Growing Degree Days	Heat Stress Days	Frost Days	Aridity Index	Heavy Precipitation Days	Flood Recurrence	Mean Runoff	Hydropower	Solar photovoltaic power	Wind power
ICHEC-EC-EARTH	KNMI-RACMO22E		✓	✓		✓					
MPI-M-MPI-ESM-LR	CLMcom-CLM-CCLM4-8-17		✓	✓		✓				✓	✓

MODELS		HAZARD INDICATORS									
Global Climate model	Regional Climate model	Growing Degree Days	Heat Stress Days	Frost Days	Aridity Index	Heavy Precipitation Days	Flood Recurrence	Mean Runoff	Hydropower	Solar photovoltaic power	Wind power
MPI-M-MPI-ESM-LR	MPI-CSC-REMO2009		✓	✓	✓	✓	✓	✓			
NCC-NorESM1-M	DMI-HIRHAM5		✓	✓		✓					
IPSL-CM5A-MR	–	✓									
HIRHAM5	EC-EARTH								✓		

In the present analysis, two climate scenarios are examined for the assessment of hazard, the Representative Concentration Pathways (RCP) 4.5 and the 8.5, in accordance with REXUS Deliverable 3.9 “Fit-for-Nexus Climate projections”. Specifically,

- RCP4.5 is a scenario that assumes stabilization of radiative forcing at 4.5 W/m2 in the year 2100 without ever exceeding that value (intermediate scenario).
- RCP8.5 assumes that radiative forcing will exceed 8.5 W/m2 by 2100 and will continue to rise for some amount of time (high emissions scenario).

The assessment is carried out for the period 2031-2090 in comparison to the reference period. In the following sections, the selected sub-indicators for the assessment of hazard for the Food, Water and Energy Nexus systems are presented in detail.

2.2.1 Water system

For the assessment of hazards for the Water system, four indicators were employed:

- Aridity
- Heavy precipitation
- Flood recurrence
- Mean runoff

The hazard indicators are presented in more detail next.

Aridity

Aridity is calculated as the annual mean values of the ratio between actual evapotranspiration and precipitation over a 30-year period, therefore it is dimensionless. Actual evapotranspiration is the modelled evapotranspiration computed only with available water.

$$Aridity = \frac{Actual\ evapotranspiration}{Precipitation} \tag{6}$$

The aridity index values have been normalized to values shown in Table 5, from hyper-arid to hyper-humid (Cherlet et al., 2018; Colantoni et al., 2015).

Table 5: Climate classification based on the Aridity Index (Middleton and Thomas, 1997)

Aridity index values (AI)	Climate classification
AI < 0.05	Hyper-arid
0.05< AI <0.2	Arid
0.2< AI <0.5	Semi-arid
0.5< AI <0.65	Dry sub-humid
0.65< AI <0.75	Humid
AI > 0.75	Hyper-humid

Coverage: Global
Temporal coverage: From 1970 to 2100
Spatial resolution: 5km x 5km
Temporal aggregation: Seasonal
Data availability: predefined indicator
Dataset: Hydrology-related climate impact indicators dataset (Berg et al., 2021)

Heavy Precipitation

The indicator "Heavy precipitation" provides information regarding the changes in the frequency and magnitude of extreme precipitation events, which may lead to runoff losses, as well as to crop damages. The indicator sums the number of days per ten consecutive days with heavy precipitation. Heavy precipitation days are defined as the days where the total daily precipitation is above a given threshold, which is defined by the pilot partners, based on the specific conditions characterizing the pilot area. This threshold was set to 30mm for all the pilot areas, except of lower Danube river basin where the threshold was set to 20mm.

Coverage: Europe
Temporal coverage: 1986-2005 (reference period) – 2031-2090 (future period)
Spatial resolution: 12.5km x 12.5km
Temporal aggregation: Days per year averaged per 20-year period
Data availability: Calculated using the specific thresholds provided by the REXUS pilot partners
Dataset: CORDEX dataset

Flood Recurrence

The Flood recurrence indicator is the return value of annual maximum river discharge (mm/year). The indicator is using a Gumbel distribution to estimate the return vales, RV, for a given return period, T, based on annual maxima of river discharge, Q:

$$RV = \mu_Q - \frac{\sqrt{6}}{\pi}\left(0.5772 + \log\left(\log\left(\frac{T}{T-1}\right)\right)\right) * \sigma_Q \quad (7)$$

Coverage: Europe

Temporal coverage: From 1971 to 2100
Spatial resolution: 5km x 5km
Temporal aggregation: Monthly
Data availability: predefined indicator
Dataset: Hydrology-related climate impact indicators dataset (Berg et al., 2021)

Mean runoff

The Mean runoff indicator is defined as the sum of surface and subsurface runoff to streams for each grid cell with spatial resolution of 5km x 5km. The mean runoff indicator is estimated as the annual mean values of daily runoff averaged over a 30-year period.

Coverage: Europe
Temporal coverage: From 1970 to 2100
Spatial resolution: 5km x 5km
Temporal aggregation: Monthly, annual
Data availability: predefined indicator
Dataset: Hydrology-related climate impact indicators dataset (Berg et al., 2021)

2.2.2 Food system

For the assessment of hazards for the Food system, three indicators were employed:

- Growing Degree Days
- Heat stress
- Frost

The hazard indicators are presented in more detail next.

Growing degree days (GDD)

The indicator "Growing degree days" (GDD) is used to estimate crop growth based on heat accumulation and is calculated as the sum of daily degrees above the daily mean temperature of 5°C. The optimal base temperatures are usually defined experimentally based on the life cycle of the plants, while a common baseline for crops is 5 °C (Tbase).

$$GDD = \int (T(t) - T_{base})dt \quad (5)$$

where integration is over the time with T(t) > Tbase.

Coverage: Europe
Temporal coverage: 1986-2005 (reference period) – 2031-2090 (future period)
Spatial resolution: 1km x 1km
Temporal aggregation: 20-year average
Data availability: predefined indicator
Dataset title: Downscaled bioclimatic indicators (Vanuytrecht et al., 2019)

Heat stress

The indicator "Heat stress" is crucial for agriculture as it provides essential information regarding the occurrence of crop stress related to the exposure of the crop to extreme temperature, which can be detrimental for crop growth. The indicator is defined as the sum of the days where the maximum daily temperature is above a given threshold, thus reflecting the specific tolerance of each crop to heat stress. In the framework of the current assessment, the pilot leaders were asked to select 3-4 main crops of high importance for each pilot area, as well as the respective temperature thresholds for each crop.

Coverage: Europe
Temporal coverage: 1986-2005 (reference period) – 2031-2090 (future period)
Spatial resolution: 12.5km x 12.5km
Temporal aggregation: Days per year averaged per 20-year period
Data availability: Calculated using the specific thresholds provided by the REXUS pilot leaders
Dataset: CORDEX regional climate model data (ECMWF, 2019) –daily maximum temperature

Frost

The indicator "Frost" shows the number of days when the minimum daily temperature is below 0°C. This indicator is crucial as the damage caused by frost is considered as one of the most important economically harmful weather-related phenomena in the agricultural sector (Snyder & De Melo-Abreu, 2005).

Coverage: Europe
Temporal coverage: 1986-2005 (reference period) – 2031-2090 (future period)
Spatial resolution: 12.5km x 12.5km
Temporal aggregation: Days per year averaged per 20-year period
Data availability: Calculated using the daily minimum temperature data
Dataset: Dataset: CORDEX regional climate model data (ECMWF, 2019) –daily minimum temperature

2.2.3 Energy system

For the assessment of hazards for the Energy system, three indicators were employed:

- Hydropower generation
- Solar photovoltaic power generation
- Wind power generation

The hazard indicators are presented in more detail next.

Hydropower generation

The indicator Hydropower generation is calculated for run-of-river units and for reservoirs. Individual models were built for the calculation of this indicator using Random Forest Models, and ERA5 data as climate inputs, as national averages. The models are built using data from the ENSTO-E Transparency Platform, over the period 2015–2019. The indicator is provided in daily energy units (MWh). This indicator was not available for all EU countries.

Coverage: Europe
Temporal coverage: 1986-2005 (reference period) – 2031-2090 (future period)
Spatial resolution: country level

Temporal aggregation: annual
Data availability: predefined indicator
Dataset: Climate and energy indicators for Europe (Troccoli, 2020).

Solar photovoltaic power generation

The Solar PhotoVoltaic (SPV) power capacity factor is defined as the ratio of actual generation over installed capacity, i.e. the sum of the peak capacity of all PhotoVoltaics (PV) systems installed in the region of interest. The indicator is dimensionless and is calculated at grid point level. It is important to highlight that this quantity does not represent the power production of a single PV system. Instead, it is designed to represent the aggregated production of the PV plant installed in each pixel. For this purpose, the power production of a PV system is calculated from the meteorological data (Global Horizontal Irradiance and mean temperature) for different module orientations taking a reference PV plant model and using empirical models of the main parts of a PV system. These different power values are then aggregated assuming a distribution of the different module orientations for the considered location (Troccoli, 2020; Saint-Drenan 2018).

Coverage: Europe
Temporal coverage: 1986-2005 (reference period) – 2031-2090 (future period)
Spatial resolution: about 28km x 28km
Temporal aggregation: Days per year averaged per 20-year period
Data availability: predefined indicator
Dataset: Climate and energy indicators for Europe (Troccoli, 2020).

Wind power generation

The Wind Power capacity factor, defined as the ratio of actual generation over installed capacity, is calculated at grid point level, considering one single wind turbine type. It is assumed that one turbine is located at each grid point, the turbine type depending only on the grid point type (land or ocean). All turbines are assumed to have a hub height of 100 m. The original EURO-CORDEX simulations of the needed input variables are retrieved from the producers and are subsequently bias adjusted by applying the Cumulative Distribution Function transform (CDFt) method (Troccoli, 2020).

Coverage: Europe
Temporal coverage: 1986-2005 (reference period) – 2031-2090 (future period)
Spatial resolution: about 28km x 28km
Temporal aggregation: Days per year averaged per 20-year period
Data availability: predefined indicator
Dataset: Climate and energy indicators for Europe (Troccoli, 2020).

2.3 Assessment of exposure

In this section, the selected exposure sub-indicators for the Food, Water and Energy Nexus systems are presented.

2.3.1 Water system

For the case of the Water system, no exposure indicator was taken into account since the management of water resources takes place at River Basin level. Therefore, the risk assessment is also examined at river basin level, in contrast to the other Nexus systems (Food, Energy) which are examined at administrative level (local, regional or national level).

2.3.2 Food system

The selected exposure indicator for the Food system is related to the share of the area cultivated with the main crops, as presented in more detail next.

Share of main crops

This indicator aims to show the actual exposure of the main crops of the pilot area to climate change through their share of the area cultivated with the main crops to the total municipality area, as shown next. The indicator is calculated at municipality or other relevant administrative unit level.

$$Share\ of\ main\ crops = \frac{Area\ cultivated\ with\ the\ main\ crops\ (km^2)}{Total\ area\ of\ the\ municipality\ (km^2)} \tag{8}$$

The source used for this indicator is the CORINE Land Cover maps (CLC 2018) provided by the Copernicus Land Monitoring Service, while for the case of the Greek pilot, more detailed, crop-specific data at land parcel level were provided by the pilot through the Greek Payment Authority of Common Agricultural Policy (C.A.P.) Aid Schemes (OPEKEPE).

2.3.3 Energy system

The exposure indicators for the Energy system are related to (i) the renewable energy intensity and (ii) the energy crop cultivation intensity, which are presented in more detail next.

Renewable energy intensity

This indicator aims to show the exposure of the renewable energy generation of the pilot area to climate change through the intensity of the installed renewable energy capacity at the pilot area, expressed in MW/km^2, as shown in Eq.8. The indicator is differentiated based on the type of renewable energy (i.e. solar, wind, hydro).

$$Renewable\ energy\ intensity = \frac{Renewable\ energy\ capacity\ (MW)}{Pilot\ area\ (km^2)} \tag{9}$$

To evaluate this indicator, the renewable energy intensity of the pilot area is compared to the respective national renewable energy intensity. If the renewable energy intensity of the pilot is lower compared to the national intensity, then the exposure is low, while if the renewable energy intensity of the pilot is higher than the national one, the exposure is high.

For the case of Spain, this indicator was calculated separately for each Province (NUTS3) of peninsular Spain, which is the second-level territorial and administrative division of Spain. The source used for this indicator is the Global Power Plant Database (World Resources Institute, 2021), while for the case of the Greek pilot, the Power plant database provided by the national Regulatory Authority for Energy of Greece was more populated.

Energy crop cultivation intensity

This indicator aims to reflect the exposure of the energy crops cultivated at the pilot area to climate change through the share of pilot area cultivated with energy crops in the total cultivated area of the pilot, as shown in Eq.9.

$$Energy\ crop\ cultivation\ intensity = \frac{Energy\ crop\ cultivation\ area\ (km^2)}{Total\ cultivated\ area\ (km^2)} \tag{10}$$

To evaluate this indicator, the energy crop cultivation intensity of the pilot area is compared to the respective national intensity. If the energy crop cultivation intensity of the pilot is lower compared to the national intensity, then the exposure is low, while if the energy crop cultivation intensity of the pilot is higher than the national one, the exposure is high.

The source used for this indicator is the Eurostat database which provides information ate the cultivated areas at regional and municipal level, while for the case of the Greek pilot, more detailed, crop-specific data were directly sourced from the National Statistical Authority of Greece (ELSTAT, 2019).

2.4 Assessment of vulnerability

In this section, the selected vulnerability sub-indicators for the Food, Water and Energy Nexus systems are presented.

2.4.1 Water system

For the assessment of the vulnerability of the Water system, two indicators were employed: (i) the Water Exploitation Index (WEI) and (ii) the Agricultural water consumption. The first indicator, WEI, is used both in the assessment of risks for the Water and Food systems, while the second indicator is used only in the assessment of risks for the Food system.

An indicator on the water use for hydropower generation in reservoirs was also considered to be used, however it was decided that since this is not a consumptive use, i.e. restricting water use in other sectors, should not be considered a vulnerability indicator.

Detailed information on the selected indicators is provided next.

Water Exploitation

The water exploitation index serves as a proxy for water stress on socio-economic systems and ecosystems, by providing indication of how the total water demand puts pressure on the water resource. The higher the water stress, the higher the vulnerability of water resources to a reduction in water availability due to climate change. The index is calculated as the ratio of water use to total water resources.

$$WEI = \frac{Water\ use}{Available\ freshwater\ resources} \tag{12}$$

For the numerator, the Eurostat dataset on water use from all NACE activities and households is used, while for the denominator, the Eurostat dataset on freshwater resources is used. Specifically, the available freshwater resources are calculated based on the following equation.

$$Available\ freshwater\ resources = External\ inflow + Precipitation - Actual\ evapotranspiration$$

Values above 20 % indicate that water resources are under water stress, and values above 40 % indicate that water stress is severe and the use of freshwater resources is clearly unsustainable (Raskin et al., 1997). For this assessment, the following threshold values/ranges have been used: (a) no stress < 10%; (b) low stress 10 to < 20%; (c) stress 20% to < 40%; and (d) severe water stress ≥ 40%.

The indicator is estimated at a river basin district level based on the data provided at an annual time frequency. For our analysis a 5-year average of the most recent data was used. In the cases that there were no data available at river basin district level (Romania, Serbia), the respective national figures were used. In the case of the Thessaly river basin district in Greece where there were missing data in Eurostat datasets, the respective data were sourced directly from the River Basin Management Plan of Thessaly (Special Secretary for Water, 2014).

Agricultural water consumption

Water plays a crucial role in food production and agriculture in general. The intensity of water use in agriculture in relation to the water use in the other sectors (industry, services, households) is considered a proxy of the vulnerability of the food sector in relation to water and climate, as the higher the share of water consumption in agriculture, the highest the vulnerability of the food system to a reduction in water availability due to climate change. This indicator is estimated at river basin district level based on the data provided by Eurostat (2022) on water use from public water supply. The data are provided in million cubic meters at an annual time frequency, while for our analysis a 5-year average of the most recent data was used.

$$Share\ of\ agricultural\ water\ consumption = \frac{Water\ use\ in\ agriculture}{Total\ water\ use} \tag{13}$$

2.4.2 Food system

For the assessment of the Food system vulnerability to climate change, the indicator Agricultural income was adopted which is presented in more detail next.

Agricultural income

The indicator Agricultural income is intended to reflect the dependency of the country to the agricultural income of the region where the pilot area is located. Therefore, the higher the agricultural income of the region, the higher the vulnerability, as climatic hazards on the agricultural sector of the region would also have important impacts for the country. The data are provided in Euros at an annual time frequency, while for our analysis a 5-year average of the most recent data was used. The normalization of this indicator was based on the position of the regional agricultural income in relation to the national average agricultural income of all regions, using the following equation.

$$Agricultural\ income\ index = \frac{Regional\ agricultural\ income}{National\ average\ agricultural\ income} \tag{11}$$

If the regional agricultural income is close to the national average (i.e. the value of the index is 80-120%), then the vulnerability related to this indicator is considered moderate. Higher values (>120%) indicate high vulnerability and lower values (<80%) low vulnerability.

This indicator is calculated based on the Eurostat dataset "Economic accounts for agriculture" and Specifically on the crop output value at current prices, which is available at regional level (NUTS2) (Eurostat, 2022). In the case of Serbia where there were no data available at regional level, the respective data were sourced directly from the Statistical Office of the Republic of Serbia (2022). In the case of Nima-Amaime pilot, the respective data were sourced from the relevant dataset of the World bank (World Bank, 2022) as well as the Administrative and Planning Department of Valle del Cauca (Lajas Torres Paz et al., 2020).

2.4.3 Energy system

For the assessment of the vulnerability of the Energy system, two indicators were employed: (i) the Renewable energy share and (ii) the Energy imports dependency. Detailed information on the selected indicators is provided next.

Renewable energy share

This assessment focuses on the climate change risks on renewable energy production and therefore, it was considered appropriate to take into account the contribution of renewable energy use in the gross final energy consumption. The higher the contribution, the higher the vulnerability of the energy system to a potential reduction in renewable energy generation due to climate change. This indicator is provided by Eurostat at national level as %. The data are provided at an annual time frequency, while for our analysis a 5-year average of the most recent data was used for each country.

$$Renewable\ energy\ share = \frac{Renewable\ energy\ use}{Gross\ final\ energy\ consumption} \tag{14}$$

Energy import dependency

The energy import dependency rate shows the extent to which an economy relies upon imports in order to meet its energy needs. It is measured by the share of net imports (imports - exports) in gross inland energy consumption (i.e. the sum of energy produced and net imports). In the framework of the current assessment, the energy import dependency of a country is used as a vulnerability indicator of the energy system in light of climate change, considering that in case the indigenous renewable energy generation is negatively impacted by climate change, the import dependency will grow. This, in turn, will have negative consequences for the energy security and economy of the country. This indicator is provided by Eurostat at national level as %. The data are provided at an annual time frequency, while for our analysis a 5-year average of the most recent data was used for each country.

$$Energy\ imports\ dependency = \frac{Net\ imports}{Gross\ inland\ energy\ consumption} \tag{15}$$

2.5 Assessment of the adaptive capacity

The assessment of the adaptive capacity is based on the respective methodology of World Bank (2021) which, examines the institutional readiness and the larger economic and social context, for assessing adaptive capacity.

In that framework, two main sub-indicators are selected for comprising the adaptive capacity component, (i) the adaptation readiness referring to the institutional capacity of a given region and (ii) the economic capacity of a country reflected by its Gross Domestic Product (GDP). The adaptive capacity component is calculated through the linear aggregation of the two sub-indicators, where equal weights are assigned to each one of them.

2.5.1 Adaptation readiness

The adaptation readiness in relation to the institutional capacity reflects the strength and existence of governance structures and policy processes which determine whether adaptation takes place. Therefore, the adaptation readiness is concerned with examining actual experiences with planning for adaptation and seeks to characterize whether human systems are prepared and ready to adapt. The extent to which a region or country is ready to adapt can therefore be used as a proxy for tracking adaptation. Adaptation readiness is evaluated based on the framework (concept, components and criteria) proposed by Ford and King (2015). Specifically, the assessment of the adaptive capacity is based on five factors, namely:

- Political Leadership
- Institutional Organization
- Decision Making
- Funding
- Public Awareness

The local stakeholders of the REXUS pilot partners were asked to evaluate the adaptation readiness components against the set criteria, through a comprehensive questionnaire that was developed for this purpose. The aim of this questionnaire was to get insight with respect to the opinion of local stakeholders on the adaptation readiness of the pilots to climate change. The questionnaire is broken down into two parts:

- Part A: Assessment of the adaptation readiness components
- Part B: Weighting of the relative importance of adaptation readiness components

The adaptation readiness components are further described in Table 6 along with the criteria for their evaluation.

Table 6: Adaptation readiness components and assessment criteria (Ford and King, 2015)

Components	Description	Criteria
Political Leadership	Governance institutions by their very nature embed a degree of resistance to change. Political Leadership is essential for overcoming the bureaucratic resistance that is common, initiating the process of adaptation, providing strategic direction, and sustaining momentum over time. Leadership may come from individuals in many different positions and at various scales, dependent on context.	▪ The extent to which the need for adaptation to climate change is recognized as a political priority. ▪ The involvement of political leadership in designing strategies for adapting to climate change. ▪ The extent to which policies and legislation related to climate change adaptation have already been adopted.
Institutional Organisation	Institutions provide the political and administrative structure that can either enable or restrict adaptation. Adaptation interventions and planning can be particularly effective where a single	▪ Other research programs or projects that study climate change in the pilot area. ▪ Institutions in the area that are engaged with adaptation to climate change.

Components	Description	Criteria
	government agency takes coordinating lead, or an interagency group is created to oversee adaptation activities.	▪ The fragmentation of responsibilities between the involved stakeholders.
Decision Making	Decision-making techniques are necessary given the inherent uncertainties surrounding climate change and the "hidden hazards" nature of the problem, which can cause policy makers to postpone and avoid action. The importance of engaging stakeholders in adaptation development and implementation is widely noted, when effective policy implementation built upon knowledge of local conditions and decision-making processes	▪ The extent to which stakeholders are involved in assessing the impact of climate change and policy-making. ▪ The existence of a decision-making framework that is used to adapt to climate change.
Funding	Funding concerns the capital costs of interventions and their maintenance over time, and the associated human resources necessary to successfully identify, implement, monitor, and maintain adaptation efforts, along with costs of funding research projects and programs.	▪ The availability of funding for adaptation to climate change.
Public Awareness	Public Awareness is important for expanding the range of adaptation possibilities and adaptation programs to be effectively promoted and implemented. Public opinion and perceptions of risk play a key role in affecting decision making at multiple levels, having a powerful influence.	▪ Media coverage of climate change. ▪ The current state of the public awareness of the need for climate change adaptation.

The weighting of the relative importance of the five adaptation readiness components was carried out with the use of the Analytic Hierarchy Process (AHP) method. The AHP is a Multicriteria Analysis (MCA) method employed for ranking a set of criteria. It is structured upon a pairwise comparison instead of comparing all criteria at once, thus the choice is easier to make. The weights of these criteria are defined after they are ranked according to their relative importance (Saaty, 1990). The participants of the survey were asked to rate the importance of each component in relation to the other with values ranging from -9 to +9, based on the scale shown in Table 7.

Table 7: AHP Rating scale for the weighting of adaptation readiness components

Rating (more/less)	Explanation
1	Component A is **equally** important to Component B
+ 3 / - 3	Component A is **slightly** more/less important than Component B
+ 5 / - 5	Component A is **strongly** more/less important than Component B
+ 7 / - 7	Component A is **very strongly** more/less important than Component B
+ 9 / - 9	Component A is **extremely** more/less important than Component B

As a result, the adaptation readiness indicator was the result of the linear weighted aggregation of the scores of the adaptation readiness components that were assigned by the local stakeholders through Part A of the questionnaire, multiplied by the weights that resulted from the AHP ranking process through Part B of the questionnaire. In the cases that the pilot areas included more than one countries, different adaptation readiness indicators were estimated based on the feedback received by the stakeholders from each country.

2.5.2 Economic capacity

The Gross Domestic Product (GDP) is a commonly used index for evaluating a nation´s economic situation and welfare. It reflects the total value of all goods and services produced less the value of goods and services used for intermediate consumption in their production. The data are provided in Euros per capita at an annual time frequency, while for our analysis a 5-year average of the most recent data was used. The normalization of this indicator was based on the position of the national GDP in relation to the regional average, using the following equation.

$$Economic\ capacity = \frac{National\ GDP}{EU\ average\ GDP} \tag{16}$$

If the national GDP is close to the EU average (i.e., the value of the index is 80-120%), then the adaptive capacity related to this indicator is considered moderate. Higher values (>120%) indicate high adaptive capacity and lower values (<80%) low adaptive capacity.

This indicator is calculated for the European pilots based on the Eurostat dataset “Gross domestic product at market prices” and compared with the EU average. In the case of Nima-Amaime pilot, the respective data were sourced from the relevant dataset of the World Bank (World Bank, 2022) and compared to the Latin America average GDP.

3. Results in pilots

In this section, the results of the climate risk assessment are provided for the pilot areas of the REXUS project. Specifically, the section is broken down into individual sub-sections for each pilot area, where in each sub-section are presented:

- The results of the selected hazard indicators for each WEF sector in the form of tables and maps.
- The results of the exposure indicators for the REXUS pilots in the form of tables and maps.
- The results of the vulnerability indicators for the REXUS pilots in the form of tables and maps.
- The results from the questionnaire that was distributed to the stakeholders of each pilot case, related to the adaptive capacity.
- The results of the overall climate risk assessment in each pilot.

3.1 Climate Risk Assessment: Pinios river basin

In this section the results of the hazard, exposure and vulnerability assessment, as well as the results from the adaptive capacity’s and the overall climate risk assessment are provided, for the Pinios river basin.

3.1.1 Hazard

In the following paragraphs, the results for the hazard indicators are given, for the food, water and energy systems.

Water system

Aridity

The spatial distribution of the Aridity index is depicted in Figure 13. It is observed that, for the reference period there are humid conditions around the city of Trikala, while Semi-Arid conditions are covered the greater part of the Pinios river basin. For the future period and according to RCP4.5, the humid conditions expected to disappear and arid conditions are found both around the Larissa region and in the southern part of the basin. On the other hand, according to RCP8.5, the largest part of the area presents semi-arid conditions with the part around Larissa not showing such intense arid conditions, as in the case of RCP8.5.

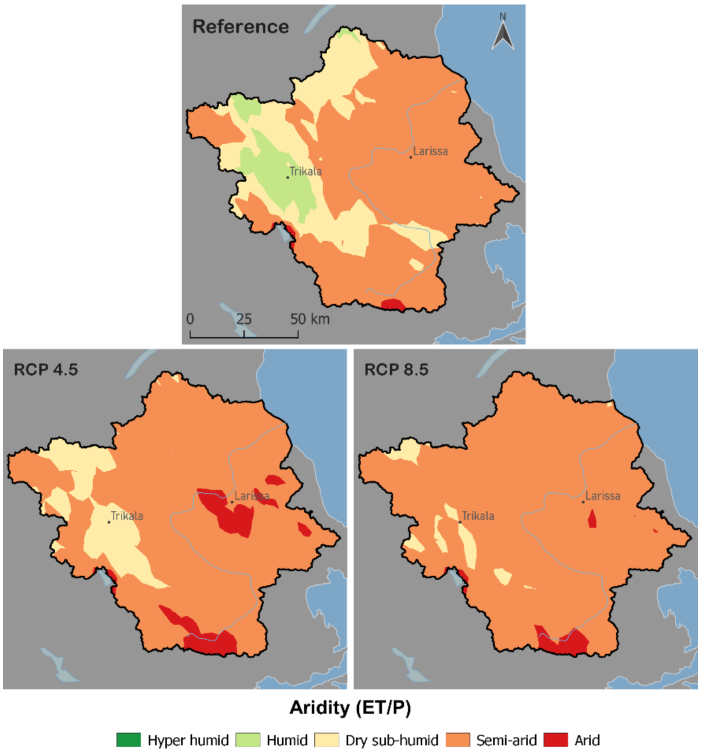

Figure 13: Spatial distribution of the mean annual Aridity indicator (potential evapotranspiration/precipitation) for the reference period (top) and the future period (2011-2070) based on the RCP4.5 and RCP8.5 (bottom), Pinios river basin

The relative change (%) of the actual aridity in the future compared to the reference period for both scenarios, is shown in Table 8. Can be seen that there is an increase of aridity for all the three future sub-periods compared to the reference period. Additionally, there is a clear difference between the scenarios, with the intermediate one showing a significantly greater increase, compared to RCP8.5, which shows a smaller increasing trend. Specifically, for the short-term period the deviation from the reference period is relatively small, at 17% and 3% for scenarios RCP4.5 and RCP8.5 respectively, while in the medium-term period RCP4.5 shows an increase of

133% and RCP8.5 31%. A corresponding increase is also shown in the long-term period of 167% (RCP4.5) and 50% (RCP8.5).

Table 8: Relative change (%) of the mean annual aridity (potential evapotranspiration/precipitation), for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Pinios river basin

Aridity Index	2011-2040		2041-2070		2071-2100	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	17	3	133	31	167	50

Flood Recurrence

The spatial distribution of the relative change of the flood recurrence indicator is depicted in Figure 14. The change in flood recurrence starts from -50% and reaches up to 150% at the south-western part of the basin, according to RCP4.5. On the other hand, RCP8.5 shows a significantly smaller change, since the flood recurrence is not expected to increase more than 75% (compared to the referrence period), apart from minor exceptions.

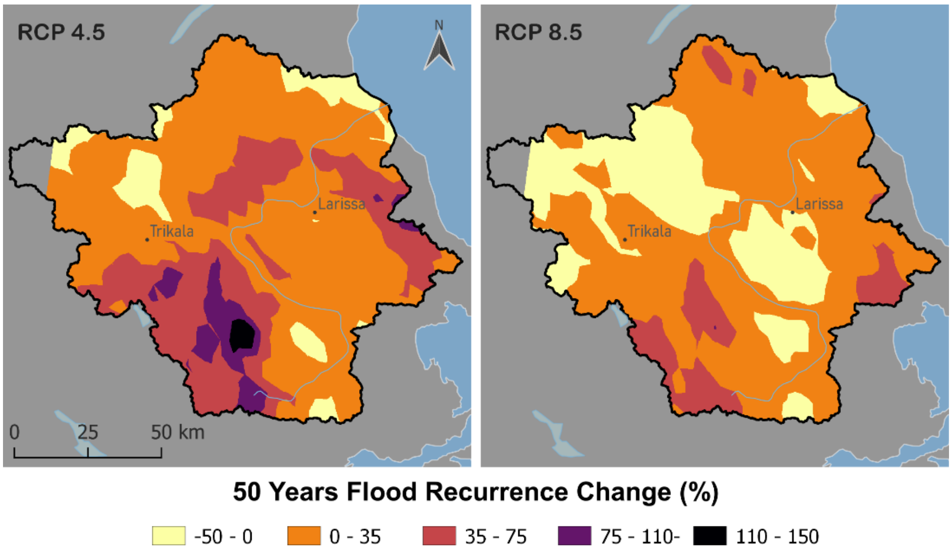

Figure 14: Spatial distribution of the 50 years Flood Recurrence relative change (%), for the period 2011-2070 based on the RCP4.5 and RCP8.5, Pinios river basin

The relative change (%) from the reference period of the flood recurrence indicator, with return period of 50 years, is shown in Table 9, for the examined future sub-periods and for both RCP4.5 and RCP8.5. Can be seen that there is an increase of the index for all the three future sub-periods compared to the reference period. Additionally, there is a small difference between the scenarios, with the intermediate one showing a significantly greater increase, compared to the RCP8.5, which shows a smaller increasing trend. Specifically, for the short-term period the deviation from the reference period is 11% on average and in the long-term period this increasing trend reaches up to 30% on average for both scenarios.

Table 9: Relative change (%) of the flood recurrence with return period 50 years, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Pinios river basin.

Flood recurrence Return period: 50 years	2011-2040		2041-2070		2071-2100	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	13	8	26	18	38	21

Mean Runoff

Regarding the spatial distribution of the mean runoff as this is depicted in Figure 15, the two scenarios show quite different results. For the RCP4.5 the basin is separated in two parts; the west and the east part which expected to experience a decrease and an increase in mean runoff respectively. Specifically, for the east part of the basin the change of mean runoff is from 0% to 20%, while the decrease's range of the west part is from -10% to -30%. On the other hand, according to the RCP8.5, the basin expected to be separated in south and north part. Specifically, the north part is the one which expected to experience a decrease in mean runoff from -10% to -30%, while the south part shows increasing trend from 0 to 20%. The similarity between the two scenarios is the projected trend around the cities Larissa and Trikala, which is decreasing and increasing respectively.

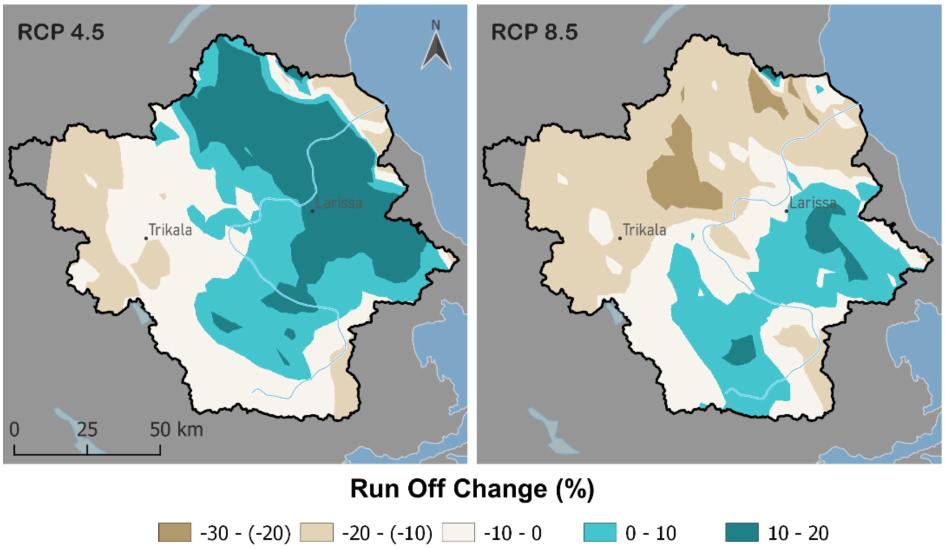

Figure 15. Spatial distribution of the annual Mean Runoff relative change (%), for the period 2011-2070 based on the RCP4.5 and RCP8.5 (bottom).

The relative change (%) from the reference period of the mean runoff indicator, is shown in Table 10, for the examined future sub-periods and for both RCP4.5 and RCP8.5. Can be seen that there is a decrease of the index for all the three future sub-periods compared to the reference period, except for the RCP4.5 for the mid-term period, which shows a slight increase of 8%. Specifically, a decrease of 11% is expected for the RCP4.5 in the short-term period and a smaller decrease for the long-term period. As for the RCP8.5 a decrease of 8% is expected for both short- and mid-term period, while a decrease of 36% is expected for the long-term period.

Table 10: Relative change (%) of the mean runoff, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Pinios river basin.

Mean Runoff	2011-2040		2041-2070		2071-2100	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	-11	-8	8	-8	-4	-36

Food system

Growing Degree Days (GDD)

Regarding the spatial distribution of the GDD for the period 2031-2050, as this is depicted in Figure 16, it is observed that during the reference period the GDD range starts from 0°C to 1000°C per year at the mountains of the Northern part of the pilot and reaches up to 4000-5000°C in a small area at the lowlands at the center and Eastern part of the basin, where the agricultural lands are located. During the future period, the minimum and maximum GDD remain similar to the reference period, with a substantial increase of the area where the maximum GDD is expected. This is even more evident in the case of RCP8.5, according to which, the minimum GDD (0-1000°C) is observed only at a very small part of the area, while the maximum GDD (4000-5000°C) prevails over the greater part of the Pinios river basin.

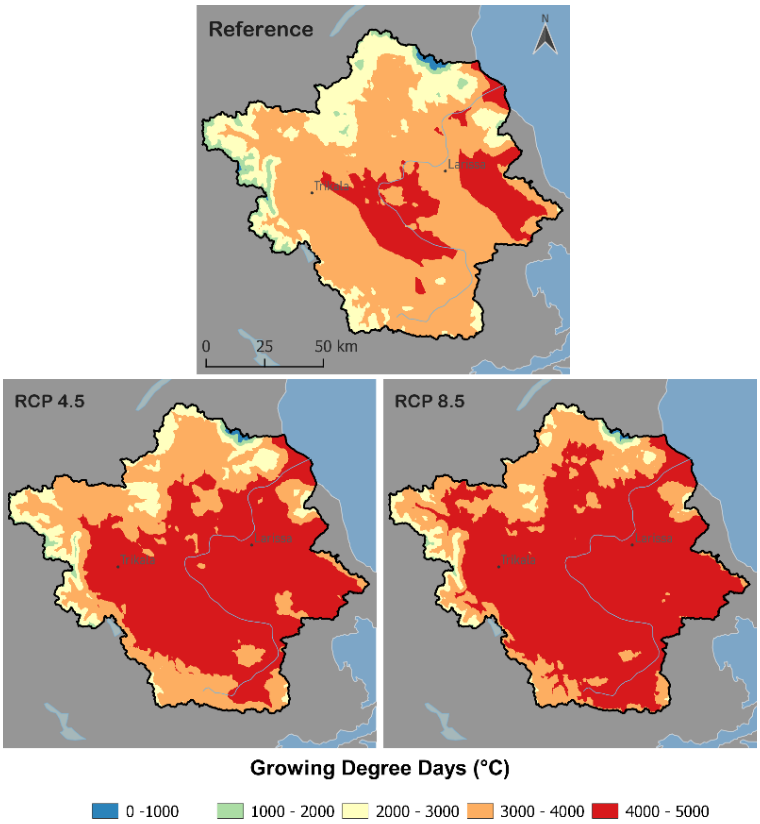

Figure 16: Spatial distribution of the mean annual Growing Degree Days with base temperature 5°C, for the reference period (top) and the future period (2031-2050) based on the RCP4.5 and RCP8.5 (bottom), Pinios river basin

The relative change in percentage (%) of the GDD indicator for the examined future periods in relation to the reference period is given in Table 11. Can be seen that the trend for all the periods and scenarios is increasing. More specific, for the RCP4.5 the change expected to be 17%, compared to the reference period, for the near-term period (2031-2050), while it is expected this difference to reach up to 28% at the long-term period. Similarly, for the RCP8.5, the change expected to be 27% for the near-term period and 65% for the long-term period.

Table 11: Relative change (%) of the growing degree days, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Pinios river basin.

Growing degree days Tmean > 5°C	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	17	27	24	47	28	65

<u>Heat Stress Days >25°C</u>

The spatial distribution of the mean annual number of days with maximum temperature above 25°C for the Pinios river basin, is depicted in Figure 17. It is observed that during the reference period, the number of heat stress days per year ranges from 0 to 170, with the lowest number of days (up to 35) being observed at the outermost north-eastern and western part of the basin. This number gradually increases reaching the maximum values at the center of the basin. For the future period, the range of heat stress days will remain the same, while the area at the center of the basin where the highest values (>135 days) are observed will be significantly expanded compared to the reference period, according to both scenarios.

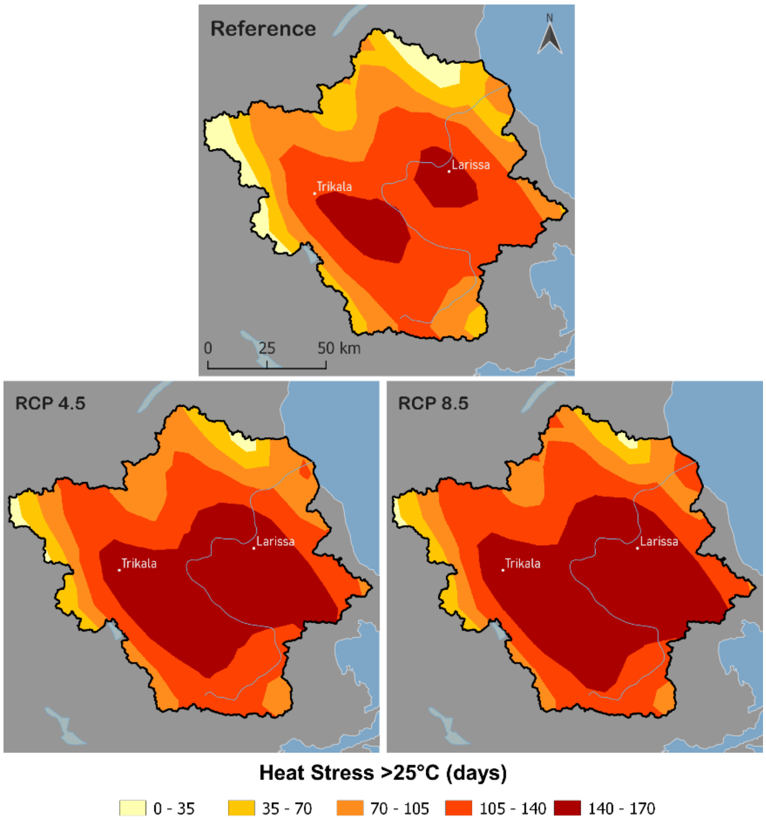

Figure 17: Spatial distribution of the mean annual number of days with maximum daily temperature > 25°C, for the reference period (top) and the future period (2031-2050) based on the RCP4.5 and RCP8.5 (bottom), Pinios river basin

The relative change (%) of the number of heat stress days >25°C expected for the future, is summarized in Table 12. As can be seen, an increase of 38% on average is projected for the near-term period (2031-2050) with small differentiation among the two scenarios. For the long-term period (2071-2090), the increase for RCP4.5 is expected to be lower (17%) compared to the near-term period, while for RCP8.5 a considerable increase of 63%

is expected. In contrast, for the mid-term period a decrease of 36% and 12% is expected based on RCP4.5 and RCP8.5 respectively (2051-2070), which is considered an anomaly for the climatic trends.

Table 12: Relative change (%) of the mean annual number of days with maximum temperature > 25°C for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Pinios river basin.

Heat stress days Tmax > 25°C	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change(%)	33	42	-36	-12	17	63

Heat Stress Days >30°C

The spatial distribution of the mean annual number of days with maximum temperature above 30°C is depicted in Figure 18. It is observed that during the reference period, the number of heat stress days per year ranges from 0 to 100, while for the future period, the range of heat stress days expected in the pilot area is from 0 to 125 for both scenarios. The spatial distribution of the indicator expected to be the same with the heat stress days >25°C for both reference and future periods.

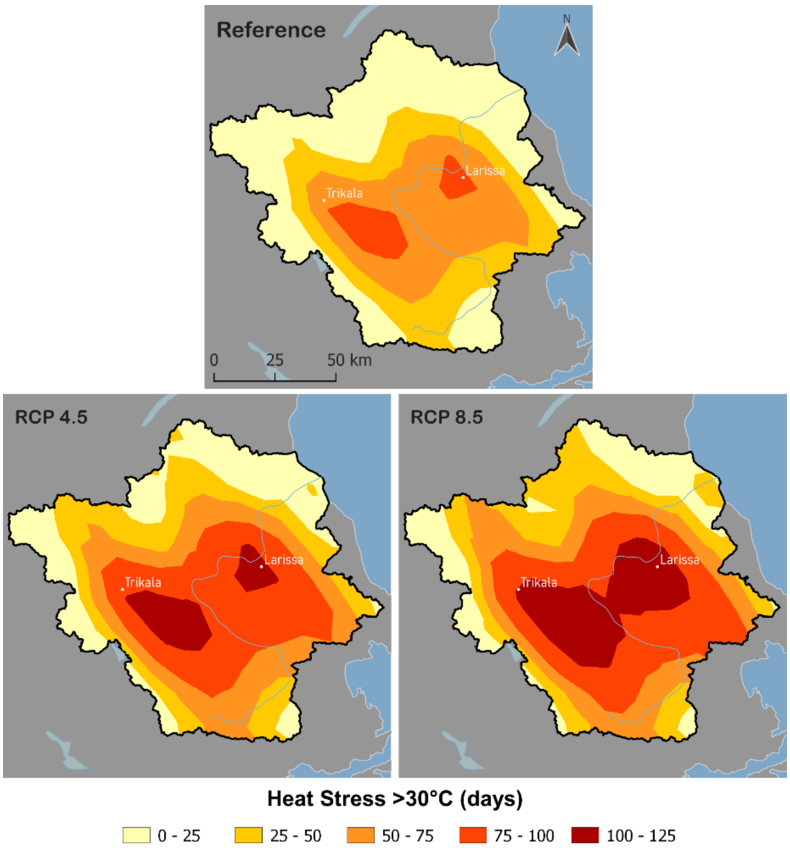

Figure 18: Spatial distribution of the mean annual number of days when maximum daily temperature > 30°C, for the reference period (top) and the future period (2031-2050) based on the RCP4.5 and RCP8.5 (bottom).

The relative change (%) of the projected heat stress days >30°C in the future, is summarized in Table 13. As can be seen, the difference between the two scenarios for all three future periods is noticeable, with the RCP4.5 presenting the highest changes. Specifically, for the near-term period (2031-2050) an increase of 97% is projected for the RCP4.5, while the respective change for the RCP8.5 is low (+8%). For the mid-term period (2051-2070), a decrease of 86% is projected based on RCP4.5 and 4% for the RCP8.5. Finally, for the long-term period (2071-2090), the increase is expected to reach the 34% for the intermediate scenario (RCP4.5) and 9% for the high-emissions scenario (RCP8.5).

Table 13: Relative change (%) of the number of days with maximum temperature >30°C, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Pinios river basin.

Heat stress days Tmax > 30°C	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change(%)	97	8	-82	-4	34	9

Frost Days

The spatial distribution of the number of frost days is depicted in Figure 19. It is observed that during the reference period the number of days starts from 0 days at the lowlands at the center of the basin, where the agricultural lands are located and reaches up to 125 days at the mountains, at the northern part of the area. During the future period, the days with no frost (or up to 25 days) are observed at a much greater area than the reference period, especially for the RCP8.5. In addition, for the future period 2031-2050 the frost does not exceed 100 days, even at the mountainous areas.

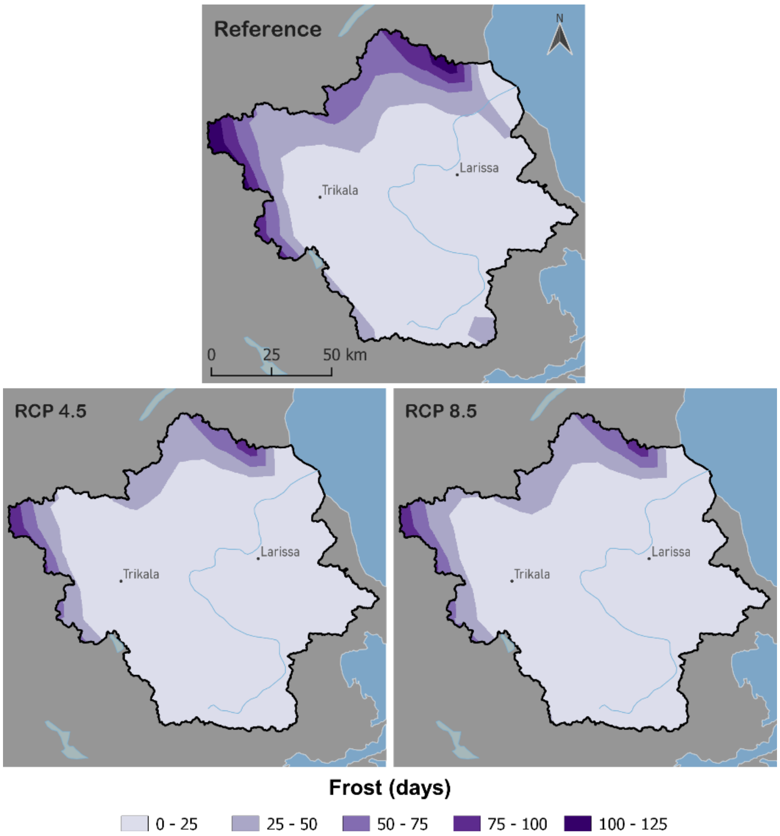

Figure 19: Spatial distribution of the mean annual number of days with minimum temperature below 0°C, for the reference period (top) and the future period (2031-2050) based on the RCP4.5 and RCP8.5 (bottom), Pinios river basin

The projected relative change (%) of the number of days with minimum temperature below 0°C, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, is summarized in Table 14. It may be concluded that for the short-term period, there is no significant difference between the scenarios, with an average 40.5% reduction from the reference period. Furthermore, for the mid-term period there is a reduction of 95% on average for the two scenarios, while for the long-term period the reduction is similar to the mid-term for the RCP8.5 and a little smaller for the RCP4.5.

Table 14: Relative change (%) of the number of days with minimum temperature < 0°C, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Pinios river basin.

Frost days	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	-42	-39	-94	-97	-84	-97

Energy system

Solar photovoltaic power generation

The relative change (%) from the reference period of the solar photovoltaic power generation indicator, is shown in Table 15, for the examined future sub-periods and for both RCP4.5 and RCP8.5. Can be seen that there is almost no difference at all between the future and the reference period, since the relative change range from -0.3% to 1.3% for both scenarios. The maximum value of relative change (+1.3%) is for the RCP8.5 for the short-term period, while the minimum value of relative change (+0.2%) is for the RCP4.5 for the mid-term period.

Table 15: Relative change (%) of solar photovoltaic power generation (ratio of actual generation over installed capacity, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Pinios river basin.

Solar photovoltaic power generation	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	0.4	1.3	0.2	-0.3	0.3	0.4

Wind power generation

The relative change from the reference period of the wind power generation onshore indicator, is shown in Table 16, for the examined future sub-periods and for both RCP4.5 and RCP8.5. Can be seen that there is small difference between the future and the reference period, since the relative change range from -1.8% to 3.1% for both scenarios. The maximum value of relative change (+3.1%) is for the RCP4.5 for the short-term period, while the minimum value of relative change (+0.3%) is for the RCP8.5 for the mid-term period.

Table 16: Relative change (%) of wind power generation (ratio of actual generation over installed capacity), for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Pinios river basin.

Wind power generation	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	3.1	-1.8	2.5	0.3	1	2.1

3.1.2 Exposure

In this section the results of the exposure assessment of the Pinios pilot for the food and energy systems are presented.

Food system

In this sub-section the results of the assessment of the food exposure index related to the areas cultivated with the crops under study (wheat, cotton and oilseed) are presented.

Share of main crops

The share of areas cultivated with the main crops in each municipality to the total extend of each municipality area of the Pinios river basin, is depicted in Figure 20. As can be seen, the examined crops of wheat, cotton and oilseed are cultivated in great extent (18-35%) at central and southeast municipalities of the pilot (Palama, Sofadon, Farsalon and Kileler). On the contrary, at the Northern part of the pilot the main crops are rarely cultivated (<1%).

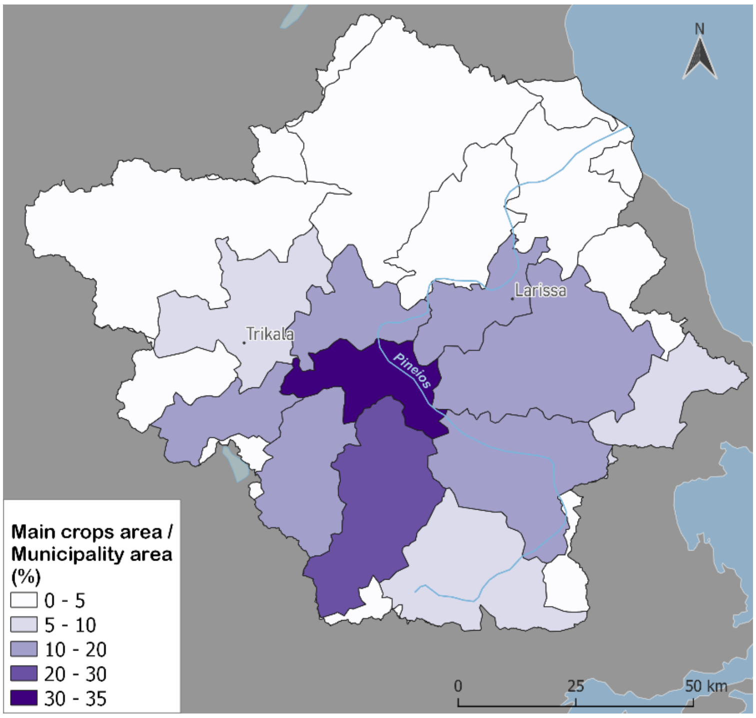

Figure 20: Food exposure index expressed as the share of the main crops area to the total municipality area, Pinios river basin

Energy system

The exposure indicators for the energy system are related to (i) the renewable energy intensity and (ii) the energy crop cultivation intensity, are presented.

Renewable energy intensity

The location of renewable energy plants in the Pinios pilot is delineated in Figure 21, where it is observed that photovoltaic plants are greater in number and also are characterized by higher spatial distribution compared to hydropower and wind plants.

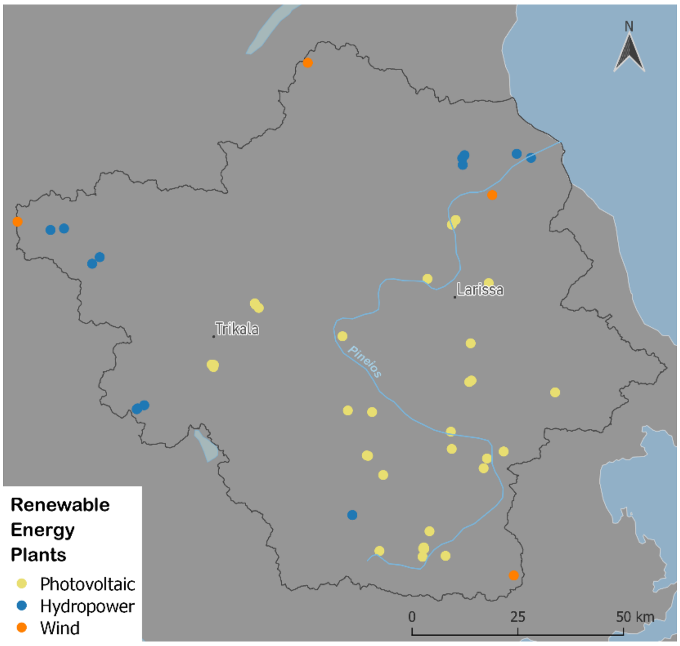

Figure 21: Photovoltaic, wind and hydropower energy operational plants, Pinios river basin

However, when the energy intensity of the pilot is compared to the national one the situation is different, as shown in Table 17. Specifically the hydropower energy intensity of the pilot is very close to the respective national intensity, with value very close to 100%, while photovoltaic and wind energy intensity of the pilot is quite low compared to the national one. Therefore, the exposure of the hydropower sector is considered medium to high, while for the wind and photovoltaic sector is low.

Table 17: Energy exposure index expressed as renewable energy intensity, Pinios river basin

Renewable energy intensity	Photovoltaic	Wind	Hydropower
Pilot (MW_p/ $Km^2{}_p$)	0.0110	0.0040	0.0035
Greece (MW_c /$Km^2{}_c$)	0.0720	0.0400	0.0038
Pilot in % of National	**15%**	**10%**	**92%**

<u>Energy crop intensity</u>

The energy crop intensity of the Pinios pilot expressed as the share of the energy crop in the pilot cultivated area compared to the national share, is presented in Table 18. As it is can be seen the energy crop intensity of the Pinios pilot is quite low (17%). Thus, the exposure related to this indicator is considered to be low.

Table 18: Energy exposure index expressed as energy crop intensity, Pinios river basin

Energy crop intensity	
Pilot (Oilseed $Km^2{}_p$/ Total crops $Km^2{}_p$)	0.0005
Greece (Oilseed $Km^2{}_c$ / Total crops $Km^2{}_c$)	0.0030

Energy crop intensity	
Pilot in % of National	**17%**

3.1.3 Vulnerability

In this section the results of the vulnerability assessment of Pinios river basin for the food, water and energy systems are presented.

Water system

In this sub-section the results of the assessment of the water vulnerability indices (water exploitation index, share of agricultural water consumption) are presented, at river basin district (RBD) level.

Water exploitation index

The water exploitation index of Thessaly region is presented in Table 19. Specifically, the WEI of Thessaly river basin district is estimated to be 0.3 which is above the threshold that water stress can begin to be a limiting factor on economic development for the region. Thus, the vulnerability related to this indicator is considered to be medium-high.

Table 19: Water vulnerability index expressed as Water Exploitation Index, Pinios river basin

River Basin District	Water Exploitation Index
Thessaly	0.3

Share of agricultural water consumption

The share of agricultural water consumption in Thessaly river basin district is shown in Table 20. Specifically the share of agricultural water consumption is very high (>90%), therefore a potential reduction in water availability due to climate change, would be critical for the agricultural sector. Thus, the vulnerability related to this indicator is considered to be high.

Table 20: Water vulnerability index expressed as share of agricultural water consumption, Pinios river basin

River Basin District	Share of agricultural water consumption
Thessaly	92.8%

Food system

In this sub-section the results of the assessment of the food vulnerability index related to agricultural income, are presented at regional level (NUTS2), i.e. for the Thessaly region where Pinios river basin is located.

Agricultural Income

The agricultural income of Thessaly region compared to the average national agricultural income of Greece, is presented in Table 18. It is observed that the region of Thessaly, where Pinios pilot is located, has 210% higher agricultural income compared to the national average. This indicates a high dependency of the country to the agricultural income of the region. Thus, the vulnerability related to this indicator is considered to be high.

Table 21: Food vulnerability index expressed as agriculture income, Pinios river basin

Region	Agricultural income	
	Million Euro	% of national average
National average	596	100
Thessaly	1251	210

Energy system

In this sub-section the results of the energy vulnerability assessment for the indices of the Renewable energy share and the Energy import dependency are presented. The results are presented at country level (Greece).

Renewable energy share

The contribution of renewable energy resources in the gross final energy consumption of Greece along with the respective EU average, is shown in Table 22. As can be seen, the share of energy from renewable sources of Greece is relatively low (18%), lower than EU average although quite close to it. The higher the contribution, the higher the vulnerability of the energy system to a potential reduction in renewable energy generation due to climate change. Thus, the vulnerability related to this indicator is considered to be low to medium.

Table 22: Energy vulnerability index expressed as renewable energy share, Pinios river basin

	Renewable energy share
European Union (EU 27 average)	19.5%
Greece	18.4%

Energy import dependency

The energy imports dependency of Greece along with the respective EU average, is presented in Table 23. As it is shown, the energy imports dependency of Greece (74%) is relatively high compared to the EU average. The higher the import dependency of a country, the higher the vulnerability of the energy system to a potential reduction in renewable energy generation due to climate change. Thus, the vulnerability related to this indicator is considered to be medium to high.

Table 23: Energy vulnerability index expressed as energy import dependency, Pinios river basin

	Energy import dependency
European Union (EU 27 average)	57.9%

Greece	74.1%

3.1.4 Adaptive capacity

In this section, the results of the assessment of the adaptive capacity of the Pinios river basin are presented. Specifically, the results refer to (i) the survey on the evaluation of the adaptation readiness of the pilot as well as to (ii) the assessment of the economic capacity for the pilot.

Adaptation readiness

With respect to the institutional readiness survey, 10 stakeholders (SH) from the Pinios pilot took part, from different domains, as shown in Figure 22. Specifically, the majority of participants are engaged in the water domain (40%) as well as in the food and environment domains (27% each).

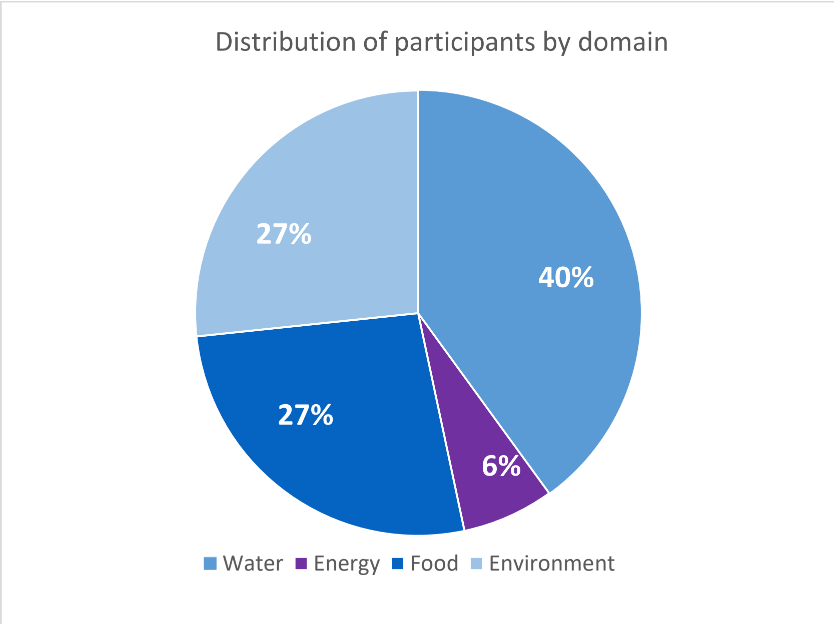

Figure 22: Distribution of participants to the adaptive capacity survey by domain, Pinios river basin

The results of the survey are presented below.

Part A: Assessment of the adaptive capacity components

Political Leadership

The results of the evaluation the Political leadership component against the criteria, are presented below. It may be concluded that the majority of the respondents (56-67%) evaluated Political leadership as moderate against all three criteria.

	1. To what extent has the need for adaptation to climate change been recognized as a political priority?	*2. Evaluate the involvement of political leadership in designing strategies for adapting to climate change.*	*3. To what extent have policies and legislation related to climate change adaptation been adopted?*
None	0%	11%	11%
Limited	22%	33%	22%
Moderate	56%	56%	67%
High	22%	0%	0%

Institutional Organisation

The results of the evaluation of the Institutional Organisation component against three criteria, are presented below. With respect to the evaluation of criterion 1, 76% of the respondents replied that there are more than 1 research projects studying climate change in the pilot area. With respect to criterion 2, 89% of them answered that there are institutions in the area that are engaged with adaptation to climate change. Finally, with respect to Criterion 3, the vast majority of the respondents (89%) replied that there is a fragmentation of responsibilities between the involved stakeholders.

	1. Are there -beyond REXUS- other research programs or projects that study climate change in the pilot area?
None	25%
1-2	63%
More than 2	13%

	2. Are there institutions in the area that are engaged with adaptation to climate change?	*3. Do you think that there is a fragmentation of responsibilities between the involved stakeholders?*
Yes	89%	89%
No	11%	11%

Decision Making

The results of the evaluation of the Decision Making component against two criteria, are presented below. With respect to criterion 1, the majority of the respondents (78%) replied that the extent to which stakeholders are involved in assessing the impact of climate change and policy making is limited. With respect to criterion 2, the respondents' replies were almost equally split between Yes and No on whether there is a decision-making framework used to adapt to climate change.

	1. To what extent are stakeholders involved in assessing the impact of climate change and policy-making?
None	0%
Limited	78%
Moderate	11%
High	0%

	2. Is there a decision-making framework used to adapt to climate change?
Yes	56%
No	44%

Funding

The results of the evaluation of the Funding component against the criterion are presented below. It may be concluded that, the majority of the respondents (67%) rated the availability of funding as limited, while the rest of them rated as moderate.

	How do you evaluate the availability of funding for adaptation to climate change?
None	0%

Limited	67%
Moderate	33%
High	0%

Public Awareness

The results of the evaluation of the Public Awareness component against two criteria are presented below. With respect to criterion 1, the majority of the respondents (56%) rated media coverage of climate change as limited. With respect to criterion 2, the majority of them (67%) answered that there is limited public awareness of the need for climate change adaptation.

	1. How do you rate media coverage of climate change?	*2. How do you evaluate the public awareness of the need for climate change adaptation?*
None	0%	22%
Limited	56%	67%
Moderate	11%	11%
High	0%	0%

Economic capacity

The economic capacity of the Pinios river basin pilot expressed as the GDP of the country in relation to the EU average is presented in the table that follows. As can be seen, the GDP of Greece is 16,570 Euros per capita which is almost half of the EU average (54%), thus reflecting a low to medium economic capacity of the pilot.

Table 24: Economic capacity of Pinios river basin

	GDP per capita (Euro)	in % of EU average
EU average (27 countries)	30632	100%
Greece	16570	54%

3.1.5 Overall Risk

In this section, the results of the climate risk assessment for the water, food and energy Nexus systems of the Pinios river basin pilot are presented, based on the RCP4.5 and RCP8.5 for the period 2031-2050. The results are presented at municipality level in geospatial form through maps as well as through tables. Specifically, the overall risk is presented qualitatively through maps, while analytical results are also presented both qualitatively, per risk component and quantitatively, at indicator level.

Water system

The results of the climate risk assessment, with respect to the water system, are depicted in Figure 23 as well as in Table 25, Table 26 and Table 27.

As can be seen in Figure 23, a "Medium-High" level risk is expected at the majority of municipalities in the pilot, while the risk for the other municipalities is characterized as "Medium", according to RCP4.5. The risk is expected to be "Medium-High" also at the majority of municipalities, based on the RCP8.5.

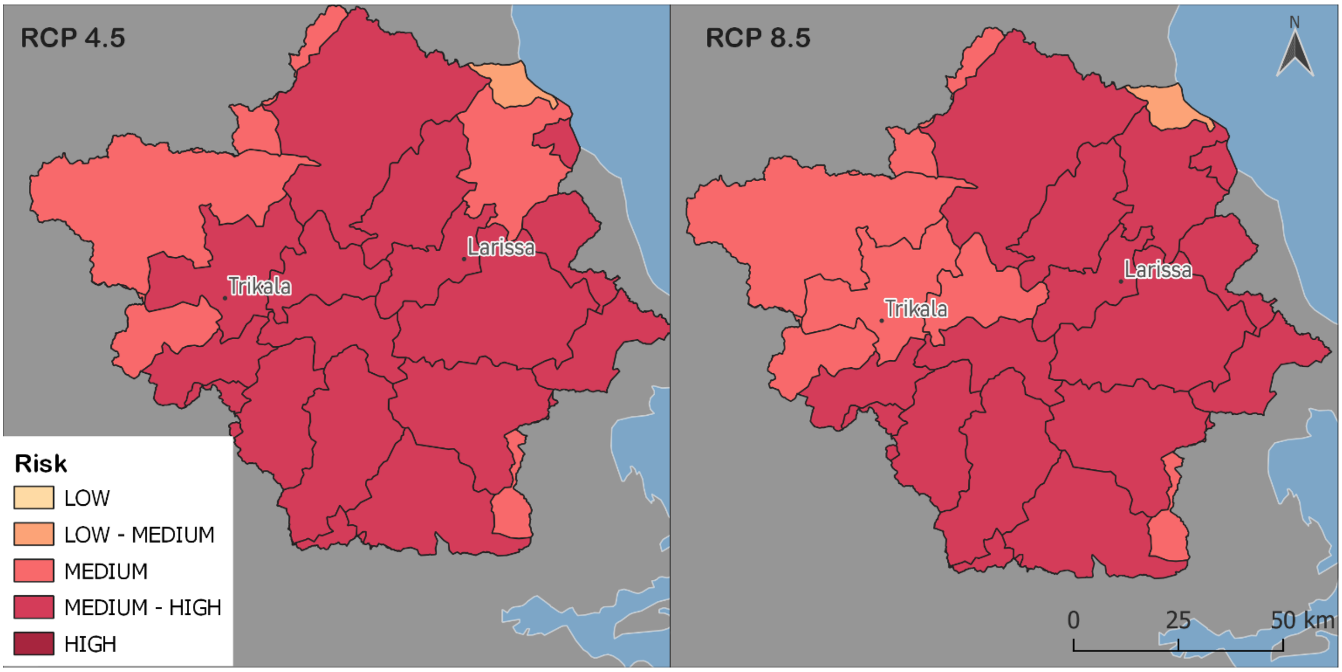

Figure 23: Qualitative climate risk assessment for the water system (RCP4.5 and RCP8.5), Pinios river basin

The results of the overall climate risk assessment are presented in more detail at the level of municipalities in Table 25. As can be seen, the above-mentioned risk levels are the result of a "Low-Medium" to "Medium-High" range hazard for RCP4.5 and RCP8.5, in combination with a "Medium-High" vulnerability. According to both scenarios, it is expected to have 15-17 municipalities reaching the "Medium-High" risk.

Table 25: Qualitative climate risk assessment per risk component for the water system (RCP4.5 and RCP8.5), Pinios river basin

Municipality	Hazard		Vulnerability	Risk	
	4.5	8.5		4.5	8.5
Diou - Olympou	Low-Medium	Low-Medium	Medium-High	Low-Medium	Low-Medium
Servion - Velventou	Medium	Medium	Medium-High	Medium	Medium
Deskatis	Low-Medium	Low-Medium	Medium-High	Medium	Medium
Larisaion	Medium-High	Medium	Medium-High	Medium-High	Medium-High
Agias	Medium-High	Medium	Medium-High	Medium-High	Medium-High
Elassonas	Medium	Medium	Medium-High	Medium-High	Medium-High
Kileler	Medium-High	Medium	Medium-High	Medium-High	Medium-High
Tempon	Medium	Medium	Medium-High	Medium-High	Medium-High
Tyrnavou	Medium-High	Medium	Medium-High	Medium-High	Medium-High

Farsalon	Medium	Medium	Medium-High	Medium-High	Medium-High
Karditsas	Medium-High	Medium-High	Medium-High	Medium-High	Medium-High
Limnis Plastira	Medium	Medium	Medium-High	Medium-High	Medium-High
Mouzakiou	Medium-High	Medium	Medium-High	Medium-High	Medium-High
Palama	Medium-High	Medium-High	Medium-High	Medium-High	Medium-High
Sofadon	Medium-High	Medium-High	Medium-High	Medium-High	Medium-High
Almyrou	Medium	Medium	Medium-High	Medium	Medium
Riga Feraiou	Medium-High	Medium-High	Medium-High	Medium-High	Medium-High
Trikkaion	Medium	Medium	Medium-High	Medium-High	Medium
Kalampakas	Medium	Low-Medium	Medium-High	Medium	Medium
Pylis	Medium	Low-Medium	Medium-High	Medium	Medium
Farkadonas	Medium-High	Medium	Medium-High	Medium-High	Medium
Domokou	Medium	Medium	Medium-High	Medium-High	Medium-High
Makrakomis	Medium-High	Medium-High	Medium-High	Medium-High	Medium-High

The detailed results of the climate risk assessment for the RCP4.5 and RCP8.5 are presented quantitatively at normalized scale [-5, 5] in Table 26 and Table 27, respectively. The negative values of the hazard indicators have a beneficial effect and thus are considered to compensate risk.

Table 26: Quantitative (normalized) climate risk assessment at indicator level for the water system (RCP4.5), Pinios river basin

Municipality	HAZARD			VULNERABILITY			Risk 4.5
	Aridity	Flood recurrence	Composite hazard indicator	Agricultural water consumption	Water exploitation	Composite vulnerability indicator	
Diou - Olympou	3.2	-1.1	**1.0**	4.8	3.0	**3.9**	**1.5**
Servion - Velventou	3.1	1.0	**2.4**	4.8	3.0	**3.9**	**2.8**
Deskatis	3.1	0.2	**1.8**	4.8	3.0	**3.9**	**2.3**
Larisaion	3.8	1.7	**3.2**	4.8	3.0	**3.9**	**3.4**
Agias	3.7	3.2	**3.1**	4.8	3.0	**3.9**	**3.3**
Elassonas	3.2	1.6	**2.7**	4.8	3.0	**3.9**	**3.0**
Kileler	3.8	2.0	**3.2**	4.8	3.0	**3.9**	**3.4**
Tempon	3.5	2.0	**2.7**	4.8	3.0	**3.9**	**3.0**
Tyrnavou	3.5	2.8	**3.3**	4.8	3.0	**3.9**	**3.5**
Farsalon	3.4	1.3	**2.9**	4.8	3.0	**3.9**	**3.2**
Karditsas	3.1	3.8	**3.3**	4.8	3.0	**3.9**	**3.5**
Limnis Plastira	3.9	3.4	**2.7**	4.8	3.0	**3.9**	**3.0**
Mouzakiou	3.0	3.4	**3.1**	4.8	3.0	**3.9**	**3.3**
Palama	3.3	3.2	**3.4**	4.8	3.0	**3.9**	**3.5**
Sofadon	3.3	4.2	**3.5**	4.8	3.0	**3.9**	**3.6**
Almyrou	3.4	1.8	**2.4**	4.8	3.0	**3.9**	**2.8**
Riga Feraiou	3.5	2.6	**3.1**	4.8	3.0	**3.9**	**3.3**
Trikkaion	3.0	1.4	**2.7**	4.8	3.0	**3.9**	**3.1**
Kalampakas	3.1	0.5	**2.1**	4.8	3.0	**3.9**	**2.5**

Municipality	HAZARD			VULNERABILITY			Risk 4.5
	Aridity	Flood recurrence	Composite hazard indicator	Agricultural water consumption	Water exploitation	Composite vulnerability indicator	
Pylis	3.0	2.3	**2.2**	4.8	3.0	**3.9**	**2.6**
Farkadonas	3.3	2.5	**3.1**	4.8	3.0	**3.9**	**3.4**
Domokou	3.8	2.3	**3.0**	4.8	3.0	**3.9**	**3.2**
Makrakomis	3.4	3.6	**3.2**	4.8	3.0	**3.9**	**3.4**

Table 27: Quantitative (normalized) climate risk assessment at indicator level for the water system (RCP8.5), Pinios river basin

Municipality	HAZARD			VULNERABILITY			Risk 8.5
	Aridity	Flood recurrence	Composite hazard indicator	Agricultural water consumption	Water exploitation	Composite vulnerability indicator	
Diou - Olympou	3.1	-1.2	**1.1**	4.8	3.0	**3.9**	**1.5**
Servion - Velventou	3.2	1.6	**2.4**	4.8	3.0	**3.9**	**2.9**
Deskatis	3.2	-1.5	**1.3**	4.8	3.0	**3.9**	**2.0**
Larisaion	3.5	-0.2	**1.4**	4.8	3.0	**3.9**	**3.0**
Agias	3.6	1.9	**2.1**	4.8	3.0	**3.9**	**3.0**
Elassonas	3.3	1.3	**2.3**	4.8	3.0	**3.9**	**3.0**
Kileler	3.6	0.5	**1.0**	4.8	3.0	**3.9**	**3.1**
Tempon	3.4	1.2	**2.2**	4.8	3.0	**3.9**	**3.0**
Tyrnavou	3.5	1.2	**2.2**	4.8	3.0	**3.9**	**3.2**
Farsalon	3.3	0.5	**1.4**	4.8	3.0	**3.9**	**3.0**
Karditsas	3.1	2.7	**2.2**	4.8	3.0	**3.9**	**3.3**
Limnis Plastira	4.0	2.3	**2.5**	4.8	3.0	**3.9**	**3.0**
Mouzakiou	3.1	1.6	**2.2**	4.8	3.0	**3.9**	**3.0**
Palama	3.3	1.6	**1.8**	4.8	3.0	**3.9**	**3.3**
Sofadon	3.2	2.8	**1.9**	4.8	3.0	**3.9**	**3.4**
Almyrou	3.4	1.2	**2.2**	4.8	3.0	**3.9**	**2.8**
Riga Feraiou	3.5	2.9	**2.0**	4.8	3.0	**3.9**	**3.4**
Trikkaion	3.1	0.3	**1.9**	4.8	3.0	**3.9**	**2.8**
Kalampakas	3.2	-0.7	**1.6**	4.8	3.0	**3.9**	**2.4**
Pylis	3.0	0.1	**1.8**	4.8	3.0	**3.9**	**2.2**
Farkadonas	3.4	-0.3	**1.7**	4.8	3.0	**3.9**	**2.8**
Domokou	3.7	1.4	**1.6**	4.8	3.0	**3.9**	**3.1**
Makrakomis	3.3	3.3	**2.3**	4.8	3.0	**3.9**	**3.3**

Food system

The results of the climate risk assessment, with respect to the food system, are depicted in Figure 24 as well as in Table 28, Table 29 and Table 30.

As can be seen in Figure 24, a “Medium-High” level risk is expected at 7 municipalities located at the central and south-western part of the pilot, while the risk for the other municipalities is characterized from “Low” to “Medium”. Additionally, under scenario RCP8.5, a “Medium-High” level risk is expected at 8 municipalities located at the central and south-western part of the pilot, while the risk for the other municipalities is characterized from “Low” to “Medium”.

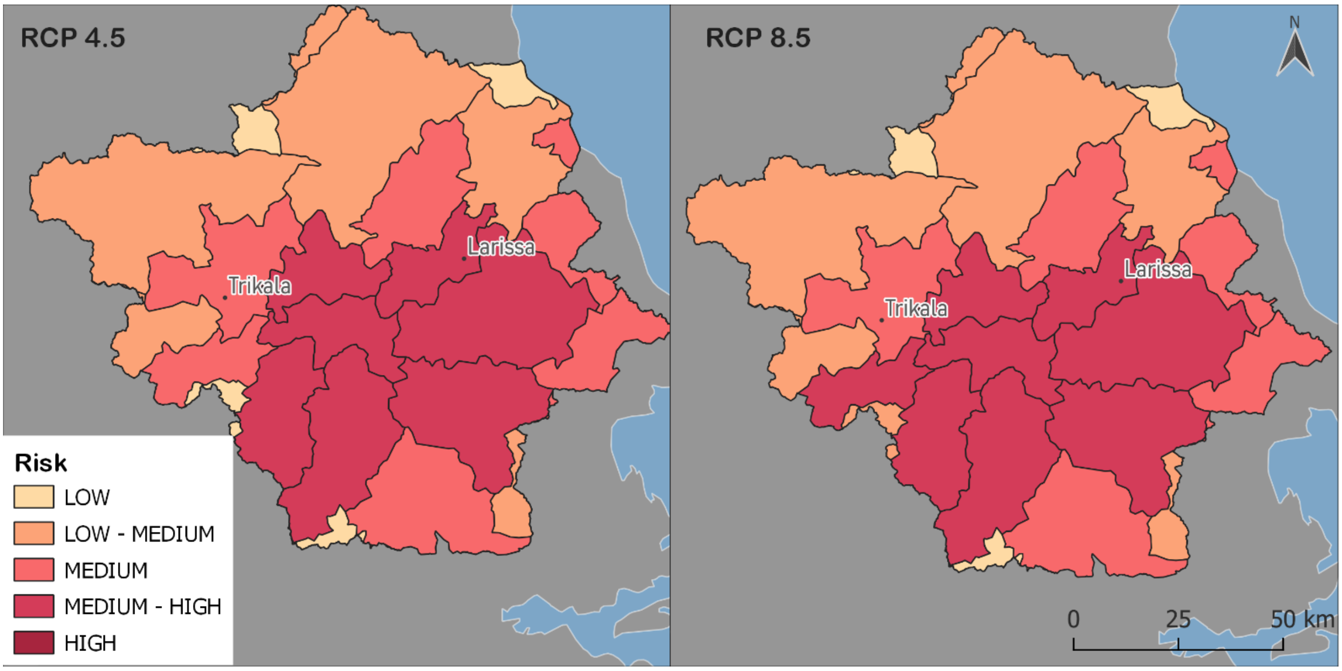

Figure 24: Qualitative climate risk assessment for the food system (RCP4.5 and RCP8.5), Pinios river basin

The results of the overall climate risk assessment are presented in more detail at the level of municipalities in Table 28. As can be seen, the above-mentioned risk levels are the result of a “Low-Medium” to “Medium-High” range hazard for both RCP4.5 and RCP8.5, with a “Low” to “Medium-High” range of exposure and “High” level of vulnerability. Additionally, according to RCP 8.5 scenario two municipalities are expected to increase their risk, compared to the RCP 4.5.

Table 28: Qualitative climate risk assessment per risk component for the food system (RCP4.5 and RCP8.5), Pinios river basin

Municipality	Hazard		Exposure	Vulnerability	Risk	
	4.5	8.5			4.5	4.5
Diou - Olympou	Low-Medium	Low-Medium	Low	High	Low	Low
Servion - Velventou	Medium	Medium	Low	High	Low-Medium	Low-Medium
Deskatis	Low-Medium	Medium	Low	High	Low	Low
Larisaion	Medium-High	Medium-High	Medium	High	Medium-High	Medium-High
Agias	Medium	Medium	Low	High	Medium	Medium
Elassonas	Medium	Medium	Low	High	Low-Medium	Low-Medium
Kileler	Medium-High	Medium-High	Medium	High	Medium-High	Medium-High
Tempon	Medium	Medium	Low	High	Low-Medium	Low-Medium

Tyrnavou	Medium-High	Medium-High	Low	High	Medium	Medium
Farsalon	Medium-High	Medium-High	Medium	High	Medium-High	Medium-High
Karditsas	Medium-High	Medium-High	Medium	High	Medium-High	Medium-High
Limnis Plastira	Medium	Medium	Low	High	Low	Low-Medium
Mouzakiou	Medium	Medium	Medium	High	Medium	Medium-High
Palama	Medium-High	Medium-High	Medium-High	High	Medium-High	Medium-High
Sofadon	Medium-High	Medium-High	Medium-High	High	Medium-High	Medium-High
Almyrou	Medium	Medium	Low	High	Low-Medium	Low-Medium
Riga Feraiou	Medium	Medium-High	Low-Medium	High	Medium	Medium
Trikkaion	Medium	Medium	Low-Medium	High	Medium	Medium
Kalampakas	Medium	Medium	Low	High	Low-Medium	Low-Medium
Pylis	Medium	Medium	Low	High	Low-Medium	Low-Medium
Farkadonas	Medium-High	Medium-High	Medium	High	Medium-High	Medium-High
Domokou	Medium	Medium	Low-Medium	High	Medium	Medium
Makrakomis	Medium	Medium	Low	High	Low	Low

The detailed results of the climate risk assessment for the RCP4.5 and RCP8.5 are presented quantitatively at normalized scale [-5, 5] in Table 29 and Table 30, respectively. The negative values of the hazard indicators have a beneficial effect and thus are considered to compensate risk.

Table 29: Quantitative (normalized) climate risk assessment at indicator level for the food system (RCP4.5), Pinios river basin

Municipality	Hazard						Exposure	Vulnerability				Risk 4.5
	Growing Degree Days	Frost	Heat stress	Aridity	Flood recurrence	Composite hazard indicator	Share of main crops	Water exploitation	Agricultural water consumption	Agricultural income	Composite vulnerability indicator	
Diou - Olympou	-1.0	0.8	2.8	3.2	-1.1	**1.2**	**0**	3.0	4.8	5.0	**4.5**	**0.8**
Servion - Velventou	-1.2	2.7	3.0	3.1	1.0	**2.3**	**0**	3.0	4.8	5.0	**4.5**	**1.0**
Deskatis	-1.0	2.3	3.1	3.1	0.2	**1.9**	**0**	3.0	4.8	5.0	**4.5**	**0.8**
Larisaion	-0.6	0.1	5.0	3.8	1.7	**3.3**	**2.4**	3.0	4.8	5.0	**4.5**	**3.3**
Agias	-0.7	0.3	3.8	3.7	3.2	**2.6**	**1.0**	3.0	4.8	5.0	**4.5**	**2.4**
Elassonas	-1.3	1.9	3.2	3.2	1.6	**2.4**	**0.1**	3.0	4.8	5.0	**4.5**	**1.3**
Kileler	-0.6	0.1	5.0	3.8	2.0	**3.3**	**2.8**	3.0	4.8	5.0	**4.5**	**3.4**
Tempon	-0.8	0.6	3.4	3.5	2.0	**2.3**	**0.5**	3.0	4.8	5.0	**4.5**	**1.9**
Tyrnavou	-0.7	0.3	4.5	3.5	2.8	**3.2**	**0.4**	3.0	4.8	5.0	**4.5**	**2.3**
Farsalon	-0.6	0.2	4.6	3.4	1.3	**3.0**	**2.8**	3.0	4.8	5.0	**4.5**	**3.2**
Karditsas	-0.7	0.2	4.5	3.1	3.8	**3.2**	**2.3**	3.0	4.8	5.0	**4.5**	**3.2**
Limnis Plastira	-0.8	0.6	3.6	3.9	3.4	**2.5**	**0**	3.0	4.8	5.0	**4.5**	**1.0**
Mouzakiou	-0.8	0.8	3.8	3.0	3.4	**2.9**	**2.3**	3.0	4.8	5.0	**4.5**	**3.0**
Palama	-0.6	0.1	5.0	3.3	3.2	**3.4**	**3.7**	3.0	4.8	5.0	**4.5**	**3.7**
Sofadon	-0.7	0.2	4.6	3.3	4.2	**3.3**	**3.0**	3.0	4.8	5.0	**4.5**	**3.5**
Almyrou	-0.8	0.6	3.3	3.4	1.8	**2.2**	**0.2**	3.0	4.8	5.0	**4.5**	**1.5**
Riga Feraiou	-0.6	0.1	4.4	3.5	2.6	**3.0**	**1.3**	3.0	4.8	5.0	**4.5**	**2.7**
Trikkaion	-0.7	0.3	4.5	3.0	1.4	**2.9**	**1.2**	3.0	4.8	5.0	**4.5**	**2.6**
Kalampakas	-0.9	2.0	3.1	3.1	0.5	**2.1**	**0**	3.0	4.8	5.0	**4.5**	**1.1**

Pylis	-0.9	1.6	3.0	3.0	2.3	**2.1**	**0.3**	3.0	4.8	5.0	**4.5**	**1.7**
Farkadonas	-0.6	0.2	4.8	3.3	2.5	**3.2**	**2.2**	3.0	4.8	5.0	**4.5**	**3.2**
Domokou	-0.7	0.4	4.2	3.8	2.3	**2.9**	**1.7**	3.0	4.8	5.0	**4.5**	**2.8**
Makrakomis	-0.9	0.6	3.6	3.4	3.6	**2.7**	**0**	3.0	4.8	5.0	**4.5**	**0.0**

Table 30: Quantitative (normalized) climate risk assessment at indicator level for the food system (RCP8.5), Pinios river basin

Municipality	**Hazard**						**Exposure**	**Vulnerability**				**Risk 8.5**
	Growing Degree Days	**Frost**	**Heat stress**	**Aridity**	**Flood recurrence**	**Composite hazard indicator**	**Share of main crops**	**Water exploitation**	**Agricultural water consumption**	**Agricultural income**	**Composite vulnerability indicator**	
Diou - Olympou	-1.6	1.0	3.1	3.1	-1.2	**1.4**	**0**	3.0	4.8	5.0	**4.5**	**0.9**
Servion - Velventou	-1.9	2.8	3.3	3.2	1.6	**2.7**	**0**	3.0	4.8	5.0	**4.5**	**1.1**
Deskatis	-1.6	2.4	3.3	3.2	-1.5	**2.0**	**0**	3.0	4.8	5.0	**4.5**	**0.9**
Larisaion	-1.0	0.2	5.0	3.5	-0.2	**3.2**	**2.4**	3.0	4.8	5.0	**4.5**	**3.2**
Agias	-1.1	0.3	4.0	3.6	1.9	**2.7**	**1.0**	3.0	4.8	5.0	**4.5**	**2.4**
Elassonas	-2.1	2.0	3.4	3.3	1.3	**2.7**	**0.1**	3.0	4.8	5.0	**4.5**	**1.3**
Kileler	-1.0	0.2	5.0	3.6	0.5	**3.2**	**2.8**	3.0	4.8	5.0	**4.5**	**3.3**
Tempon	-1.3	0.8	3.7	3.4	1.2	**2.5**	**0.5**	3.0	4.8	5.0	**4.5**	**2.0**
Tyrnavou	-1.1	0.4	4.7	3.5	1.2	**3.2**	**0.4**	3.0	4.8	5.0	**4.5**	**2.3**
Farsalon	-1.1	0.2	4.8	3.3	0.5	**3.1**	**2.8**	3.0	4.8	5.0	**4.5**	**3.3**
Karditsas	-1.1	0.3	4.6	3.1	2.7	**3.2**	**2.3**	3.0	4.8	5.0	**4.5**	**3.2**
Limnis Plastira	-1.3	0.8	3.8	4.0	2.3	**2.6**	**0**	3.0	4.8	5.0	**4.5**	**1.0**
Mouzakiou	-1.3	0.9	4.0	3.1	1.6	**2.8**	**2.3**	3.0	4.8	5.0	**4.5**	**3.0**
Palama	-1.0	0.1	5.0	3.3	1.6	**3.3**	**3.7**	3.0	4.8	5.0	**4.5**	**3.6**
Sofadon	-1.1	0.3	4.8	3.2	2.8	**3.3**	**3.0**	3.0	4.8	5.0	**4.5**	**3.5**

Municipality	Hazard						Exposure	Vulnerability				Risk 8.5
	Growing Degree Days	Frost	Heat stress	Aridity	Flood recurrence	Composite hazard indicator	Share of main crops	Water exploitation	Agricultural water consumption	Agricultural income	Composite vulnerability indicator	
Almyrou	-1.3	0.8	3.5	3.4	1.2	**2.4**	**0.2**	3.0	4.8	5.0	**4.5**	**1.6**
Riga Feraiou	-1.0	0.1	4.6	3.5	2.9	**3.2**	**1.3**	3.0	4.8	5.0	**4.5**	**2.8**
Trikkaion	-1.1	0.4	4.6	3.1	0.3	**2.9**	**1.2**	3.0	4.8	5.0	**4.5**	**2.7**
Kalampakas	-1.5	2.1	3.3	3.2	-0.7	**2.3**	**0**	3.0	4.8	5.0	**4.5**	**1.1**
Pylis	-1.5	1.8	3.2	3.0	0.1	**2.1**	**0.3**	3.0	4.8	5.0	**4.5**	**1.7**
Farkadonas	-1.0	0.2	5.0	3.4	-0.3	**3.0**	**2.2**	3.0	4.8	5.0	**4.5**	**3.1**
Domokou	-1.1	0.5	4.4	3.7	1.4	**3.0**	**1.7**	3.0	4.8	5.0	**4.5**	**2.9**
Makrakomis	-1.4	0.8	3.8	3.3	3.3	**2.9**	**0**	3.0	4.8	5.0	**4.5**	**0.0**

Energy system

The results of the climate risk assessment, with respect to the energy system, are presented in Table 31, Table 32 and Table 33.

As can be seen in Table 31, a "Low" level risk is expected for all municipalities of the pilot, according to both scenarios as the result of a "Low" hazard, in combination with a "Low-Medium" exposure level and "Medium" vulnerability. Therefore, no change is expected at risk level for the Pinios river basin pilot.

Table 31: Qualitative climate risk assessment per risk component for the energy system (RCP4.5 and RCP8.5), Pinios river basin

Municipality	Hazard		Exposure		Vulnerability	Risk	
	4.5	8.5	4.5	8.5		4.5	8.5
Diou - Olympou	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Servion - Velventou	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Deskatis	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Larisaion	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Agias	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Elassonas	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Kileler	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Tempon	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Tyrnavou	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Farsalon	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Karditsas	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Limnis Plastira	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Mouzakiou	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Palama	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Sofadon	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Almyrou	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Riga Feraiou	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Trikkaion	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Kalampakas	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Pylis	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Farkadonas	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Domokou	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low
Makrakomis	Low	Low	Low-Medium	Low-Medium	Medium	Low	Low

The analytical results of the climate risk assessment for the RCP4.5 and 8.5 are presented quantitatively at normalized scale [-5, 5] in Table 32 and Table 33, respectively. The negative values of the hazard indicators have a beneficial effect and thus are considered to compensate risk.

Table 32: Quantitative (normalized) climate risk assessment at indicator level for the energy system (RCP4.5), Pinios river basin

Municipality	Hazard							Exposure					Vulnerability			Risk				
	Growing degree days (energy crop)	Frost days (energy crop)	Heat stress days 25 (energy crop)	Energy crop	Wind energy	Photovoltaic energy	Composite hazard indicator	Energy crop cultivation intensity	Wind intensity	Photovoltaic intensity	Hydropower intensity	Composite exposure indicator	Energy imports dependency	Share of energy from renewable sources	Composite vulnerability indicator	Energy crop	Wind energy	Photovoltaic energy	Hydropower energy	Overall Risk
Diou - Olympou	-1.0	0.8	2.8	0.0	0	0	**0.3**	0	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.0	0.0	0.0	0.0	**0.0**
Servion - Velventou	-1.2	2.7	3.0	0.0	0	0	**0.5**	0	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.0	0.0	0.0	0.0	**0.0**
Deskatis	-1.0	2.3	3.1	1.5	0	0	**0.5**	1.2	0.4	0.6	3.3	**1.3**	3.7	1.8	**2.2**	1.5	0.0	0.0	0.0	**0.4**
Larisaion	-0.6	0.1	5.0	1.1	0	0	**0.5**	0.3	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	1.2	0.0	0.0	0.0	**0.3**
Agias	-0.7	0.3	3.8	1.5	0	0	**0.4**	2.7	0.4	0.6	3.3	**1.7**	3.7	1.8	**2.2**	1.5	0.0	0.0	0.0	**0.4**
Elassonas	-1.3	1.9	3.2	0.8	0	0	**0.4**	0.1	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.9	0.0	0.0	0.0	**0.2**
Kileler	-0.6	0.1	5.0	0.9	0	0	**0.5**	0.1	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.9	0.0	0.0	0.0	**0.2**
Tempon	-0.8	0.6	3.4	1.1	0	0	**0.4**	0.6	0.4	0.6	3.3	**1.2**	3.7	1.8	**2.2**	1.1	0.0	0.0	0.0	**0.3**
Tyrnavou	-0.7	0.3	4.5	0.0	0	0	**0.5**	0	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.0	0.0	0.0	0.0	**0.0**
Farsalon	-0.6	0.2	4.6	1.1	0	0	**0.4**	0.3	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	1.1	0.0	0.0	0.0	**0.3**
Karditsas	-0.7	0.2	4.5	0.9	0	0	**0.4**	0.1	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.9	0.0	0.0	0.0	**0.2**
Limnis Plastira	-0.8	0.6	3.6	0.0	0	0	**0.4**	0	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.0	0.0	0.0	0.0	**0.0**
Mouzakiou	-0.8	0.8	3.8	0.9	0	0	**0.4**	0.1	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.9	0.0	0.0	0.0	**0.2**
Palama	-0.6	0.1	5.0	0.9	0	0	**0.5**	0.1	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	1.0	0.0	0.0	0.0	**0.2**
Sofadon	-0.7	0.2	4.6	1.1	0	0	**0.5**	0.3	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	1.1	0.0	0.0	0.0	**0.3**

Municipality	Hazard							Exposure					Vulnerability			Risk				
	Growing degree days (energy crop)	Frost days (energy crop)	Heat stress days 25 (energy crop)	Energy crop	Wind energy	Photovoltaic energy	Composite hazard indicator	Energy crop cultivation intensity	Wind intensity	Photovoltaic intensity	Hydropower intensity	Composite exposure indicator	Energy imports dependency	Share of energy from renewable sources	Composite vulnerability indicator	Energy crop	Wind energy	Photovoltaic energy	Hydropower energy	Overall Risk
Almyrou	-0.8	0.6	3.3	0.0	0	0	**0.3**	0	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.0	0.0	0.0	0.0	**0.0**
Riga Feraiou	-0.6	0.1	4.4	1.1	0	0	**0.4**	0.3	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	1.1	0.0	0.0	0.0	**0.3**
Trikkaion	-0.7	0.3	4.5	1.0	0	0	**0.4**	0.2	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	1.0	0.0	0.0	0.0	**0.2**
Kalampakas	-0.9	2.0	3.1	1.7	0	0	**0.5**	3.1	0.4	0.6	3.3	**1.8**	3.7	1.8	**2.2**	1.8	0.0	0.0	0.0	**0.4**
Pylis	-0.9	1.6	3.0	1.5	0	0	**0.4**	1.9	0.4	0.6	3.3	**1.5**	3.7	1.8	**2.2**	1.5	0.0	0.0	0.0	**0.4**
Farkadonas	-0.6	0.2	4.8	0.0	0	0	**0.5**	0	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.0	0.0	0.0	0.0	**0.0**
Domokou	-0.7	0.4	4.2	1.7	0	0	**0.4**	2.8	0.4	0.6	3.3	**1.8**	3.7	1.8	**2.2**	1.7	0.0	0.0	0.0	**0.4**
Makrakomis	-0.9	0.6	3.6	0.0	0	0	**0.4**	0	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.0	0.0	0.0	0.0	**0.0**

Table 33: Quantitative (normalized) climate risk assessment at indicator level for the energy system (RCP8.5), Pinios river basin

Municipality	Hazard							Exposure					Vulnerability			Risk				
	Growing degree days (energy crop)	Frost days (energy crop)	Heat stress days 25 (energy crop)	Energy crop composite indicator	Wind energy	Photovoltaic energy	Composite hazard indicator	Energy crop cultivation intensity	Wind intensity	Photovoltaic intensity	Hydropower intensity	Composite exposure indicator	Energy imports dependency	Share of energy from renewable sources	Composite vulnerability indicator	Energy crop	Wind energy	Photovoltaic energy	Hydropower energy	Overall Risk
Diou - Olympou	-1.6	1.0	3.1	0.8	0	0	**0.3**	0	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.0	0.1	0.0	0.0	**0.0**
Servion - Velventou	-1.9	2.8	3.3	1.4	0	0	**0.5**	0	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.0	0.1	0.0	0.0	**0.0**
Deskatis	-1.6	2.4	3.3	1.4	0	0	**0.5**	1.2	0.4	0.6	3.3	**1.3**	3.7	1.8	**2.2**	1.5	0.1	0.0	0.0	**0.4**
Larisaion	-1.0	0.2	5.0	1.4	0	0	**0.5**	0.3	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	1.1	0.0	0.0	0.0	**0.3**
Agias	-1.1	0.3	4.0	1.1	0	0	**0.4**	2.7	0.4	0.6	3.3	**1.7**	3.7	1.8	**2.2**	1.5	0.1	0.0	0.0	**0.4**
Elassonas	-2.1	2.0	3.4	1.1	0	0	**0.4**	0.1	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.8	0.0	0.0	0.0	**0.2**
Kileler	-1.0	0.2	5.0	1.4	0	0	**0.5**	0.1	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.9	0.0	0.0	0.0	**0.2**
Tempon	-1.3	0.8	3.7	1.1	0	0	**0.4**	0.6	0.4	0.6	3.3	**1.2**	3.7	1.8	**2.2**	1.1	0.1	0.0	0.0	**0.3**
Tyrnavou	-1.1	0.4	4.7	1.3	0	0	**0.4**	0	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.0	0.0	0.0	0.0	**0.0**
Farsalon	-1.1	0.2	4.8	1.3	0	0	**0.4**	0.3	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	1.1	0.0	0.0	0.0	**0.3**
Karditsas	-1.1	0.3	4.6	1.3	0	0	**0.4**	0.1	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.9	0.0	0.0	0.0	**0.2**
Limnis Plastira	-1.3	0.8	3.8	1.1	0	0	**0.4**	0	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.0	0.0	0.0	0.0	**0.0**
Mouzakiou	-1.3	0.9	4.0	1.2	0	0	**0.4**	0.1	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.9	0.0	0.0	0.0	**0.2**
Palama	-1.0	0.1	5.0	1.4	0	0	**0.5**	0.1	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.9	0.0	0.0	0.0	**0.2**
Sofadon	-1.1	0.3	4.8	1.3	0	0	**0.4**	0.3	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	1.1	0.0	0.0	0.0	**0.3**
Almyrou	-1.3	0.8	3.5	1.0	0	0	**0.3**	0	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.0	0.0	0.0	0.0	**0.0**
Riga Feraiou	-1.0	0.1	4.6	1.2	0	0	**0.4**	0.3	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	1.1	0.1	0.0	0.0	**0.3**
Trikkaion	-1.1	0.4	4.6	1.3	0	0	**0.4**	0.2	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	1.0	0.0	0.0	0.0	**0.2**

Municipality	Hazard							Exposure					Vulnerability			Risk				
	Growing degree days (energy crop)	Frost days (energy crop)	Heat stress days 25 (energy crop)	Energy crop composite indicator	Wind energy	Photovoltaic energy	Composite hazard indicator	Energy crop cultivation intensity	Wind intensity	Photovoltaic intensity	Hydropower intensity	Composite exposure indicator	Energy imports dependency	Share of energy from renewable sources	Composite vulnerability indecator	Energy crop	Wind energy	Photovoltaic energy	Hydropower energy	Overall Risk
Kalampakas	-1.5	2.1	3.3	1.3	0	0	**0.4**	3.1	0.4	0.6	3.3	**1.8**	3.7	1.8	**2.2**	1.7	0.0	0.0	0.0	**0.4**
Pylis	-1.5	1.8	3.2	1.2	0	0	**0.4**	1.9	0.4	0.6	3.3	**1.5**	3.7	1.8	**2.2**	1.5	0.0	0.0	0.0	**0.4**
Farkadonas	-1.0	0.2	5.0	1.4	0	0	**0.5**	0	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.0	0.0	0.0	0.0	**0.0**
Domokou	-1.1	0.5	4.4	1.3	0	0	**0.4**	2.8	0.4	0.6	3.3	**1.8**	3.7	1.8	**2.2**	1.7	0.0	0.0	0.0	**0.4**
Makrakomis	-1.4	0.8	3.8	1.1	0	0	**0.4**	0	0.4	0.6	3.3	**1.1**	3.7	1.8	**2.2**	0.0	0.1	0.0	0.0	**0.0**

WEF Nexus systems

In this section, the results of the risk assessment for the period of 2031-2050 are summarized for all WEF systems and aggregated at pilot level, based on the area weighted average of the pilot administrative units. In addition, the result of the adaptive capacity assessment is presented in parallel, in order to examine the degree to which the overall risk can be influenced.

The results for the Pinios river basin are presented in Table 34. As can be seen, according to both future climate scenarios the overall risk for the Water system is expected to be "Medium-High", for the Food system "Medium" and for the Energy system "Low".

Furthermore, the adaptive capacity is characterized as "Low-Medium" for the pilot, which theoretically is not sufficient to address the the expected risk for the Food and Energy systems.

Table 34: Overall risk of the WEF Nexus systems and adaptive capacity, Pinios river basin

System	Overall Risk		Adaptive Capacity
	RCP4.5	RCP8.5	
Water	(3.1) Medium-High	(3.0) Medium-High	(1.9) Low-Medium
Food	(2.1) Medium	(2.2) Medium	
Energy	(0.2) Low	(0.2) Low	

3.2 Climate Risk Assessment: Lower Danube river basin

In this section the results of the hazard, exposure and vulnerability assessment, as well as the results from the adaptive capacity's and the overall climate risk assessment are provided, for the lower Danube river basin.

3.2.1 Hazard

In the following paragraphs, the results for the hazard indicators are given, for the food, water and energy systems.

Water system

Aridity

The spatial distribution of the Aridity index is depicted in Figure 25. It is observed that, for the reference period there are humid conditions at the greater part of the basin, while hyper-humid conditions are observed at the western part of the basin, where the mountains are located. Additionally, dry/sub-humid and semi-arid conditions are found in scattered areas of the basin, however the area they cover is small. For the future period and according to both scenarios, the hyper-humid conditions expected to disappear, and humid conditions to replace them. Moreover, the largest part of the area presents dry/sub-humid and semi-arid conditions, while the areas that used to be semi-arid in the reference period, are expected to be arid.

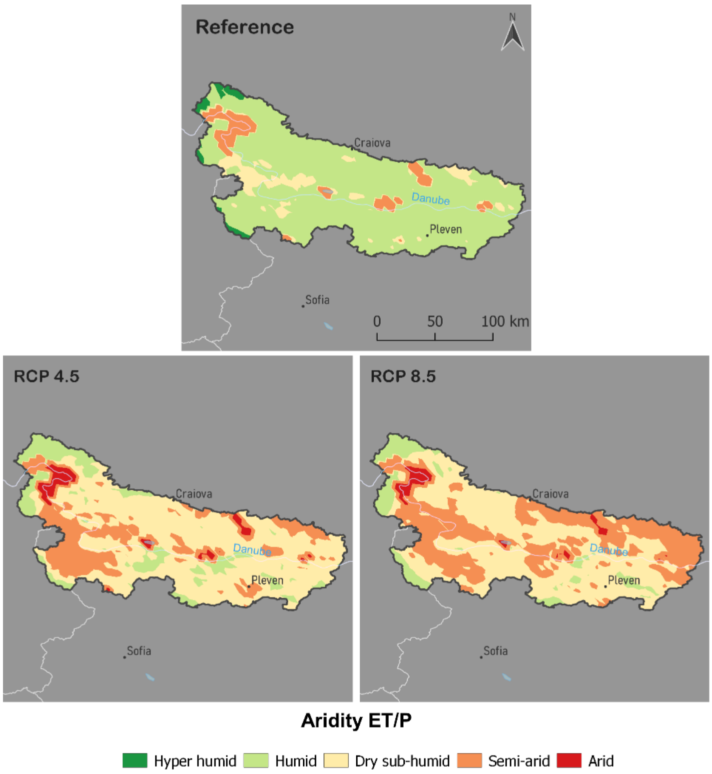

Figure 25: Spatial distribution of the mean annual Aridity indicator (potential evapotranspiration/precipitation) for the reference period (top) and the future period (2011-2070) based on the RCP4.5 and RCP8.5 (bottom) , lower Danube river basin

The relative change (%) of the actual aridity in the future compared to the reference period for both scenarios, is shown in Table 35. Can be seen that there is an increase of aridity for all the three future sub-periods compared to the reference period. Specifically, for the short-term period the deviation from the reference period is 24%, while for the long-term period reaches up to 58% for both scenarios.

Table 35: Relative change (%) of the mean annual aridity (potential evapotranspiration/precipitation), for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, lower Danube river basin

Aridity Index	2011-2040		2041-2070		2071-2100	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	24	24	56	48	58	58

Flood Recurrence

The spatial distribution of the relative change of the flood recurrence indicator is depicted in Figure 26. The change in flood recurrence starts from -90% in a small part at the centre of the basin and reaches up to 180% at the western part of the basin, for both scenarios. In addition, for the RCP4.5 the basin is separated into two parts (west and east), with the western part expected to experience an increase in floods of up to 60%, while the eastern part has a reduction of up to 40%. On the other hand, for the RCP8.5, most of the basin is expected to show an increase of 1% to 60%, while the area in the east of the basin that shows a decrease of up to 40% is of limited extent.

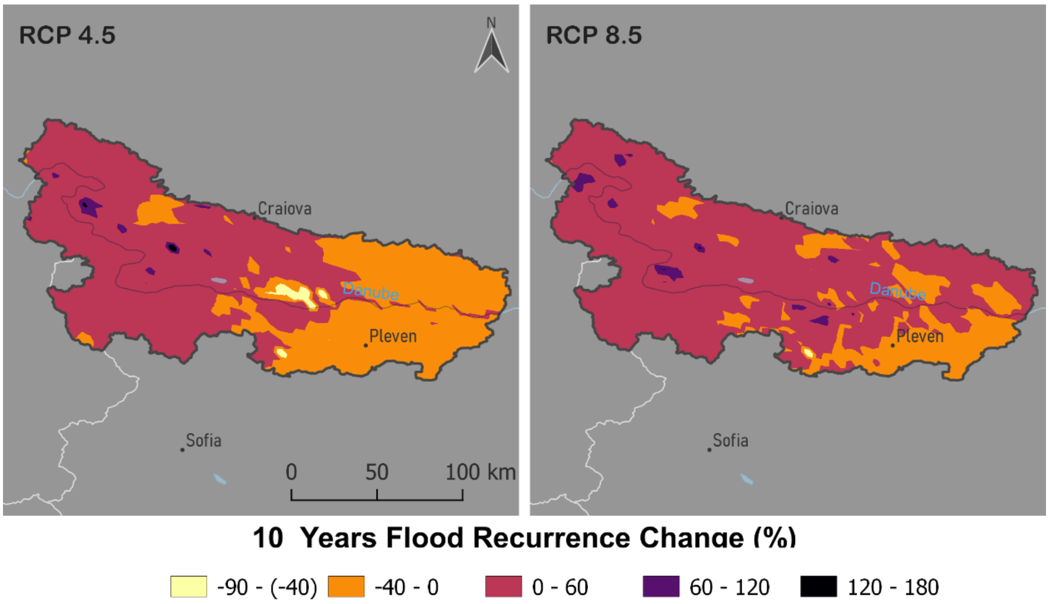

Figure 26: Spatial distribution of the 10 years Flood Recurrence relative change (%), for the future period (2011-2040) based on the RCP4.5 and RCP8.5, lower Danube river basin

The relative change (%) from the reference period of the flood recurrence index, with return period of 10 years, is shown in Table 36 for the examined future sub-periods and for both RCP4.5 and RCP8.5. It can be seen that there is an increase of the index for all the three future sub-periods compared to the reference period, except from a small decrease (-1.2%) for the RCP4.5 for the long-term period. Specifically, for the short-term period the deviation from the reference period is 7.5% on average and in the long-term period this increasing trend reaches up to 25% for the RCP8.5.

Table 36: Relative change (%) of the flood recurrence with return period 10 years, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, lower Danube river basin

Flood recurrence Return period: 10 years	2011-2040		2041-2070		2071-2100	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	6	9	2	11	-1.2	25

<u>Mean Runoff</u>

Regarding the spatial distribution of the mean runoff as this is depicted in Figure 27, the two scenarios show similar results. For the RCP4.5 the basin is separated in two parts; the east and the west part which expected to experience a decrease and an increase in mean runoff respectively. Specifically, for the east part of the basin the change of mean runoff is from 0% to -20%, while the increase's range of the west part is from 0% to +25%. Similarly, according to RCP8.5, the basin expected to be seperated in two parts, with the increasing area to be more extended to the east and up to +20%. In both scenarios the city of Pleven expected to experience a decrease in mean runoff, up to -20%.

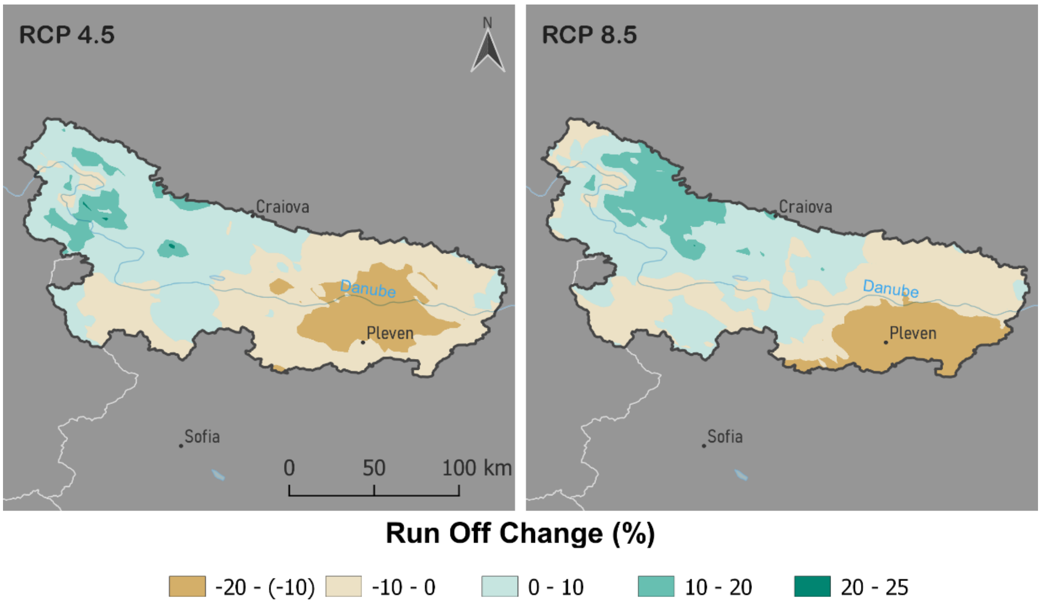

Figure 27: Spatial distribution of the mean runoff relative change (%), for the future period (2011-2040) based on the RCP4.5 and RCP8.5, lower Danube river basin

The relative change (%) from the reference period of the mean runoff indicator, is shown in Table 37, for the examined future sub-periods and for both RCP4.5 and RCP8.5. It can be seen that there is an increase for the near-term period and a decrease of the index for the rest future sub-periods compared to the reference period. Specifically, the increase for the short-term period is 4% and 1% for the RCP4.5 and RCP8.5 respectively. For the RCP4.5 the decreasing trend starts from -1% in the mid-term period and reaches up to -10% in the long-term period. Similarly, the RCP8.5 starts from -5% (mid-term) and reaches up to -17% (long-term).

Table 37: Relative change (%) of the mean runoff, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, lower Danube river basin

Mean Runoff	2011-2040		2041-2070		2071-2100	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	4	1	-1	-5	-10	-17

Food system

Growing Degree Days

Regarding the spatial distribution of the GDD for the period 2031-2050, as this is depicted in Figure 28, it is observed that during the reference period the GDD range starts from 1300°C to 2300°C per year at the mountains of the North-west part of the pilot and reaches up to 2900°C in the rest of the basin. During the future period, the minimum GDD remain similar to the reference period, but in a much smaller area. As for the maximum GDD for the future period, ranges between 2900°C and 3400°C for both scenarios, with a substantial increase of the area where the maximum GDD is expected, in the case of RCP8.5.

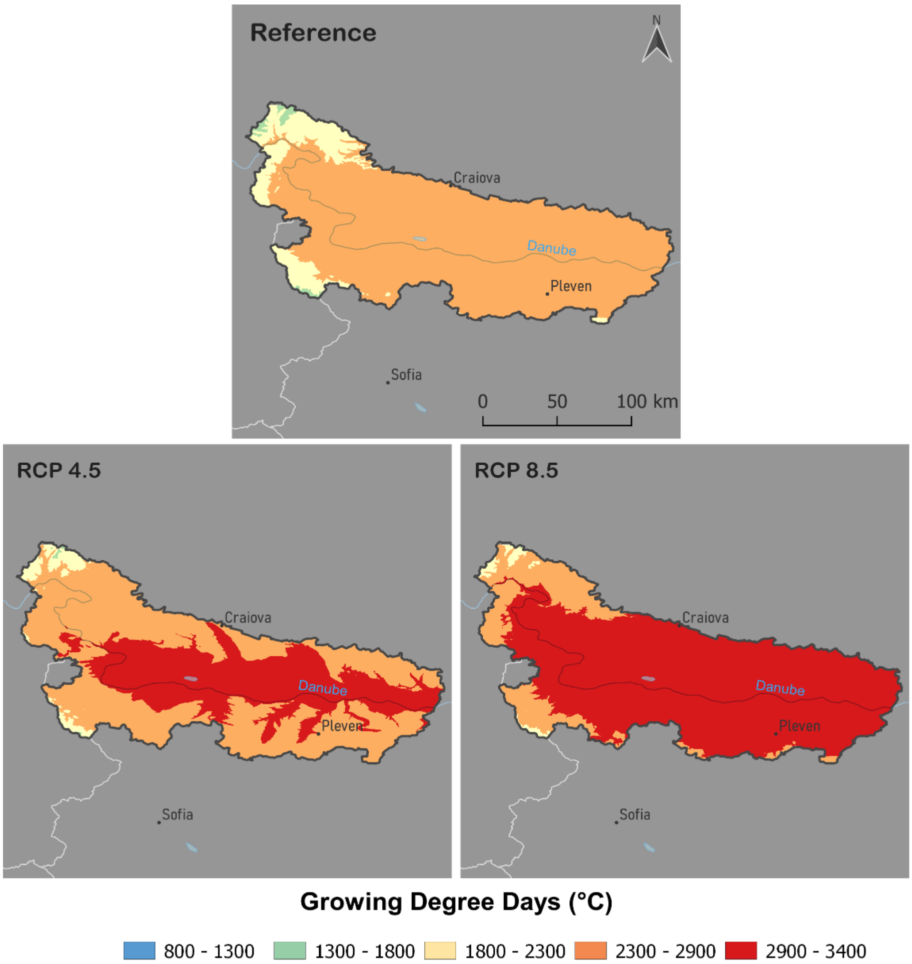

Figure 28: Spatial distribution of the mean annual Growing Degree Days with base temperature 5°C, for the reference period (top) and the future period (2031-2050) based on the RCP4.5 and RCP8.5 (bottom), lower Danube river basin

The relative change in percentage (%) of the GDD indicator for the examined future periods in relation to the reference period is given in Table 38. Can be seen that the trend for all the periods and scenarios is increasing. More specific, for the RCP4.5 the change expected to be 17%, compared to the reference period, for the near-term period (2031-2050), while this this difference is expected to reach up to 28% at the long-term period. Similarly, for the RCP8.5, the change expected to be 27% for the near-term period and 65% for the long-term period.

Table 38: Relative change (%) of the growing degree days, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, lower Danube river basin

Growing degree days Tmean > 5°C	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	17	28	23	48	27	67

Heat Stress Days > 25°C

The spatial distribution of the mean annual number of days with maximum temperature above 25°C for the lower Danube river basin, is depicted in Figure 29. It is observed that during the reference period, the number of heat stress days per year ranges from 0 to140, with the lowest number of days (up to 35) being observed at the north-western and south-western parts of the basin. This number gradually increases reaching the maximum values at the rest of the basin. For the future period, the range of heat stress days will remain the same, while the area where the highest values (>105 days) are observed, will be significantly expanded compared to the reference period, according to both scenarios.

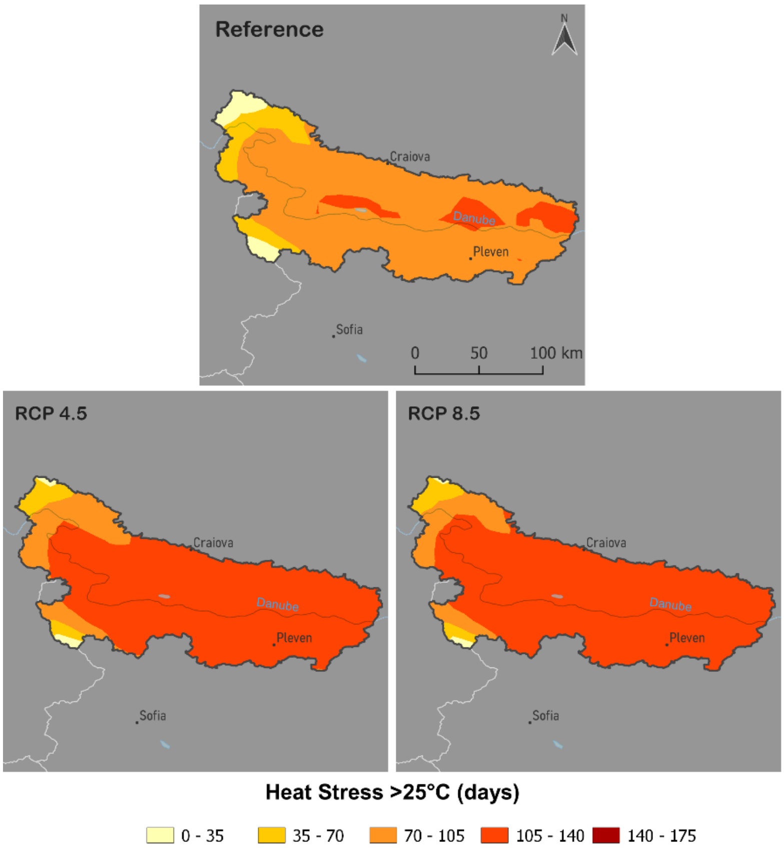

Figure 29: Spatial distribution of the mean annual number of days with maximum daily temperature > 25°C, for the reference period (top) and the future period (2031-2050) based on the RCP4.5 and RCP8.5 (bottom), lower Danube river basin

The relative change (%) of the number of heat stress days >25°C expected for the future, is summarized in Table 39. As can be seen, an increase of 38.5% on average is projected for the near-term period (2031-2050) with small differentiation among the two scenarios. For the long-term period (2071-2090), the increase for RCP4.5 is expected to be lower (6%) compared to the near-term period, while for RCP8.5 a considerable increase of 46% is expected. In contrast, for the mid-term period a decrease of 60% and 37% is expected based on RCP4.5 and RCP8.5 respectively, which is considered an anomaly for the climatic trends.

Table 39: Relative change (%) of the mean annual number of days with maximum temperature > 25°C, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, lower Danube river basin

Heat stress days Tmax > 25°C	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	34	43	-60	-37	6	46

Heat Stress Days > 30°C

The spatial distribution of the mean annual number of days with maximum temperature above 30°C for the lower Danube river basin, is depicted in Figure 30. It is observed that during the reference period, the number of heat stress days per year ranges from 0 to39, with the lowest number of days (up to 13) being observed at the north-western and south-western parts of the basin. This number increases until to reach the maximum values (up to 39 days) at the centre of the basin. For the future period, the range of heat stress days is 0 to 65, with the location of the lowest values remains the same as the reference period, while the maximum values of heat stress days cover the greater part of the area, for both scenarios.

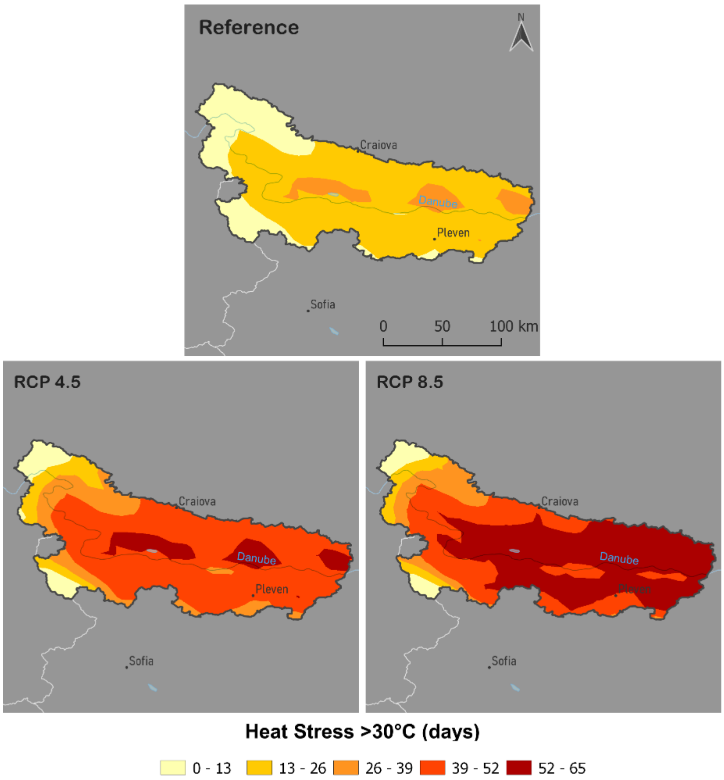

Figure 30. Spatial distribution of the mean annual number of days when maximum daily temperature > 30°C, for the reference period (top) and the future period (2031-2050) based on the RCP4.5 and RCP8.5 (bottom), lower Danube river basin

The relative change (%) of the number of heat stress days >30°C expected for the future, is summarized in Table 40. As can be seen, an increase of 197% on average is projected for the near-term period (2031-2050) with a noticeable differentiation among the two scenarios. For the long-term period (2071-2090), the increase for RCP4.5 is expected to be lower (49%) compared to the near-term period, while for RCP8.5 a considerable increase of 232% is expected. In contrast, for the mid-term period an intense decrease of 93% on average is expected, which is considered an anomaly for the climatic trends.

Table 40: Relative change (%) of the mean annual number of days with maximum temperature > 30°C, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, lower Danube river basin

Heat stress days Tmax > 30°C	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	159	234	-96	-90	49	232

Frost Days

The spatial distribution of the number of frost days is depicted in Figure 31. It is observed that during the reference period the number of days starts from 0 days at the south of the basin, and reaches up to 120 days at the mountains, at the western part of the area. During the future period, the days with no frost (or up to 25 days) are observed at a much greater area than the reference period, especially for the RCP4.5. In addition, for the future period the frost does not exceed 100 days, even at the mountainous areas.

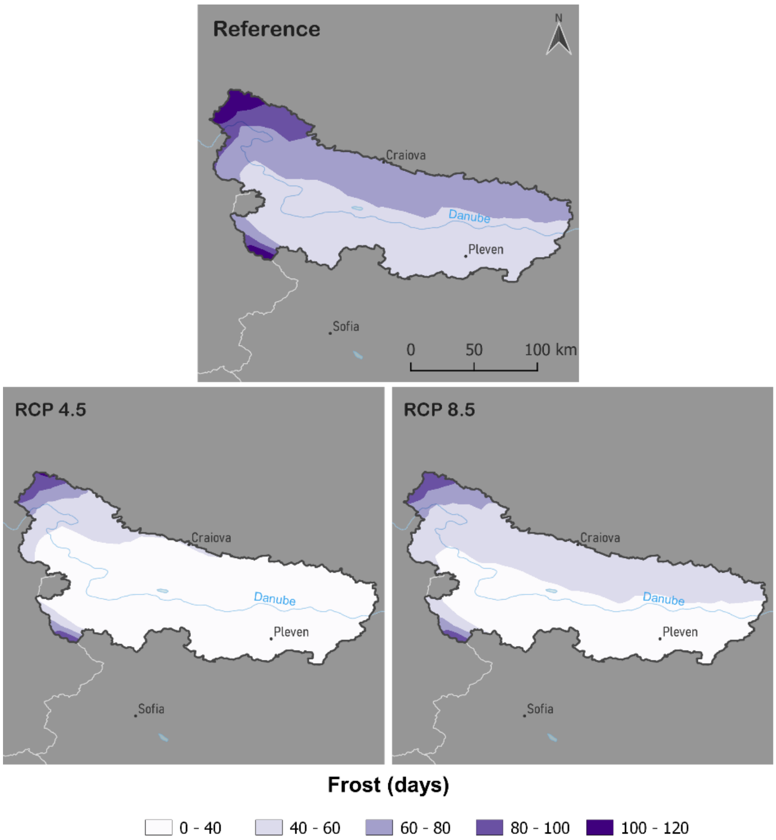

Figure 31: Spatial distribution of the mean annual number of days with minimum temperature below 0°C, for the reference period (top) and the future period (2031-2050) based on the RCP4.5 and RCP8.5 (bottom), lower Danube river basin

The projected relative change (%) of the number of days with minimum temperature below 0°C, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, is summarized in Table 41. It may be concluded that for the short-term period, there is no significant difference between the scenarios, with an average 45% reduction, from the reference period. Furthermore, for the mid-term period there is a reduction of 96% on average for the two scenarios, while for the long-term period the reduction is similar to the mid-term for the RCP8.5 and a little smaller for the RCP4.5.

Table 41: Relative change (%) of the number of days with minimum temperature < 0°C, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, lower Danube river basin

Frost days	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	-40	-30	-95	-97	-84	-97

Energy system

Hydropower generation rivers and/or reservoirs

The relative change (%) from the reference period of the hydropower generation of rivers, is shown in Table 42 for the examined future sub-periods and for both RCP4.5 and RCP8.5. Can be seen that the results for the two scenarios are the same for the three sub-periods and the trend is decreasing. Specifically, for the short-term period the deviation from the reference period is -3% and in the long-term period reaches up to -8%.

Table 42: Relative change (%) of the hydropower generation rivers, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, lower Danube river basin

Hydropower generation rivers	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	-3	-3	-5	-5	-8	-8

The relative change (%) from the reference period of the hydropower generation of reservoirs, is shown in Table 43 for the examined future sub-periods and for both RCP4.5 and RCP8.5. Can be seen that the RCP4.5 shows a small decrease of -2% for the near-term period and with an increasing trend reaches up to +4% for the long-term period. On the other hand the RCP8.5 starts from +7% for the near-term period and with a decreasing trend it ends up at +5% in the long-term period, compared to the reference period.

Table 43: Relative change (%) of the hydropower generation reservoirs, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, lower Danube river basin

Hydropower generation reservoirs	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	-2	7	0	6	4	5

Solar photovoltaic power generation

The relative change (%) from the reference period of the solar photovoltaic power generation indicator, is shown in Table 44, for the examined future sub-periods and for both RCP4.5 and RCP8.5. Can be seen that there is almost no difference between the future and the reference period, since the relative change range from -0.1% to -1.7% for both scenarios. The maximum value of relative change (-1.7%) is for the RCP8.5 for the long-term period, while the minimum value of relative change (-0.1%) is for the RCP4.5 for the same period.

Table 44: Relative change (%) of solar photovoltaic power generation (ratio of actual generation over installed capacity), for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, lower Danube river basin

Solar photovoltaic power generation	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	-0.2	-0.2	-0.8	-1.6	-0.1	-1.7

Wind power generation

The relative change (%) from the reference period of the solar photovoltaic power generation indicator, is shown in Table 45, for the examined future sub-periods and for both RCP4.5 and RCP8.5. Can be seen that there is small difference between the future and the reference period, since the relative change range from -1.7% to +3.1% for both scenarios. The maximum value of relative change (+3.1%) is for the RCP8.5 for the long-term period, while the minimum value of relative change (0.8%) is for the RCP4.5 for the mid-term period.

Table 45: Relative change (%) of the wind power generation (ratio of actual generation over installed capacity), for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, lower Danube river basin

Wind power generation	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	1.0	-1.7	0.8	1.7	1.6	3.1

3.2.2 Exposure

In this section, the results of the exposure assessment of the lower Danube river basin for the food and energy systems are presented.

Food system

In this sub-section the results of the assessment of the food exposure index related to the areas cultivated with the crops under study (wheat, maize, and sunflower) are presented.

Share of main crops

The share of areas cultivated with the main crops in each administrative unit[1] to the total area of the administrative unit for the lower Danube river basin, is depicted in Figure 32. As can be seen, the examined crops of wheat and maize are cultivated in great extent (40-90%) at almost all the area of the pilot, with the exception of the northern and western part of the pilot, where the main crops are rarely cultivated (0-10%).

[1] Administrative unit: Romania-Communes, Bulgaria&Serbia-Municipality

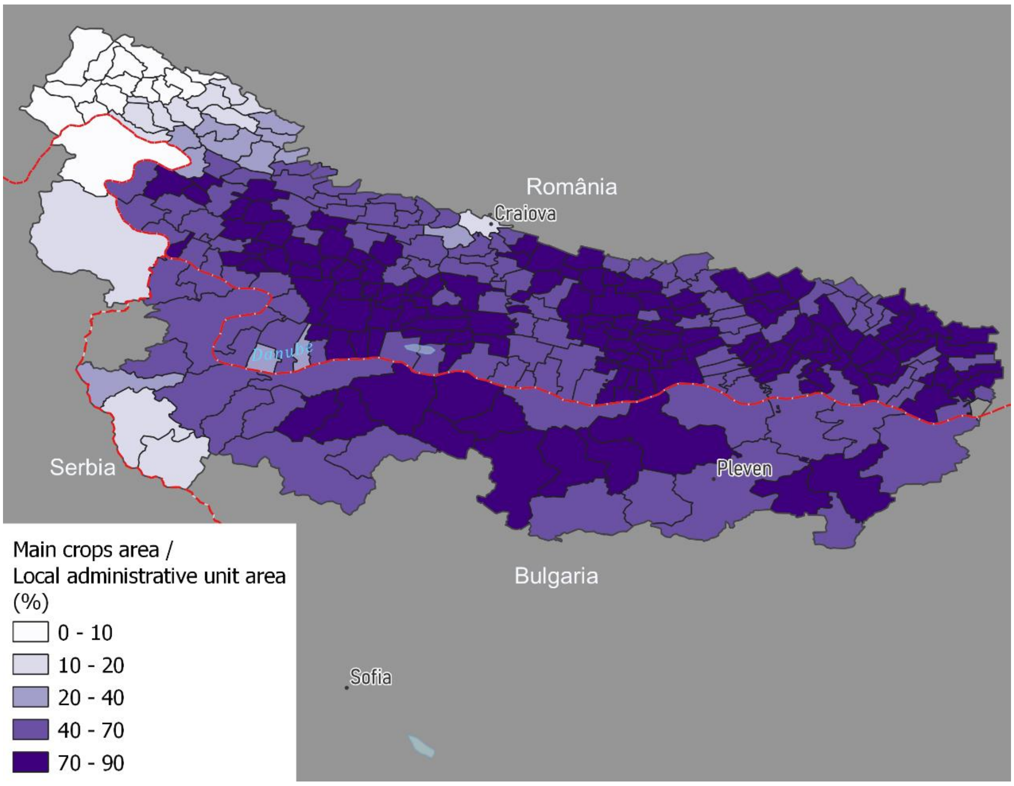

Figure 32: Food exposure index expressed as the share of the main crops area to the total administrative unit area, lower Danube river basin

Energy system

In this sub-section the results of the assessment of the energy exposure index related to the renewable energy intensity, are presented.

<u>Renewable energy intensity</u>

The location of renewable energy plants in the lower Danube river basin is delineated in Figure 33, where it is observed that photovoltaic plants are greater in number, while they are also characterized by higher spatial distribution compared to hydropower. No wind energy plants were indicated in the renewable energy database (World Resources Institute, 2021).

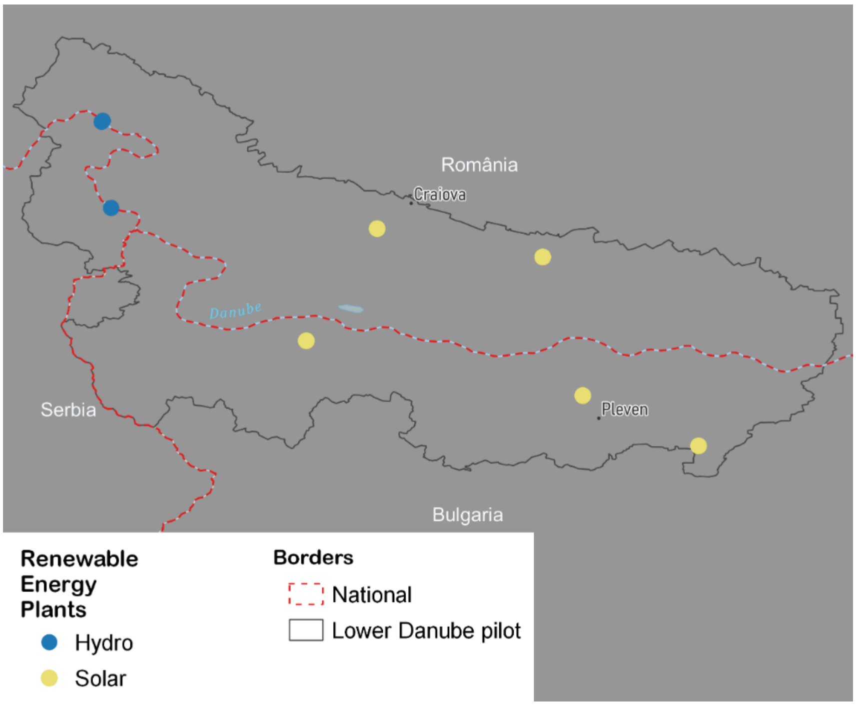

Figure 33: Photovoltaic, wind and hydropower energy operational plants, lower Danube river basin

However, when the energy intensity of the pilot is compared to the national one for each country, the situation is different, as shown in Table 46. Specifically, for the case of Romania, the hydropower energy intensity of the pilot is 6.5 times higher compared to the national intensity, while photovoltaic energy intensity of the pilot is almost half of the national one (55%). At the same time, for the case of Serbia, the hydropower energy intensity of the pilot is 3 times higher compared to the national intensity. Finally, for the case of Bulgaria where there were data available only for the photovoltaic plants, the renewable energy intensity of the pilot is almost double compared to the national one (217%). Therefore, the exposure of the hydropower sector is considered to be high, while for the photovoltaic sector is medium for Romania and high for Bulgaria.

Table 46: Energy exposure index expressed as renewable energy intensity, lower Danube river basin

Country	Renewable energy intensity	Photovoltaic	Wind	Hydropower
Romania	Pilot (MWp/ Km2p)	0.001	-	0.091
	Country (MWc /Km2c)	0.002	-	0.014
	Pilot in % of National	**55%**	**-**	**648%**
Bulgaria	Pilot (MWp/ Km2p)	0.005	-	-
	Country (MWc /Km2c)	0.003	-	-
	Pilot in % of National	**217%**	**-**	**-**
Serbia	Pilot (MWp/ Km2p)	-	-	0.798
	Country (MWc /Km2c)	-	-	0.027

	Pilot in % of National	-	-	295%

3.2.3 Vulnerability

In this section, the results of the vulnerability assessment of Lower Danube river basin for the food, water and energy systems are presented.

Water system

In this sub-section, the results of the assessment of the water vulnerability indices (Water exploitation index, Share of agricultural water consumption) for the lower Danube pilot are presented, at river basin district (RBD) level.

Water exploitation index

The Water Exploitation Index (WEI) of Danube RBDs is presented in Table 47. Specifically, it is estimated that for all the 3 districts of the pilot, the WEI is quite low (3-4%) which indicates absence of water stress in the area. Thus, the vulnerability related to this indicator is considered to be low.

Table 47: Water vulnerability index expressed as Water Exploitation Index, lower Danube river basin

River Basin District	Water Exploitation index
Danube Romania	4%
Danube Bulgaria	3%
Danube Serbia	3%

Share of agricultural water consumption

The share of agricultural water consumption in Danube river basin districts is shown in Table 48. Specifically, the highest share of agricultural water consumption is observed at the Romanian RBD (57%) which is considered to indicate medium to high vulnerability. The respective share for Serbia is 24% which is considered to indicate medium vulnerability, while for the Bulgarian RBD the share is close to zero.

Table 48: Water vulnerability index expressed as share of agricultural water consumption, lower Danube river basin

River Basin District	Share of agricultural water consumption
Danube Romania	56.6%
Danube Bulgaria	0.62%
Danube Serbia	24.2%

Food system

In this sub-section the results of the assessment of the food vulnerability index related to agricultural income, are presented at regional level, for the regions of Romania, Serbia and Bulgaria where the pilot is located.

Agricultural Income

The agricultural income of each pilot region compared to the average national agricultural income, is presented in Table 49. It is observed that the agricultural income of Muntenia region (Romania), is high compared to the average national agricultural income (166%), while the agricultural income of the Južne i Istočne Srbije region (Serbia) is quite low (56%), compared to the national average. The agriculture income of the other pilot regions is quite close to the national averages.

Table 49: Food vulnerability index expressed as agriculture income, lower Danube river basin

Country	Regions	Agricultural income	
		Million Euro	% of national average
Romania	National average	1448	100
	Vest Oltenia	1503	104
	Muntenia	2398	166
Bulgaria	National average	548	100
	Severoiztochen	597	109
Serbia	National average	9716	100
	Južne i Istočne Srbije	5429	56

Energy system

In this sub-section, the results of the energy vulnerability assessment for the indices of the Renewable energy share and the Energy import dependency are presented at country level (Romania, Bulgaria, Serbia).

Renewable energy share

The contribution of renewable energy resources in the gross final energy consumption of Romania, Serbia and Bulgaria, along with the respective EU average, is shown in Table 50. As can be seen, the shares of energy from renewable sources of all the three countries are higher than EU average although quite close to it. The higher the contribution, the higher the vulnerability of the energy system to a potential reduction in renewable energy generation due to climate change. Thus, the vulnerability related to this indicator is considered to be medium.

Table 50: Energy vulnerability index expressed as renewable energy share, lower Danube river basin

Countries	Renewable energy share
European Union (EU 27 average)	19.5%
Romania	24.4%

Countries	Renewable energy share
Bulgaria	20.6%
Serbia	21.8%

Energy import dependency

The energy imports dependency of the pilot countries along with the respective EU average, is presented in Table 51. As it is shown, the energy imports dependency of the three countries is 25-38%, which is lower compared to the EU average. The higher the import dependency of a country, the higher the vulnerability of the energy system to a potential reduction in renewable energy generation due to climate change. Thus, the vulnerability related to this indicator is considered to be medium.

Table 51: Energy vulnerability index expressed as energy import dependency, lower Danube river basin

Countries	Energy imports dependency
European Union (EU 27 average)	57.9%
Romania	25.6%
Bulgaria	38.0%
Serbia	32.7%

3.2.4 Adaptive capacity

In this section, the results of the assessment of the adaptive capacity of the lower Danube river basin are presented. Specifically, the results refer to (i) the survey on the evaluation of the adaptation readiness of the pilot as well as to (ii) the assessment of the economic capacity for the pilot.

Adaptation readiness

With respect to the institutional readiness survey, 13 stakeholders (SH) from the Lower Danube pilot who took part, who had different backgrounds, as shown in Figure 34. Specifically, there were 7 participants from Romania, 3 from Bulgaria and 3 from Serbia. The majority of participants are engaged in the environment domain (47.1%) as well as in the energy domain (17.6%).

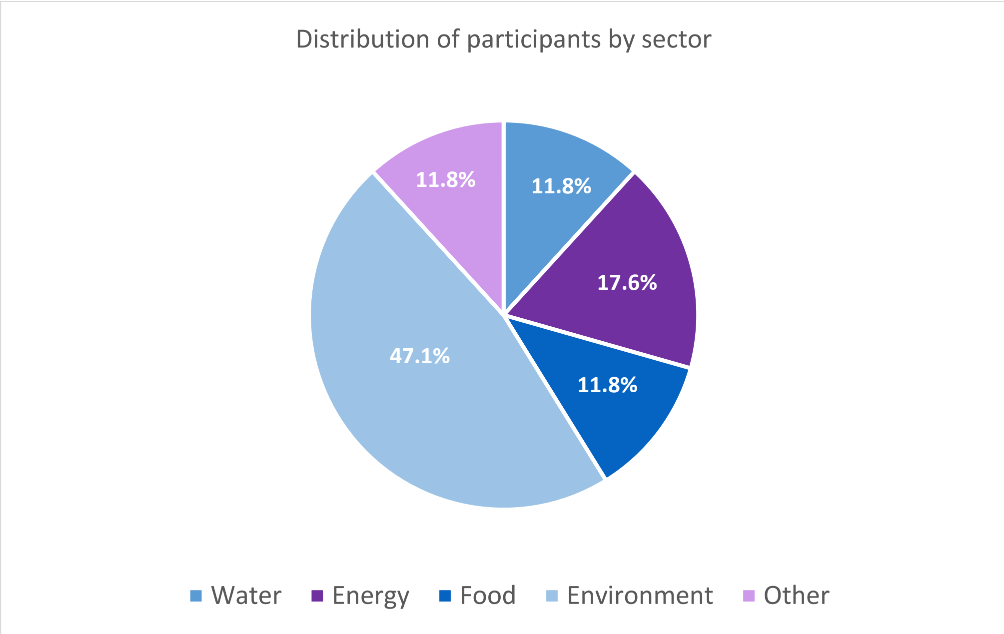

Figure 34: Distribution of participants to the adaptive capacity survey by domain, lower Danube river basin

Part A: Assessment of the adaptive capacity components

Political Leadership

The results of the evaluation the Political leadership component against the criteria, are presented below. It may be concluded that the half of the respondents (almost 50%) rated as limited all the three criteria of the component. The majority of the other half of them, rated the three criteria as moderate.

	To what extent has the need for adaptation to climate change been recognized as a political priority?				*Evaluate the involvement of political leadership in designing strategies for adapting to climate change.*				*To what extent have policies and legislation related to climate change adaptation been adopted?*			
	RO SH	*SRB SH*	*BG SH*	*Total*	*RO SH*	*SRB SH*	*BG SH*	*Total*	*RO SH*	*SRB SH*	*BG SH*	*Total*
None	12.5%	0%	0%	7%	12.5%	0%	0%	7%	13%	0%	0%	7%
Limited	25%	100%	66.7%	50%	25%	33.3%	100%	43%	50%	33.3%	66.7%	50%
Moderate	50%	0%	33.3%	36%	37.5%	66.7%	0%	36%	25%	66.7%	33.3%	36%
High	12.5%	0%	0%	7%	25%	0%	0%	14%	13%	0%	0%	7%

Institutional Organisation

The results of the evaluation of the Institutional Organisation component against three criteria, are presented below. With respect to the evaluation of criterion 1, half of the respondents replied that there are no research projects studying climate change in the pilot area, while the other 50% answered that there are more than 1 research programs or projects. With respect to criterion 2, 57% of the respondents answered that there are institutions in the area that are engaged with adaptation to climate change while 43% of them answered there are none institutes. Finally, with respect to Criterion 3, the vast majority of the respondents (86%) replied that there is a fragmentation of responsibilities between the involved stakeholders.

	Are there -beyond REXUS- other research programs or projects that study climate change in the pilot area?			
	RO SH	*SRB SH*	*BG SH*	*Total*
None	75%	0%	33.3%	50%
1-2	0%	33.3%	33.3%	14%
More than 2	25%	66.7%	33.3%	36%

	Are there institutions in the area that are engaged with adaptation to climate change?				*Do you think that there is a fragmentation of responsibilities between the involved stakeholders?*			
	RO SH	*SRB SH*	*BG SH*	*Total*	*RO SH*	*SRB SH*	*BG SH*	*Total*
Yes	37.5%	100%	66.7%	57%	75%	100%	100%	86%
No	62.5%	0%	33.3%	43%	25%	0%	0%	14%

Decision Making

The results of the evaluation of the Decision Making component against two criteria, are presented below. With respect to the evaluation of criterion 1, the majority of respondents (79%) replied that the extent to which stakeholders are involved in assessing the impact of climate change and policy making is either limited or moderate. With respect to criterion 2, the majority of them (64%) answered that there is a decision-making framework used to adapt to climate change.

	To what extent are stakeholders involved in assessing the impact of climate change and policy-making?			
	RO SH	*SRB SH*	*BG SH*	*Total*
None	12.5%	0%	33.3%	14%
Limited	37.5%	66.7%	33.3%	43%
Moderate	37.5%	33.3%	33.3%	36%
High	12.5%	0%	0%	7%

	Is there a decision-making framework used to adapt to climate change?			
	RO SH	*SRB SH*	*BG SH*	*Total*
Yes	50%	100%	66.7%	64%
No	50%	0%	33.3%	36%

Funding

The results of the evaluation of the Funding component against the criterion are presented below. The majority of respondents (57%) rate the availability of funding as limited.

	How do you evaluate the availability of funding for adaptation to climate change?			
	RO SH	*SRB SH*	*BG SH*	*Total*
None	12.5%	0%	33.3%	14%
Limited	50%	100%	33.3%	57%
Moderate	37.5%	0%	33.3%	29%
High	0%	0%	0%	0%

Public Awareness

The results of the evaluation of the Public Awareness component against the criteria are presented below, by country of origin of the participants and as a total percentage. With respect to criterion 1, the majority of the respondents (79%) rated media coverage of climate change either as limited or moderate. With respect to criterion 2, the majority of them (79%) answered that there is either limited or moderate public awareness of the need for climate change adaptation.

	How do you rate media coverage of climate change?				*How do you evaluate the public awareness of the need for climate change adaptation?*			
	RO SH	*SRB SH*	*BG SH*	*Total*	*RO SH*	*SRB SH*	*BG SH*	*Total*
None	12.5%	33.3%	0%	14%	12.5%	33.3%	0%	14%
Limited	37.5%	0%	100%	43%	37.5%	0%	100%	43%
Moderate	50%	33.3%	0%	36%	50%	33.3%	0%	36%
High	0%	33.3%	0%	7%	0%	33.3%	0%	7%

Economic capacity

The economic capacity of the lower Danube river basin pilot expressed as the GDP of each country in relation to the EU average is presented in the table that follows. As can be seen, the GDP of Romania is 11,094 Euros per capita which is below the EU average (36%), thus reflecting a low economic capacity. The GDP of Bulgaria is 8,586 Euros per capita which is below the EU average (28%), thus reflecting a low economic capacity. Finally, the GDP of Serbia is 6,582 Euros per capita which is again below the EU average (21%), thus reflecting a low economic capacity.

Table 52: Economic capacity per country of the lower Danube river basin

	GDP per capita (Euro)	in % of EU average
EU average(27 countries)	30632	100%
Romania	11094	36%
Bulgaria	8586	28%
Serbia	6582	21%

3.2.5 Overall Risk

In this section, the results of the climate risk assessment for the water, food and energy Nexus systems of the lower Danube river basin pilot are presented, based on the RCP4.5 and RCP8.5 for the period 2031-2050. The results are presented at administrative unit level in geospatial form through maps as well as through tables. Specifically, the overall risk is presented qualitatively through maps, while analytical results are also presented both qualitatively, per risk component and quantitatively, at indicator level. Regarding, the Romanian part of the pilot, the qualitative analysis was done also at the level of communes and the results are presented in the Annex section.

Water system

The results of the climate risk assessment, with respect to the water system, are depicted in Figure 35 as well as in Table 53, Table 54 and Table 55.

As can be seen in Figure 35, a “Medium” to “Medium-High” level risk is expected at the administrative units located at the northern part of the pilot, while the risk for the other municipalities is characterized “Low” to “Low-Medium”, according to RCP4.5. The risk is expected to be “Medium” at almost all the administrative units in the northern part, while almost all the municipalities located at the southern part of the pilot are expected to reach out "Low-Medium" level of risk, based on the RCP8.5.

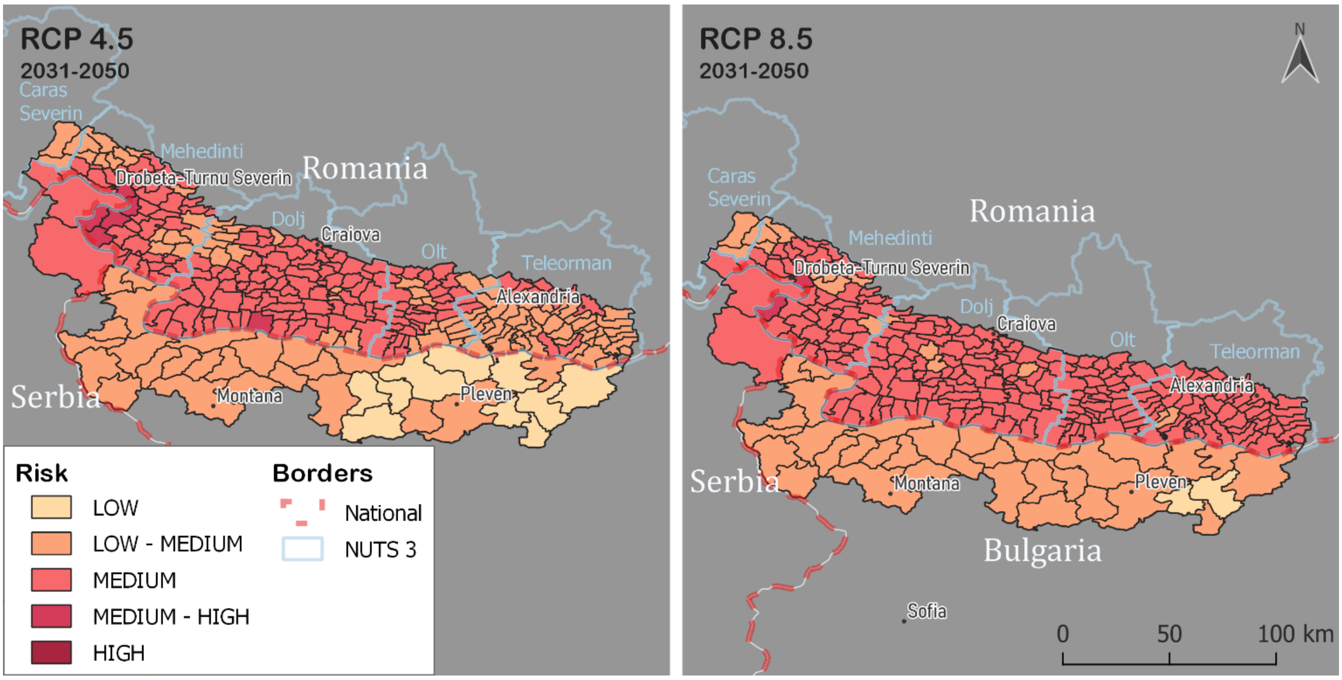

Figure 35: Qualitative climate risk assessment for the water system (RCP4.5 and RCP8.5), lower Danube river basin

The results of the overall climate risk assessment are presented in more detail at the level of administrative units in Table 53. As can be seen, the above-mentioned risk levels are the result of a "Low-Medium" to "Medium-High" range of hazard for both scenarios, in combination with a "Low" to "Medium" vulnerability. Additionally, according to RCP 8.5 scenario several administrative units are expected to increase their risk, compared to the RCP 4.5.

Table 53: Qualitative climate risk assessment per risk component for the water system (RCP4.5 and RCP8.5), lower Danube river basin

Country	Administrative units	Hazard		Vulnerability	Risk	
		4.5	8.5		4.5	8.5
Romania	Teleorman	Low-Medium	Medium	Medium	Low-Medium	Medium
	Olt	Medium	Medium	Medium	Medium	Medium
	Dolj	Medium	Medium	Medium	Medium	Medium
	Mehedinti	Medium	Medium	Medium	Medium	Medium
	Caras-Severin	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
Serbia	Kladovo	Medium-High	Medium - High	Low-medium	Medium	Medium
	Negotin	Medium	Medium - High	Low-medium	Medium	Medium
Bulgaria	Летница	Low-Medium	Low-Medium	Low	Low	Low-Medium

	Бойчиновци	Medium	Medium	Low	Low-Medium	Low-Medium
	Брусарци	Medium	Medium	Low	Low-Medium	Low-Medium
	Вълчедръм	Low-Medium	Medium	Low	Low-Medium	Low-Medium
	Лом	Medium	Medium	Low	Low-Medium	Low-Medium
	Медковец	Medium	Medium	Low	Low-Medium	Low-Medium
	Монтана	Medium	Medium	Low	Low-Medium	Low-Medium
	Якимово	Medium	Medium	Low	Low-Medium	Low-Medium
	Белене	Low-Medium	Medium	Low	Low-Medium	Low-Medium
	Гулянци	Low-Medium	Medium	Low	Low	Low-Medium
	Долна Митрополия	Low-Medium	Medium	Low	Low	Low-Medium
	Долни Дъбник	Low-Medium	Low-Medium	Low	Low-Medium	Low-Medium
	Левски	Low-Medium	Low-Medium	Low	Low	Low
	Никопол	Low-Medium	Low-Medium	Low	Low	Low-Medium
	Искър	Low-Medium	Medium	Low	Low	Low-Medium
	Плевен	Low-Medium	Low-Medium	Low	Low-Medium	Low-Medium
	Пордим	Low-Medium	Low-Medium	Low	Low	Low
	Червен бряг	Low-Medium	Low-Medium	Low	Low	Low-Medium
	Кнежа	Low-Medium	Medium	Low	Low	Low-Medium
	Белоградчик	Medium	Medium	Low	Low-Medium	Low-Medium
	Брегово	Medium	Medium	Low	Low-Medium	Low-Medium
	Видин	Medium	Medium	Low	Low-Medium	Low-Medium
	Грамада	Medium	Medium	Low	Low-Medium	Low-Medium
	Димово	Medium	Medium	Low	Low-Medium	Low-Medium
	Макреш	Medium	Medium	Low	Low-Medium	Low-Medium
	Ново село	Medium	Medium	Low	Low-Medium	Low-Medium
	Ружинци	Medium	Medium	Low	Low-Medium	Low-Medium

	Чупрене	Medium	Low-Medium	Low	Low-Medium	Low-Medium
	Бяла Слатина	Low-Medium	Medium	Low	Low-Medium	Low-Medium
	Козлодуй	Low-Medium	Medium	Low	Low-Medium	Low-Medium
	Мизия	Low-Medium	Medium	Low	Low-Medium	Low-Medium
	Оряхово	Medium	Medium	Low	Low-Medium	Low-Medium
	Хайредин	Low-Medium	Low-Medium	Low	Low-Medium	Low-Medium
	Свищов	Low-Medium	Medium	Low	Low	Low-Medium

The detailed results of the climate risk assessment for the RCP4.5 and RCP8.5 are presented quantitatively at normalized scale [-5, 5] in Table 54 and Table 55 respectively. The negative values of the hazard indicators have a beneficial effect and thus are considered to compensate risk.

Table 54: Quantitative (normalized) climate risk assessment at indicator level for the water system (RCP4.5), lower Danube river basin

Country	Administrative Unit	HAZARD			VULNERABILITY			RISK 4.5
		Aridity	Flood recurrence	Composite hazard indicator	Agricultural water consumption	Water exploitation	Composite vulnerability indicator	
Romania	Teleorman	3.0	-1.3	**1.9**	3.8	0.4	**1.6**	1.8
	Olt	3.1	-0.4	**2.2**	3.8	0.4	**2.1**	2.2
	Dolj	2.9	1.5	**2.5**	3.8	0.4	**2.1**	2.4
	Mehedinti	3.1	2.1	**2.8**	3.8	0.4	**2.1**	2.7
	Caras-Severin	1.6	2.0	**1.7**	3.8	0.4	**2.1**	1.8
Ser	Kladovo	3.7	1.6	**3.2**	2.2	0.3	**1.1**	2.6
	Negotin	3.1	2.0	**2.8**	2.2	0.3	**1.1**	2.3
Bulgaria	Летница	2.1	-1.4	**1.2**	0.1	0.3	**0.2**	0.9
	Бойчиновци	2.3	1.4	**2.1**	0.1	0.3	**0.2**	1.3
	Брусарци	3.1	1.7	**2.7**	0.1	0.3	**0.2**	1.6
	Вълчедръм	2.1	1.0	**1.8**	0.1	0.3	**0.2**	1.2
	Лом	3.0	1.3	**2.6**	0.1	0.3	**0.2**	1.5
	Медковец	3.0	1.8	**2.7**	0.1	0.3	**0.2**	1.6
	Монтана	3.0	1.8	**2.7**	0.1	0.3	**0.2**	1.6
	Якимово	2.5	1.9	**2.3**	0.1	0.3	**0.2**	1.4
	Белене	2.7	-1.0	**1.8**	0.1	0.3	**0.2**	1.2
	Гулянци	2.2	-1.3	**1.3**	0.1	0.3	**0.2**	0.9

	Долна Митрополия	2.3	-1.3	**1.4**	0.1	0.3	**0.2**	1.0
	Долни Дъбник	2.6	-1.7	**1.5**	0.1	0.3	**0.2**	1.0
	Левски	2.2	-1.5	**1.3**	0.1	0.3	**0.2**	0.9
	Никопол	2.3	-1.5	**1.3**	0.1	0.3	**0.2**	0.9
	Искър	2.3	-1.5	**1.4**	0.1	0.3	**0.2**	0.9
	Плевен	2.8	-1.8	**1.6**	0.1	0.3	**0.2**	1.1
	Пордим	2.2	-1.8	**1.2**	0.1	0.3	**0.2**	0.8
	Червен бряг	2.3	-1.3	**1.4**	0.1	0.3	**0.2**	1.0
	Кнежа	2.1	-0.3	**1.5**	0.1	0.3	**0.2**	1.0
	Белоградчик	3.0	1.5	**2.7**	0.1	0.3	**0.2**	1.6
	Брегово	3.0	2.4	**2.9**	0.1	0.3	**0.2**	1.7
	Видин	3.1	2.0	**2.8**	0.1	0.3	**0.2**	1.7
	Грамада	3.2	0.9	**2.6**	0.1	0.3	**0.2**	1.6
	Димово	3.2	1.5	**2.8**	0.1	0.3	**0.2**	1.6
	Макреш	3.1	1.7	**2.7**	0.1	0.3	**0.2**	1.6
	Ново село	2.8	1.8	**2.5**	0.1	0.3	**0.2**	1.5
	Ружинци	3.1	1.5	**2.7**	0.1	0.3	**0.2**	1.6
	Чупрене	2.4	0.8	**2.0**	0.1	0.3	**0.2**	1.3
	Бяла Слатина	2.1	0.2	**1.7**	0.1	0.3	**0.2**	1.1
	Козлодуй	2.1	-0.1	**1.5**	0.1	0.3	**0.2**	1.0
	Мизия	2.5	0.3	**2.0**	0.1	0.3	**0.2**	1.2
	Оряхово	2.5	1.1	**2.2**	0.1	0.3	**0.2**	1.4
	Хайредин	2.1	0.2	**1.6**	0.1	0.3	**0.2**	1.1
	Свищов	2.3	-1.5	**1.4**	0.1	0.3	**0.2**	0.9

Table 55: Quantitative (normalized) climate risk assessment at indicator level for the water system (RCP8.5), lower Danube river basin

Country	Administrative Unit	HAZARD			VULNERABILITY			RISK 8.5
		Aridity	Flood recurrence	Composite hazard indicator	Agricultural water consumption	Water exploitation	Composite vulnerability indicator	
Romania	Teleorman	3.1	0.4	**2.4**	3.8	0.4	**2.1**	2.4
	Olt	3.2	1.1	**2.6**	3.8	0.4	**2.1**	2.5
	Dolj	3.0	1.6	**2.7**	3.8	0.4	**2.1**	2.5
	Mehedinti	3.1	1.8	**2.8**	3.8	0.4	**2.1**	2.6
	Caras-Severin	1.5	2.2	**1.7**	3.8	0.4	**2.1**	1.8
Ser bia	Kladovo	3.5	2.3	**3.2**	2.2	0.3	**1.1**	2.6
	Negotin	3.5	1.4	**3.0**	2.2	0.3	**1.1**	2.5
Bulgaria	Летница	2.5	-1.5	**1.5**	0.1	0.3	**0.2**	1.0
	Бойчиновци	2.8	0.4	**2.2**	0.1	0.3	**0.2**	1.4
	Брусарци	3.1	2.1	**2.8**	0.1	0.3	**0.2**	1.7
	Вълчедръм	2.6	0.4	**2.1**	0.1	0.3	**0.2**	1.3

	Лом	2.8	1.6	**2.5**	0.1	0.3	**0.2**	1.5
	Медковец	3.0	2.0	**2.8**	0.1	0.3	**0.2**	1.6
	Монтана	3.0	1.8	**2.7**	0.1	0.3	**0.2**	1.6
	Якимово	3.0	1.8	**2.7**	0.1	0.3	**0.2**	1.6
	Белене	2.9	0.1	**2.2**	0.1	0.3	**0.2**	1.4
	Гулянци	2.6	0.7	**2.1**	0.1	0.3	**0.2**	1.3
	Долна Митрополия	2.2	1.9	**2.1**	0.1	0.3	**0.2**	1.3
	Долни Дъбник	2.6	-0.1	**1.9**	0.1	0.3	**0.2**	1.2
	Левски	2.2	-1.4	**1.3**	0.1	0.3	**0.2**	0.9
	Никопол	2.5	-0.2	**1.8**	0.1	0.3	**0.2**	1.2
	Искър	2.3	1.1	**2.0**	0.1	0.3	**0.2**	1.3
	Плевен	2.5	-0.8	**1.6**	0.1	0.3	**0.2**	1.1
	Пордим	2.2	-1.5	**1.3**	0.1	0.3	**0.2**	0.9
	Червен бряг	2.2	-0.2	**1.6**	0.1	0.3	**0.2**	1.0
	Кнежа	2.5	1.7	**2.3**	0.1	0.3	**0.2**	1.4
	Белоградчик	2.0	2.1	**2.0**	0.1	0.3	**0.2**	1.3
	Брегово	3.1	1.6	**2.7**	0.1	0.3	**0.2**	1.6
	Видин	3.1	1.3	**2.7**	0.1	0.3	**0.2**	1.6
	Грамада	3.1	1.6	**2.7**	0.1	0.3	**0.2**	1.6
	Димово	3.0	1.8	**2.7**	0.1	0.3	**0.2**	1.6
	Макреш	2.3	2.0	**2.2**	0.1	0.3	**0.2**	1.4
	Ново село	3.1	1.0	**2.6**	0.1	0.3	**0.2**	1.6
	Ружинци	3.0	2.2	**2.8**	0.1	0.3	**0.2**	1.7
	Чупрене	1.8	1.9	**1.8**	0.1	0.3	**0.2**	1.2
	Бяла Слатина	2.5	0.7	**2.1**	0.1	0.3	**0.2**	1.3
	Козлодуй	2.7	1.0	**2.3**	0.1	0.3	**0.2**	1.4
	Мизия	3.0	1.3	**2.6**	0.1	0.3	**0.2**	1.6
	Оряхово	3.0	2.8	**3.0**	0.1	0.3	**0.2**	1.7
	Хайредин	2.5	0.2	**1.9**	0.1	0.3	**0.2**	1.2
	Свищов	3.0	-0.7	**2.1**	0.1	0.3	**0.2**	1.3

Food system

The results of the climate risk assessment, with respect to the food system, are depicted in Figure 36 as well as in Table 56, Table 57 and Table 58.

As can be seen in Figure 36, a "Medium" level risk is expected at the majority of the administrative units of the pilot, while the risk for the others is characterized as "Low" to "Low-Medium" at the Western regions according to RCP4.5. Additionally, "Medium-High" risk administrative units are expected to be more under scenario RCP8.5, mainly at the eastern part of the pilot.

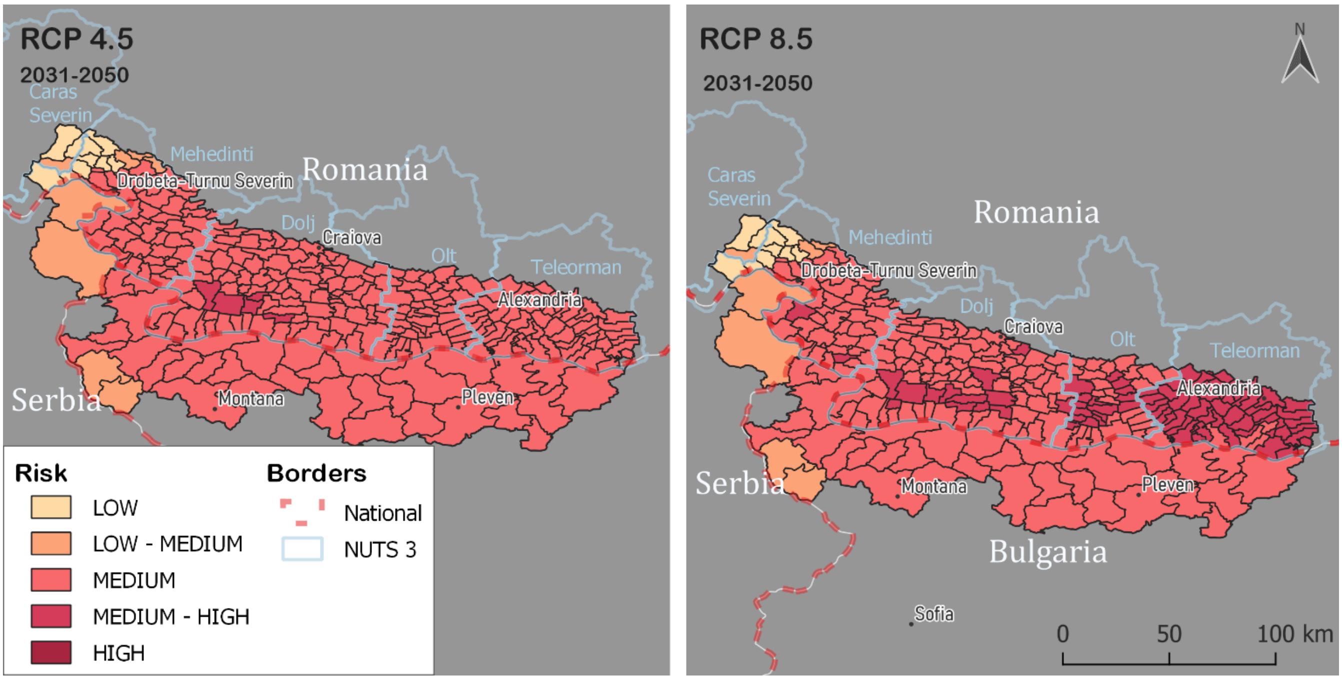

Figure 36: Qualitative climate risk assessment for the food system (RCP4.5 and RCP8.5), lower Danube river basin

The results of the overall climate risk assessment are presented in more detail at the level of administrative units in Table 56. As can be seen, the above-mentioned risk levels are the result of "Low-Medium" to "Medium" range hazard for both RCPs, in combination with a "Low" to "High" range of exposure and "Low-Medium" to "Medium-High" range vulnerability. Additionally, according to RCP 8.5 scenario several administrative units are expected to increase their risk reaching "Medium-High" level, compared to the RCP 4.5.

Table 56: Qualitative climate risk assessment per risk component for the food system (RCP4.5 and RCP8.5), lower Danube river basin

Country	Administrative units	Hazard		Exposure	Vulnerability	Risk	
		4.5	8.5			4.5	8.5
Romania	Teleorman	Medium	Medium	High	Medium-high	Medium	Medium-high
	Olt	Medium	Medium	High	Medium	Medium	Medium-high
	Dolj	Medium	Medium	High	Medium	Medium	Medium
	Mehedinti	Medium	Medium	Medium	Medium	Medium	Medium

	Caras-Severin	Low - medium	Low - medium	Medium	Medium	Low	Low
Serbia	Kladovo	Medium	Medium	Low	Low-medium	Low-medium	Low-medium
	Negotin	Medium	Medium	Low-medium	Low-medium	Low-medium	Low-medium
Bulgaria	Летница	Low - medium	Medium	Medium-high	Low-medium	Medium	Medium
	Бойчиновци	Medium	Medium	High	Low-medium	Medium	Medium
	Брусарци	Medium	Medium	High	Low-medium	Medium	Medium
	Вълчедръм	Medium	Medium	High	Low-medium	Medium	Medium
	Лом	Medium	Medium	High	Low-medium	Medium	Medium
	Медковец	Medium	Medium	High	Low-medium	Medium	Medium
	Монтана	Medium	Medium	Medium-high	Low-medium	Medium	Medium
	Якимово	Medium	Medium	High	Low-medium	Medium	Medium
	Белене	Medium	Medium	Medium-high	Low-medium	Medium	Medium
	Гулянци	Medium	Medium	High	Low-medium	Medium	Medium
	Долна Митрополия	Medium	Medium	High	Low-medium	Medium	Medium
	Долни Дъбник	Medium	Medium	High	Low-medium	Medium	Medium
	Левски	Medium	Medium	High	Low-medium	Medium	Medium
	Никопол	Medium	Medium	Medium-high	Low-medium	Medium	Medium
	Искър	Medium	Medium	High	Low-medium	Medium	Medium
	Плевен	Medium	Medium	Medium-high	Low-medium	Medium	Medium
	Пордим	Low - medium	Medium	High	Low-medium	Medium	Medium
	Червен бряг	Medium	Medium	Medium-high	Low-medium	Medium	Medium
	Кнежа	Medium	Medium	High	Low-medium	Medium	Medium
	Белоградчик	Low - medium	Low - medium	Low-medium	Low-medium	Low - medium	Low - medium
	Брегово	Medium	Medium	High	Low-medium	Medium	Medium
	Видин	Medium	Medium	High	Low-medium	Medium	Medium
	Грамада	Medium	Medium	Medium-high	Low-medium	Medium	Medium

	Димово	Medium	Medium	Medium-high	Low-medium	Medium	Medium
	Макреш	Medium	Medium	Medium	Low-medium	Medium	Medium
	Ново село	Medium	Medium	High	Low-medium	Medium	Medium
	Ружинци	Medium	Medium	Medium-high	Low-medium	Medium	Medium
	Чупрене	Low - medium	Low - medium	Low-medium	Low-medium	Low - medium	Low - medium
	Бяла Слатина	Medium	Medium	High	Low-medium	Medium	Medium
	Козлодуй	Medium	Medium	High	Low-medium	Medium	Medium
	Мизия	Medium	Medium	High	Low-medium	Medium	Medium
	Оряхово	Medium	Medium	High	Low-medium	Medium	Medium
	Хайредин	Medium	Medium	High	Low-medium	Medium	Medium
	Свищов	Medium	Medium	High	Low-medium	Medium	Medium

The detailed results of the climate risk assessment for the RCP4.5 and RCP8.5 are presented quantitatively at normalized scale [-5, 5] in Table 57 and

Table 58, respectively. The negative values of the hazard indicators have a beneficial effect and thus are considered to compensate risk.

Table 57: Quantitative (normalized) climate risk assessment at indicator level for the food system (RCP4.5), lower Danube river basin

Country	Administrative Unit	HAZARD: Growing Degree Days	HAZARD: Frost	HAZARD: Heat stress	HAZARD: Aridity	HAZARD: Flood recurrence	HAZARD: Composite hazard indicator	Exposure: Share of main crops	VULNERABILITY: Agricultural water consumption	VULNERABILITY: Water exploitation	VULNERABILITY: Agricultural income	VULNERABILITY: Composite vulnerability indicator	Risk 4.5
Romania	Teleorman	-0.8	2.3	4.1	3.0	-1.3	**2.4**	**4.2**	3.8	0.4	4.1	**3.1**	2.8
	Olt	-0.8	2.3	4.0	3.1	-0.4	**2.5**	**4.3**	3.8	0.4	2.6	**2.4**	2.7
	Dolj	-0.8	2.3	3.9	2.9	1.5	**2.5**	**4.1**	3.8	0.4	2.6	**2.4**	2.7
	Mehedinti	-0.9	3.5	3.2	3.1	2.1	**2.3**	**2.7**	3.8	0.4	2.6	**2.4**	2.1
	Caras-Severin	-1.2	5.0	1.4	1.6	2.0	**1.6**	**2.5**	3.8	0.4	2.3	**2.2**	0.9
Ser bia	Kladovo	-0.9	3.5	2.1	3.7	1.6	**2.5**	**0.6**	2.2	0.3	1.4	**1.3**	1.7
	Negotin	-0.9	2.6	2.3	3.1	2.0	**2.4**	**1.4**	2.2	0.3	1.4	**1.3**	1.9
Bulgaria	Летница	-0.8	1.8	2.9	2.1	-1.4	**1.9**	**3.8**	0.1	0.3	2.7	**1.5**	2.0
	Бойчиновци	-0.8	1.7	3.1	2.3	1.4	**2.3**	**4.1**	0.1	0.3	2.7	**1.5**	2.4
	Брусарци	-0.8	1.6	2.9	3.1	1.7	**2.5**	**4.1**	0.1	0.3	2.7	**1.5**	2.5
	Вълчедръм	-0.8	1.8	3.2	2.1	1.0	**2.2**	**4.5**	0.1	0.3	2.7	**1.5**	2.4
	Лом	-0.7	1.7	3.1	3.0	1.3	**2.5**	**4.0**	0.1	0.3	2.7	**1.5**	2.5
	Медковец	-0.8	1.7	3.0	3.0	1.8	**2.5**	**4.5**	0.1	0.3	2.7	**1.5**	2.5
	Монтана	-0.8	1.8	2.7	3.0	1.8	**2.4**	**3.3**	0.1	0.3	2.7	**1.5**	2.3
	Якимово	-0.8	1.8	3.1	2.5	1.9	**2.4**	**4.5**	0.1	0.3	2.7	**1.5**	2.5
	Белене	-0.8	1.9	3.1	2.7	-1.0	**2.2**	**3.9**	0.1	0.3	2.7	**1.5**	2.3
	Гулянци	-0.8	1.8	3.3	2.2	-1.3	**2.1**	**4.2**	0.1	0.3	2.7	**1.5**	2.2

	Долна Митрополия	-0.8	1.8	3.1	2.3	-1.3	**2.1**	**4.4**	0.1	0.3	2.7	**1.5**	**2.2**
	Долни Дъбник	-0.8	1.8	3.0	2.6	-1.7	**2.1**	**4.2**	0.1	0.3	2.7	**1.5**	**2.2**
	Левски	-0.8	1.7	3.3	2.2	-1.5	**2.1**	**4.3**	0.1	0.3	2.7	**1.5**	**2.2**
	Никопол	-0.8	1.9	3.2	2.3	-1.5	**2.0**	**3.9**	0.1	0.3	2.7	**1.5**	**2.2**
	Искър	-0.8	1.8	3.2	2.3	-1.5	**2.1**	**4.3**	0.1	0.3	2.7	**1.5**	**2.2**
	Плевен	-0.8	1.7	3.0	2.8	-1.8	**2.1**	**4.0**	0.1	0.3	2.7	**1.5**	**2.2**
	Пордим	-0.8	1.6	3.1	2.2	-1.8	**2.0**	**4.4**	0.1	0.3	2.7	**1.5**	**2.2**
	Червен бряг	-0.8	1.8	3.1	2.3	-1.3	**2.0**	**3.8**	0.1	0.3	2.7	**1.5**	**2.1**
	Кнежа	-0.8	1.8	3.2	2.1	-0.3	**2.1**	**4.5**	0.1	0.3	2.7	**1.5**	**2.3**
	Белоградчик	-1.0	3.3	1.4	3.0	1.5	**2.0**	**1.6**	0.1	0.3	2.7	**1.5**	**1.8**
	Брегово	-0.8	1.9	3.0	3.0	2.4	**2.6**	**4.2**	0.1	0.3	2.7	**1.5**	**2.5**
	Видин	-0.8	1.8	3.1	3.1	2.0	**2.6**	**4.1**	0.1	0.3	2.7	**1.5**	**2.5**
	Грамада	-0.8	1.7	2.7	3.2	0.9	**2.4**	**4.0**	0.1	0.3	2.7	**1.5**	**2.4**
	Димово	-0.8	1.7	2.7	3.2	1.5	**2.4**	**3.5**	0.1	0.3	2.7	**1.5**	**2.3**
	Макреш	-0.9	2.4	2.1	3.1	1.7	**2.2**	**3.0**	0.1	0.3	2.7	**1.5**	**2.2**
	Ново село	-0.8	1.9	3.0	2.8	1.8	**2.5**	**4.1**	0.1	0.3	2.7	**1.5**	**2.5**
	Ружинци	-0.8	1.7	2.6	3.1	1.5	**2.3**	**3.7**	0.1	0.3	2.7	**1.5**	**2.3**
	Чупрене	-1.1	4.6	0.8	2.4	0.8	**1.6**	**1.0**	0.1	0.3	2.7	**1.5**	**1.4**
	Бяла Слатина	-0.8	1.8	3.0	2.1	0.2	**2.1**	**4.3**	0.1	0.3	2.7	**1.5**	**2.3**
	Козлодуй	-0.8	1.8	3.2	2.1	-0.1	**2.1**	**4.3**	0.1	0.3	2.7	**1.5**	**2.3**
	Мизия	-0.8	1.8	3.2	2.5	0.3	**2.3**	**4.3**	0.1	0.3	2.7	**1.5**	**2.4**
	Оряхово	-0.8	1.9	3.0	2.5	1.1	**2.3**	**4.1**	0.1	0.3	2.7	**1.5**	**2.4**
	Хайредин	-0.8	1.7	3.2	2.1	0.2	**2.1**	**4.4**	0.1	0.3	2.7	**1.5**	**2.3**
	Свищов	-0.8	1.9	3.2	2.3	-1.5	**2.1**	**4.1**	0.1	0.3	2.7	**1.5**	**2.2**

Table 58: Quantitative (normalized) climate risk assessment at indicator level for the food system (RCP8.5), lower Danube river basin

Country	Administrative Unit	Hazard						Exposure	Vulnerability				Risk 8.5
		Growing Degree Days	Frost	Heat stress	Aridity	Flood recurrence	Composite hazard indicator	Share of main crops	Agricultural water consumption	Water exploitation	Agricultural income	Composite vulnerability indicator	
Romania	Teleorman	-1.2	2.9	4.3	3.1	0.4	**2.4**	**4.2**	3.8	0.4	4.1	**3.1**	**2.8**
	Olt	-1.2	3.0	4.2	3.2	1.1	**2.5**	**4.3**	3.8	0.4	2.6	**2.4**	**2.7**
	Dolj	-1.2	3.0	4.1	3.0	1.6	**2.5**	**4.1**	3.8	0.4	2.6	**2.4**	**2.7**
	Mehedinti	-1.5	3.9	3.4	3.1	1.8	**2.3**	**2.7**	3.8	0.4	2.6	**2.4**	**2.1**
	Caras-Severin	-2.0	5.0	1.6	1.5	2.2	**1.6**	**2.5**	3.8	0.4	2.3	**2.2**	**0.9**
Serbia	Kladovo	-1.5	3.8	3.2	3.5	2.3	**2.6**	**0.6**	2.2	0.0	1.4	**1.3**	**1.3**
	Negotin	-1.4	3.2	3.4	0.0	1.4	**2.4**	**1.4**	2.2	0.0	1.4	**1.3**	**1.3**
Bulgaria	Летница	-1.3	2.3	4.0	2.5	-1.5	**2.2**	**3.8**	0.1	0.3	2.7	**1.5**	**2.2**
	Бойчиновци	-1.3	2.3	4.1	2.8	0.4	**2.5**	**4.1**	0.1	0.3	2.7	**1.5**	**2.5**
	Брусарци	-1.3	2.1	4.0	3.1	2.1	**2.7**	**4.1**	0.1	0.3	2.7	**1.5**	**2.6**
	Вълчедръм	-1.2	2.3	4.2	2.6	0.4	**2.5**	**4.5**	0.1	0.3	2.7	**1.5**	**2.5**
	Лом	-1.2	2.3	4.1	2.8	1.6	**2.6**	**4.0**	0.1	0.3	2.7	**1.5**	**2.5**
	Медковец	-1.3	2.2	4.0	3.0	2.0	**2.7**	**4.5**	0.1	0.3	2.7	**1.5**	**2.6**
	Монтана	-1.4	2.4	3.8	3.0	1.8	**2.6**	**3.3**	0.1	0.3	2.7	**1.5**	**2.4**
	Якимово	-1.2	2.3	4.1	3.0	1.8	**2.7**	**4.5**	0.1	0.3	2.7	**1.5**	**2.6**
	Белене	-1.2	2.6	4.2	2.9	0.1	**2.6**	**3.9**	0.1	0.3	2.7	**1.5**	**2.5**
	Гулянци	-1.2	2.5	4.2	2.6	0.7	**2.6**	**4.2**	0.1	0.3	2.7	**1.5**	**2.5**
	Долна Митрополия	-1.2	2.4	4.2	2.2	1.9	**2.5**	**4.4**	0.1	0.3	2.7	**1.5**	**2.5**
	Долни Дъбник	-1.3	2.3	4.1	2.6	-0.1	**2.4**	**4.2**	0.1	0.3	2.7	**1.5**	**2.4**
	Левски	-1.3	2.3	4.3	2.2	-1.4	**2.3**	**4.3**	0.1	0.3	2.7	**1.5**	**2.4**
	Никопол	-1.3	2.6	4.2	2.5	-0.2	**2.4**	**3.9**	0.1	0.3	2.7	**1.5**	**2.4**
	Искър	-1.2	2.5	4.2	2.3	1.1	**2.5**	**4.3**	0.1	0.3	2.7	**1.5**	**2.5**

	Плевен	-1.3	2.3	4.0	2.5	-0.8	**2.2**	**4.0**	0.1	0.3	2.7	**1.5**	**2.3**
	Пордим	-1.3	2.2	4.2	2.2	-1.5	**2.2**	**4.4**	0.1	0.3	2.7	**1.5**	**2.3**
	Червен бряг	-1.3	2.4	4.1	2.2	-0.2	**2.3**	**3.8**	0.1	0.3	2.7	**1.5**	**2.3**
	Кнежа	-1.3	2.5	4.2	2.5	1.7	**2.6**	**4.5**	0.1	0.3	2.7	**1.5**	**2.6**
	Белоградчик	-1.7	3.8	2.4	2.0	2.1	**1.8**	**1.6**	0.1	0.3	2.7	**1.5**	**1.7**
	Брегово	-1.3	2.5	4.0	3.1	1.6	**2.7**	**4.2**	0.1	0.3	2.7	**1.5**	**2.6**
	Видин	-1.2	2.3	4.1	3.1	1.3	**2.7**	**4.1**	0.1	0.3	2.7	**1.5**	**2.6**
	Грамада	-1.4	2.4	3.8	3.1	1.6	**2.5**	**4.0**	0.1	0.3	2.7	**1.5**	**2.5**
	Димово	-1.3	2.2	3.8	3.0	1.8	**2.5**	**3.5**	0.1	0.3	2.7	**1.5**	**2.4**
	Макреш	-1.5	3.1	3.2	2.3	2.0	**2.2**	**3.0**	0.1	0.3	2.7	**1.5**	**2.1**
	Ново село	-1.3	2.6	4.0	3.1	1.0	**2.6**	**4.1**	0.1	0.3	2.7	**1.5**	**2.6**
	Ружинци	-1.3	2.2	3.7	3.0	2.2	**2.5**	**3.7**	0.1	0.3	2.7	**1.5**	**2.4**
	Чупрене	-1.9	4.9	1.5	1.8	1.9	**1.6**	**1.0**	0.1	0.3	2.7	**1.5**	**1.4**
	Бяла Слатина	-1.3	2.3	4.1	2.5	0.7	**2.4**	**4.3**	0.1	0.3	2.7	**1.5**	**2.5**
	Козлодуй	-1.2	2.5	4.2	2.7	1.0	**2.6**	**4.3**	0.1	0.3	2.7	**1.5**	**2.6**
	Мизия	-1.2	2.4	4.2	3.0	1.3	**2.7**	**4.3**	0.1	0.3	2.7	**1.5**	**2.6**
	Оряхово	-1.3	2.6	4.1	3.0	2.8	**2.8**	**4.1**	0.1	0.3	2.7	**1.5**	**2.7**
	Хайредин	-1.3	2.3	4.2	2.5	0.2	**2.5**	**4.4**	0.1	0.3	2.7	**1.5**	**2.5**
	Свищов	-1.3	2.5	4.2	3.0	-0.7	**2.6**	**4.1**	0.1	0.3	2.7	**1.5**	**2.5**

Energy system

The results of the overall climate risk assessment are presented in detail at the level of municipalities in Table 59. As can be seen, the risk levels of the pilot are the result of a "Low" hazard for both scenarios, in combination with a "Medium" exposure and "Medium" vulnerability.

Table 59: Qualitative climate risk assessment per risk component for the energy system (RCP4.5 and RCP8.5), lower Danube river basin

Country	Administrative units	Hazard		Exposure	Vulnerability	Risk	
		4.5	8.5			4.5	8.5
Romania	Teleorman	Low	Low	Medium	Medium	Low	Low
	Olt	Low	Low	Medium	Medium	Low	Low
	Dolj	Low	Low	Medium	Medium	Low	Low
	Mehedinti	Low	Low	Medium	Medium	Low	Low
	Caras-Severin	Low	Low	Medium	Medium	Low	Low
Serbia	Kladovo	Low	Low	Medium	Medium	Low	Low
	Negotin	Low	Low	Medium	Medium	Low	Low
Bulgaria	Лом	Low	Low	Medium	Medium	Low	Low
	Медковец	Low	Low	Medium	Medium	Low	Low
	Монтана	Low	Low	Medium	Medium	Low	Low
	Якимово	Low	Low	Medium	Medium	Low	Low
	Летница	Low	Low	Medium	Medium	Low	Low
	Бойчиновци	Low	Low	Medium	Medium	Low	Low
	Брусарци	Low	Low	Medium	Medium	Low	Low
	Вълчедръм	Low	Low	Medium	Medium	Low	Low
	Мизия	Low	Low	Medium	Medium	Low	Low
	Оряхово	Low	Low	Medium	Medium	Low	Low
	Хайредин	Low	Low	Medium	Medium	Low	Low
	Свищов	Low	Low	Medium	Medium	Low	Low
	Ново село	Low	Low	Medium	Medium	Low	Low
	Ружинци	Low	Low	Medium	Medium	Low	Low
	Чупрене	Low	Low	Medium	Medium	Low	Low
	Бяла Слатина	Low	Low	Medium	Medium	Low	Low
	Козлодуй	Low	Low	Medium	Medium	Low	Low

	Белене	Low	Low	Medium	Medium	Low	Low
	Гулянци	Low	Low	Medium	Medium	Low	Low
	Долна Митрополия	Low	Low	Medium	Medium	Low	Low
	Долни Дъбник	Low	Low	Medium	Medium	Low	Low
	Левски	Low	Low	Medium	Medium	Low	Low
	Никопол	Low	Low	Medium	Medium	Low	Low
	Искър	Low	Low	Medium	Medium	Low	Low
	Плевен	Low	Low	Medium	Medium	Low	Low
	Пордим	Low	Low	Medium	Medium	Low	Low
	Червен бряг	Low	Low	Medium	Medium	Low	Low
	Кнежа	Low	Low	Medium	Medium	Low	Low
	Белоградчик	Low	Low	Medium	Medium	Low	Low
	Брегово	Low	Low	Medium	Medium	Low	Low
	Видин	Low	Low	Medium	Medium	Low	Low
	Грамада	Low	Low	Medium	Medium	Low	Low
	Димово	Low	Low	Medium	Medium	Low	Low
	Макреш	Low	Low	Medium	Medium	Low	Low

The detailed results of the climate risk assessment for the RCP4.5 and RCP8.5 are presented quantitatively at normalized scale [-5, 5] inTable 60 and Table 61, respectively. The negative values of the hazard indicators have a beneficial effect and thus are considered to compensate risk.

Table 60: Quantitative (normalized) climate risk assessment at indicator level for the energy system (RCP4.5), lower Danube river basin

Country	Administrative units	Hazard				Exposure				Vulnerability			Risk				
		Energy crop composite (GDD, Frost, Heat stress)	Wind power generation	Solar photovoltaic power generation	Hydropower generation	Energy crop cultivation	Wind energy intensity	Photovoltaic energy intensity	Hydropower energy intensity	Energy imports dependency	Renewable energy share	Composite vulnerability	energy crop	Wind energy	Photovoltaic energy	Hydropower energy	Overall Risk
Romania	Teleorman	1.4	0.0	0.0	0.7	2.7	0.0	2.1	5.0	2.3	2.2	**2.2**	-	0.0	0.1	1.3	**0.5**
	Olt	1.4	0.0	0.0	0.7	2.7	0.0	2.1	5.0	2.3	2.2	**2.2**	-	0.0	0.1	1.3	**0.5**
	Dolj	1.3	0.0	0.0	0.7	2.7	0.0	2.1	5.0	2.3	2.2	**2.2**	-	0.0	0.1	1.3	**0.5**

	Mehedinti	1.3	0.0	0.0	0.7	2.7	0.0	2.1	5.0	2.3	2.2	**2.2**	-	0.0	0.1	1.3	**0.5**
	Caras-Severin	1.3	0.0	0.0	0.7	2.7	0.0	2.1	5.0	2.3	2.2	**2.2**	-	0.0	0.1	1.3	**0.5**
Serbia	Kladovo	1.2	0.0	0.0	-	3.1	0.0	0.0	5.0	2.6	2.1	**2.2**	1.7	0.0	0.0	-	**0.6**
	Negotin	1.1	0.0	0.0	-	3.9	0.0	0.0	5.0	2.6	2.1	**2.2**	1.6	0.0	0.0	-	**0.5**
Bulgaria	Лом	1.1	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**
	Медковец	1.0	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.6	0.0	0.0	-	**0.5**
	Монтана	0.9	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.5	0.0	0.0	-	**0.5**
	Якимово	1.1	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.6	0.0	0.0	-	**0.6**
	Летница	1.0	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.5	0.0	0.1	-	**0.5**
	Бойчиновци	1.1	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.6	0.0	0.0	-	**0.5**
	Брусарци	1.0	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.5	0.0	0.0	-	**0.5**
	Вълчедръм	1.1	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.0	-	**0.6**
	Мизия	1.2	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.0	-	**0.6**
	Оряхово	1.1	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**
	Хайредин	1.1	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.0	-	**0.6**
	Свищов	1.2	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**
	Ново село	1.1	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**
	Ружинци	0.9	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.4	0.0	0.0	-	**0.5**
	Чупрене	1.2	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.0	-	**0.6**
	Бяла Слатина	1.1	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.6	0.0	0.0	-	**0.5**
	Козлодуй	1.2	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.0	-	**0.6**
	Белене	1.2	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**
	Гулянци	1.2	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**
	Долна Митрополия	1.1	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**
	Долни Дъбник	1.1	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.6	0.0	0.0	-	**0.5**
	Левски	1.2	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**
	Никопол	1.2	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**

	Искър	1.2	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.0	-	**0.6**
	Плевен	1.0	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.6	0.0	0.1	-	**0.5**
	Пордим	1.1	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.6	0.0	0.1	-	**0.6**
	Червен бряг	1.1	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.6	0.0	0.0	-	**0.5**
	Кнежа	1.2	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.0	-	**0.6**
	Белоградчик	0.9	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.5	0.0	0.0	-	**0.5**
	Брегово	1.1	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**
	Видин	1.1	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.6	0.0	0.1	-	**0.6**
	Грамада	0.9	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.5	0.0	0.1	-	**0.5**
	Димово	0.9	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.5	0.0	0.1	-	**0.5**
	Макреш	0.9	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.5	0.0	0.0	-	**0.5**

Table 61: Quantitative (normalized) climate risk assessment at indicator level for the energy system (RCP8.5), lower Danube river basin

Country	Administrative units	Hazard				Exposure				Vulnerability			Risk				
		Energy crop composite (GDD, Frost, Heat stress)	Wind power generation	Solar photovoltaic power generation	Hydropower generation	Energy crop cultivation intensity	Wind energy intensity	Photovoltaic energy intensity	Hydropower energy intensity	Energy imports dependency	Renewable energy share	Composite vulnerability	energy crop	Wind energy	Photovoltaic energy	Hydropower energy	Overall Risk
Romania	Teleorman	1.6	0.0	0.0	0.7	2.7	0.0	2.1	5.0	2.3	2.2	**2.2**	-	0.0	0.1	1.3	**0.5**
	Olt	1.6	0.0	0.0	0.7	2.7	0.0	2.1	5.0	2.3	2.2	**2.2**	-	0.0	0.1	1.3	**0.5**
	Dolj	1.5	0.0	0.0	0.7	2.7	0.0	2.1	5.0	2.3	2.2	**2.2**	-	0.0	0.1	1.3	**0.5**
	Mehedinti	1.4	0.0	0.0	0.7	2.7	0.0	2.1	5.0	2.3	2.2	**2.2**	-	0.0	0.0	1.3	**0.5**
	Caras-Severin	1.1	0.0	0.0	0.7	2.7	0.0	2.1	5.0	2.3	2.2	**2.2**	-	0.0	0.0	1.3	**0.5**
Serbia	Kladovo	1.3	0.0	0.0	-	3.1	0.0	0.0	5.0	2.6	2.1	**2.2**	1.7	0.0	0.0	-	**0.6**

	Negotin	1.2	0.0	0.0	-	3.9	0.0	0.0	5.0	2.6	2.1	**2.2**	1.6	0.0	0.0	-	**0.5**
Bulgaria	Лом	1.3	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**
	Медковец	1.2	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.6	0.0	0.0	-	**0.5**
	Монтана	1.1	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.5	0.0	0.0	-	**0.5**
	Якимово	1.2	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.6	0.0	0.0	-	**0.6**
	Летница	1.2	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.5	0.0	0.1	-	**0.5**
	Бойчиновци	1.3	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.6	0.0	0.0	-	**0.5**
	Брусарци	1.1	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.5	0.0	0.0	-	**0.5**
	Вълчедръм	1.3	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.0	-	**0.6**
	Мизия	1.3	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.0	-	**0.6**
	Оряхово	1.3	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**
	Хайредин	1.3	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.0	-	**0.6**
	Свищов	1.4	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**
	Ново село	1.3	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**
	Ружинци	1.0	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.4	0.0	0.0	-	**0.5**
	Чупрене	1.1	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.0	-	**0.6**
	Бяла Слатина	1.2	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.6	0.0	0.0	-	**0.5**
	Козлодуй	1.4	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.0	-	**0.6**
	Белене	1.4	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**
	Гулянци	1.4	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**
	Долна Митрополия	1.3	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**
	Долни Дъбник	1.2	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.6	0.0	0.0	-	**0.5**
	Левски	1.4	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**
	Никопол	1.4	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**
	Искър	1.4	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.0	-	**0.6**
	Плевен	1.2	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.6	0.0	0.1	-	**0.5**
	Пордим	1.2	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.6	0.0	0.1	-	**0.6**
	Червен бряг	1.3	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.6	0.0	0.0	-	**0.5**
	Кнежа	1.4	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.0	-	**0.6**

	Белоградчик	1.0	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.5	0.0	0.0	-	**0.5**
	Брегово	1.3	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.7	0.0	0.1	-	**0.6**
	Видин	1.2	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.6	0.0	0.1	-	**0.6**
	Грамада	1.1	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.5	0.0	0.1	-	**0.5**
	Димово	1.0	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.5	0.0	0.1	-	**0.5**
	Макреш	1.0	0.0	0.0	-	4.1	0.0	5.0	0.0	2.9	2.0	**2.2**	1.5	0.0	0.0	-	**0.5**

WEF Nexus systems

In this section, the results of the risk assessment for the period of 2031-2050 are summarized for all WEF systems and aggregated at pilot level, based on the area weighted average of the pilot administrative units. In addition, the result of the adaptive capacity assessment is presented in parallel, in order to examine the degree to which the overall risk can be influenced.

The results for the lower Danube river basin are presented in Table 62. As can be seen, according to both climate scenarios the overall risk for the Water system is expected to be "Medium", for the Food system "Medium" and for the Energy system "Low". According to RCP8.5 the overall risk is expected to be slightly higher for the Water and Food systems, but still in the same classification level.

Furthermore, the adaptive capacity is characterized as "Low-Medium" for the pilot, which theoretically is not sufficient to address the the expected risk for the Water and Food systems.

Table 62: Overall risk of the WEF Nexus systems and adaptive capacity, Lower Danube pilot

System	Overall risk		Adaptive Capacity
	RCP4.5	RCP8.5	
Water	(2.0) Medium	(2.1) Medium	(1.7) Low-Medium
Food	(2.2) Medium	(2.3) Medium	
Energy	(0.7) Low	(0.7) Low	

3.3 Climate Risk Assessment: Peninsular Spain

In this section the results of the hazard, exposure and vulnerability assessment, as well as the results from the adaptive capacity's and the overall climate risk assessment are provided, for the peninsular Spain.

3.3.1 Hazard

In the following paragraphs, the results for the hazard indicators are given, for the food, water and energy systems.

Water system

Aridity

The spatial distribution of the Aridity index is depicted in Figure 37. It is observed that, for the reference period the aridity conditions are zonal; hyper-humid conditions prevail in the northern part of the country, gradually becoming more arid as we head south, with the most arid conditions found in the southern end of the country, as well as in small, scattered places on the mainland. For the future period and according to both scenarios, the humid conditions expected to cover only a small part of the northern country and semi-arid conditions are found in the greater part of the basin. Additionally, in the case of RCP8.5 the area covered by arid conditions is expected to be greater than in the case of RCP4.5.

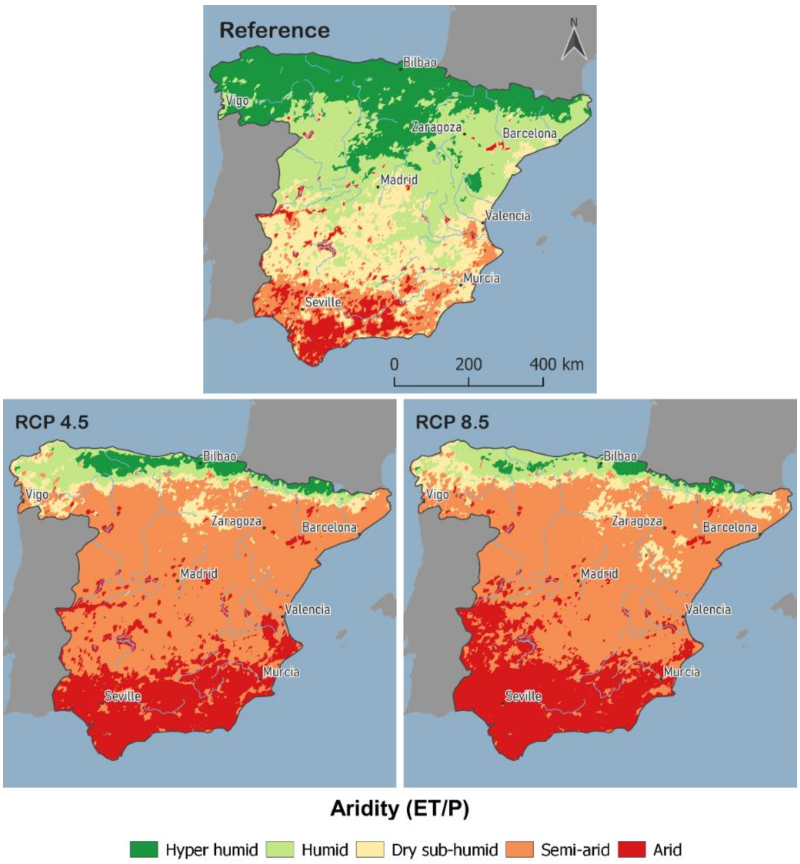

Figure 37: Spatial distribution of the mean annual Aridity indicator (potential evapotranspiration/precipitation) for the reference period (top) and the future period (2011-2070) based on the RCP4.5 and RCP8.5 (bottom), peninsular Spain

The relative change (%) of the actual aridity in the future compared to the reference period for both scenarios, is shown in Table 63. Can be seen that there is an increase of aridity for all the three future sub-periods compared to the reference period. Specifically, for the short-term period the deviation from the reference period is relatively small, at 8% and 3% for scenarios RCP4.5 and RCP8.5 respectively. Moreover, the increase continues until the long-term period where reaches 23% and 48%, for the RCP4.5 and RCP8.5 respectively.

Table 63: Relative change (%) of the mean annual aridity (potential evapotranspiration/precipitation), for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, peninsular Spain

Aridity Index	2011-2040		2041-2070		2071-2100	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	8	3	7	19	23	48

<u>Flood Recurrence</u>

The spatial distribution of the relative change of the flood recurrence indicator is depicted in Figure 38. For both scenarios, for the period 2011-2070 the values range from -90% to +500% relative change, in relation to the reference period. In more detail, for the RCP4.5 the greatest positive change (+500%) is located west and south-west of Madrid, as well as south of Barcelona. On the contrary, the highest negative change values (-90%) are located south of Madrid, up to the coasts near the city of Murcia. In the case of RCP8.5, the changes from +50% to +500% are of greater extent and are located mainly around large cities, while negative changes of up to -90% are located in very limited areas.

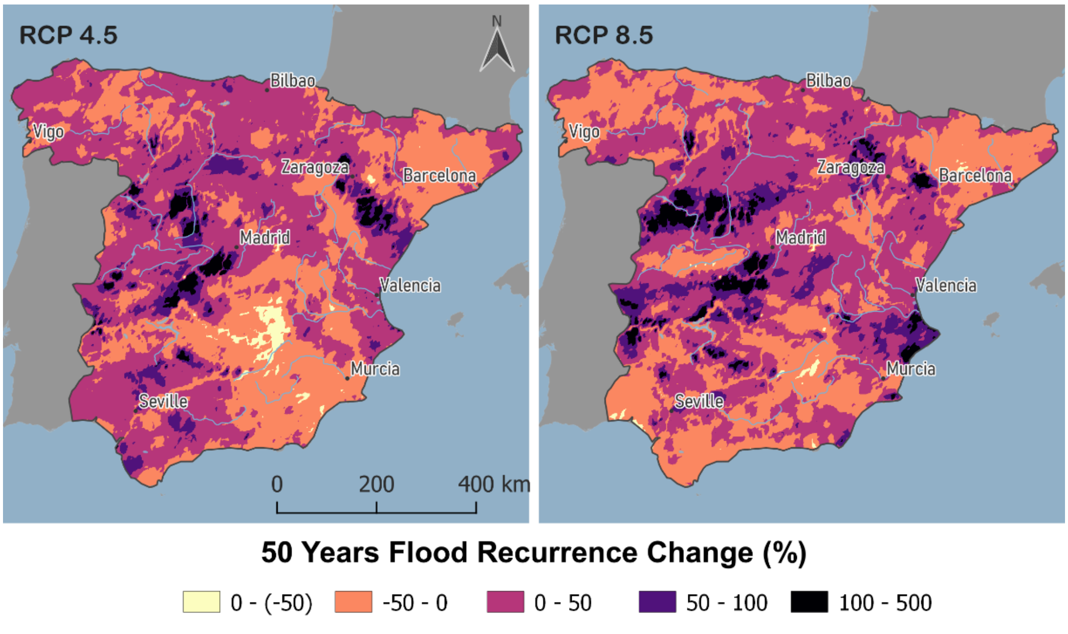

Figure 38: Spatial distribution of the 50 years Flood Recurrence relative change (%), for the period 2011-2070 based on the RCP4.5 and RCP8.5, peninsular Spain

The relative change (%) from the reference period of the flood recurrence indicator, with return period of 50 years, is shown in Table 64: Relative change (%) of the flood recurrence with return period 50 years, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, peninsular Spain, for the examined future sub-periods and for both RCP4.5 and RCP8.5. Can be seen that there is an increase of the index for all the three future sub-periods compared to the reference period. Specifically, for the short-term period the deviation from the reference period is 9.5% on average and in the long-term period this increasing trend reaches up to 25.5% on average for both scenarios.

Table 64: Relative change (%) of the flood recurrence with return period 50 years, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, peninsular Spain

Flood recurrence Return period: 50 years	2011-2040		2041-2070		2071-2100	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	7	12	17	20	19	30

Mean Runoff

Regarding the spatial distribution of the mean runoff as this is depicted in Figure 39, the two scenarios show similar results. For the RCP4.5, the mean runoff expected to be decreased (up to -40%) for the north and west part of the country, as well as for the east around the cities of Murcia, Barcelona and Valencia. The biggest increase (more than 200%) is predicted to be around the cities of Madrid and Zaragoza, as well as in some scattered areas in the south. On the other hand, for the RCP8.5, the decreased change (up to -40%) is depicted in a much wider area, in the greater part of the country. The positive change (more than 200%) remain in the same areas as in the case of the RCP4.5.

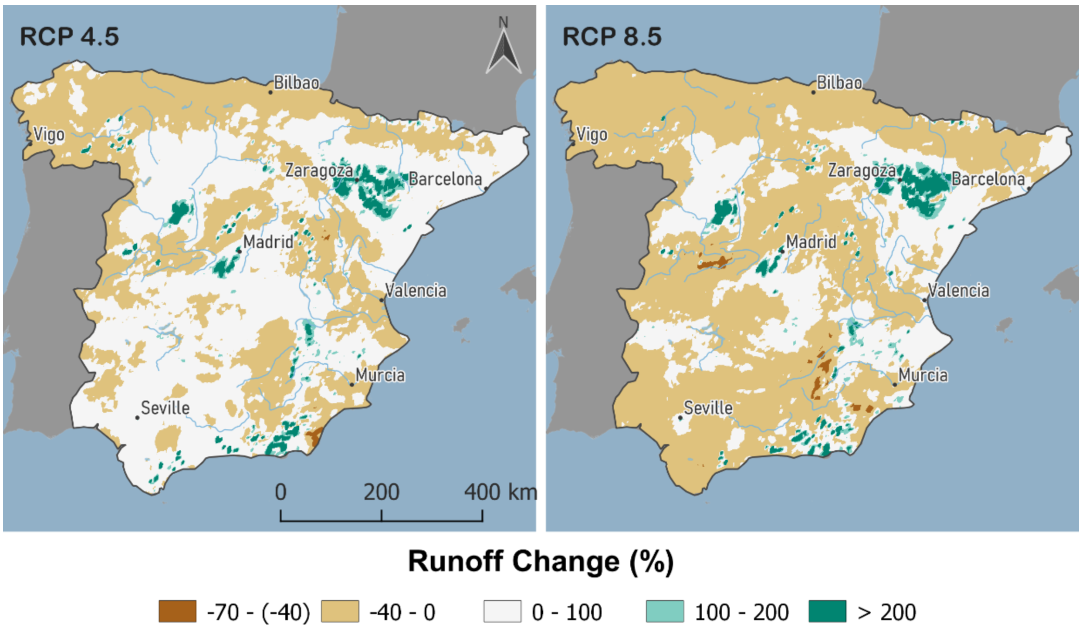

Figure 39: Spatial distribution of the mean runoff relative change (%), for the period 2011-2070 based on the RCP4.5 and RCP8.5, peninsular Spain

The relative change (%) from the reference period of the mean runoff indicator, is shown in Table 65, for the examined future sub-periods and for both RCP4.5 and RCP8.5. Can be seen that there is an increase of the index for all the three future sub-periods compared to the reference period. Specifically, the RCP4.5 starts with a 36% increase in the near-term period and reaches up to 50% in the long-term period. As for the RCP8.5 the increasing trend is more intense, from +39% for the short-term period, reaches up to +182% for the long-term period.

Table 65: Relative change (%) of the mean runoff, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, peninsular Spain

Mean Runoff	2011-2040		2041-2070		2071-2100	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	36	39	54	97	50	182

Food system

<u>Growing Degree Days</u>

The spatial distribution of the GDD for the period 2031-2050, is depicted in Figure 40. It is observed that during the reference period the GDD range starts from 0°C to 3400°C per year at the mountains of the Northern part of the country and reaches up to 4500-5700°C at the southern part of Spain, close to Seville, Murcia and Valencia. During the future period, the minimum and maximum GDD remain similar to the reference period, with a substantial increase of the area where the maximum GDD is expected. Specifically, 4500-5700°C per year is expected to experience the whole the east coast of the country, including the city of Barcelona, as well as the south-western part of the country. At the same time, the values from 0 to 1400°C have been limited to the Pyrenees mountains located in the north-eastern part of the country on the border with France, for both scenarios.

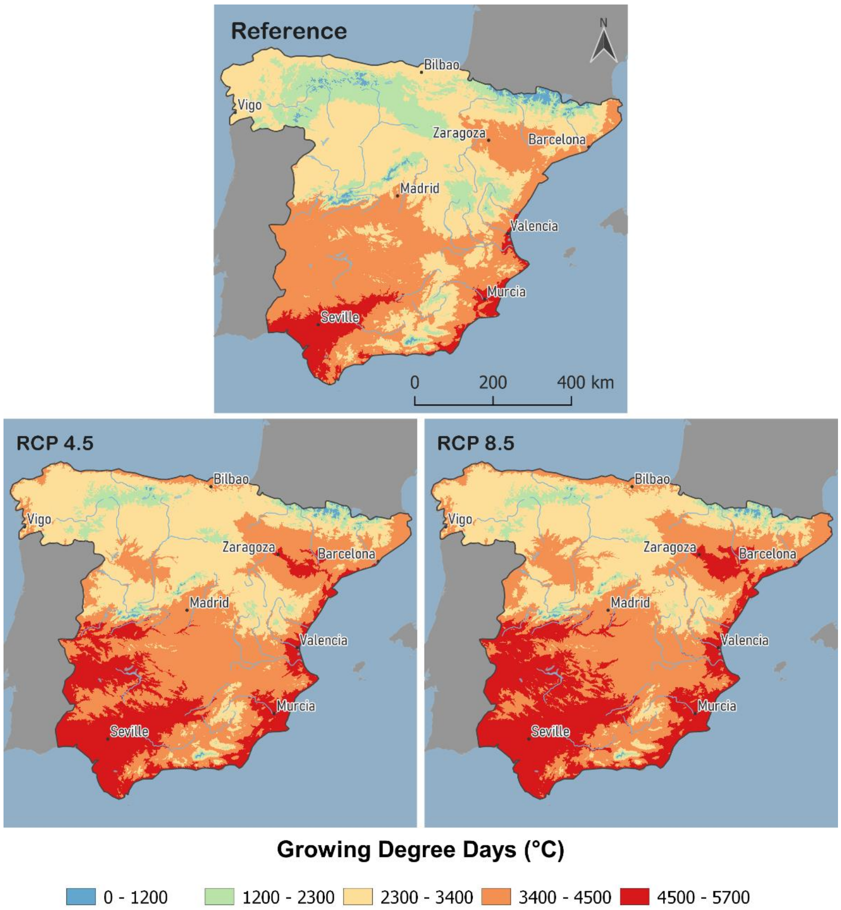

Figure 40: Spatial distribution of the mean annual Growing Degree Days with base temperature 5°C, for the reference period (top) and the future period (2031-2050) based on the RCP4.5 and RCP8.5 (bottom), peninsular Spain

The relative change in percentage (%) of the GDD indicator for the examined future periods in relation to the reference period is given in Table 66. Can be seen that the trend for all the periods and scenarios is increasing. More specific, for the RCP4.5 the change expected to be 15%, compared to the reference period, for the near-term period (2031-2050), while it is expected this difference to increase up to 23% at the long-term period. Similarly, for the RCP8.5, the change expected to be 20% for the near-term period and 55% for the long-term period.

Table 66: Relative change (%) of the growing degree days, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, peninsular Spain

Growing degree days Tmean > 5°C	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	15	20	19	41	23	55

<u>Heat Stress Days >25°C</u>

The spatial distribution of the mean annual number of days with maximum temperature above 25°C for the peninsular Spain, is depicted in Figure 41. It is observed that during the reference period, the number of heat stress days per year ranges from 0 to 200, with the lowest number of days (up to 40) being observed at the north-western part and the centre of the country. This number increases reaching the maximum values at the south of the country. For the future period, the range of heat stress days will remain the same, while the area at the south of Spain, where the highest values (>200) are observed will be significantly expanded compared to the reference period, according to both scenarios. It is worth notice that also Barcelona and Zaragoza is expected to experience an increase in heat stress days > 25°C.

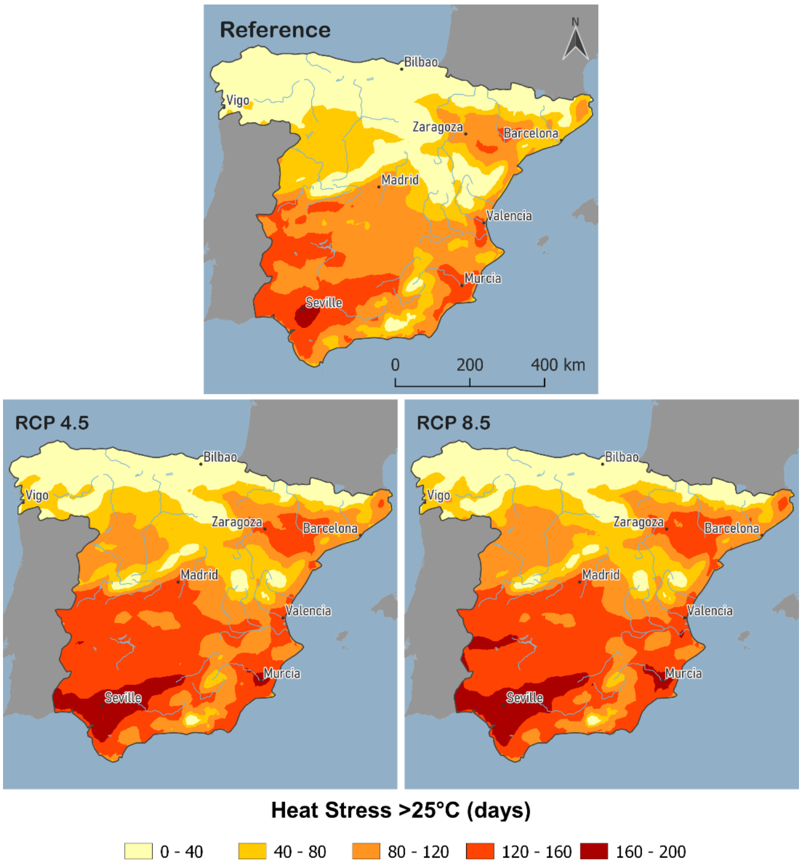

Figure 41: Spatial distribution of the mean annual number of days with maximum daily temperature > 25°C, for the reference period (top) and the future period (2031-2050) based on the RCP4.5 and RCP8.5 (bottom), peninsular Spain

The relative change (%) of the number of heat stress days >25°C expected for the future, is summarized in Table 12. As can be seen, an increase of 57.5% on average is projected for the near-term period (2031-2050) with small differentiation among the two scenarios. For the long-term period (2071-2090), the increase for RCP4.5 is expected to be lower (32%) compared to the near-term period, while for RCP8.5 a considerable increase of 110% is expected. In contrast, for the mid-term period a decrease of 50% and 2% is expected based on RCP4.5 and RCP8.5 respectively (2051-2070), which is considered an anomaly for the climatic trends.

Table 67: Relative change (%) of the mean annual number of days with maximum temperature > 25°C, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, peninsular Spain

Heat stress days Tmax > 25°C	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change(%)	50	63	-50	-2	32	110

<u>Heat Stress Days >32°C</u>

The spatial distribution of the mean annual number of days with maximum temperature above 32°C for the peninsular Spain, is depicted in Figure 42. It is observed that during the reference period, the number of heat stress days per year ranges from 0 to 20, for the greater part of the country while this number increases reaching the maximum values (60-80 days) at the south of the country, around the city of Seville. For the future period, the range of heat stress days is increased from 0 days at the north and the center of the country to 100 days around Seville. It is worth notice that also Barcelona and Zaragoza is expected to experience an increase (up to 60 days) in heat stress days > 32°C, for both scenarios.

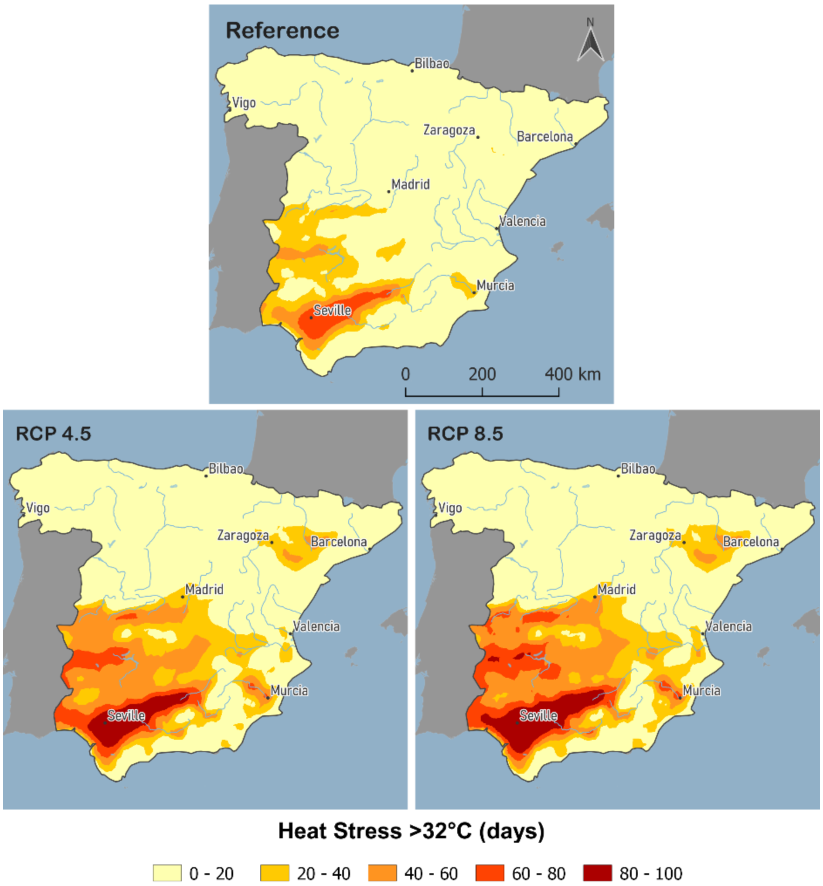

Figure 42: Spatial distribution of the mean annual number of days with maximum daily temperature > 32°C, for the reference period (top) and the future period (2031-2050) based on the RCP4.5 and RCP8.5 (bottom), peninsular Spain

The relative change (%) of the number of heat stress days >32°C expected for the future, is summarized in Table 68: Relative change (%) of the mean annual number of days with maximum temperature > 32°C, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, peninsular Spain. As can be seen, an increase of 135.5% on average is projected for the near-term period (2031-2050) with small differentiation among the two scenarios. For the mid- and long-term periods, a decreasing trend is expected for both scenarios. Specifically, a decrease up to -9% and up to -7% is expected based on RCP4.5 and RCP8.5 respectively, which is considered an anomaly for the climatic trends.

Table 68: Relative change (%) of the mean annual number of days with maximum temperature > 32°C, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, peninsular Spain

Heat stress days Tmax > 32°C	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change(%)	116	155	-9	-7	-5	-3

Frost Days

The spatial distribution of the number of frost days is depicted in Figure 43. It is observed that during the reference period the number of days starts from 0 days at the greater part of the basin, and reaches up to 230 days at the mountains, at the northern part of the area, along the French border. During the future period, the days with no frost (or up to 50 days) are observed at an extended area, compared to the reference period. In addition, for the future period 2031-2050 the frost exceeds 200 days, only at the northern mountainous areas.

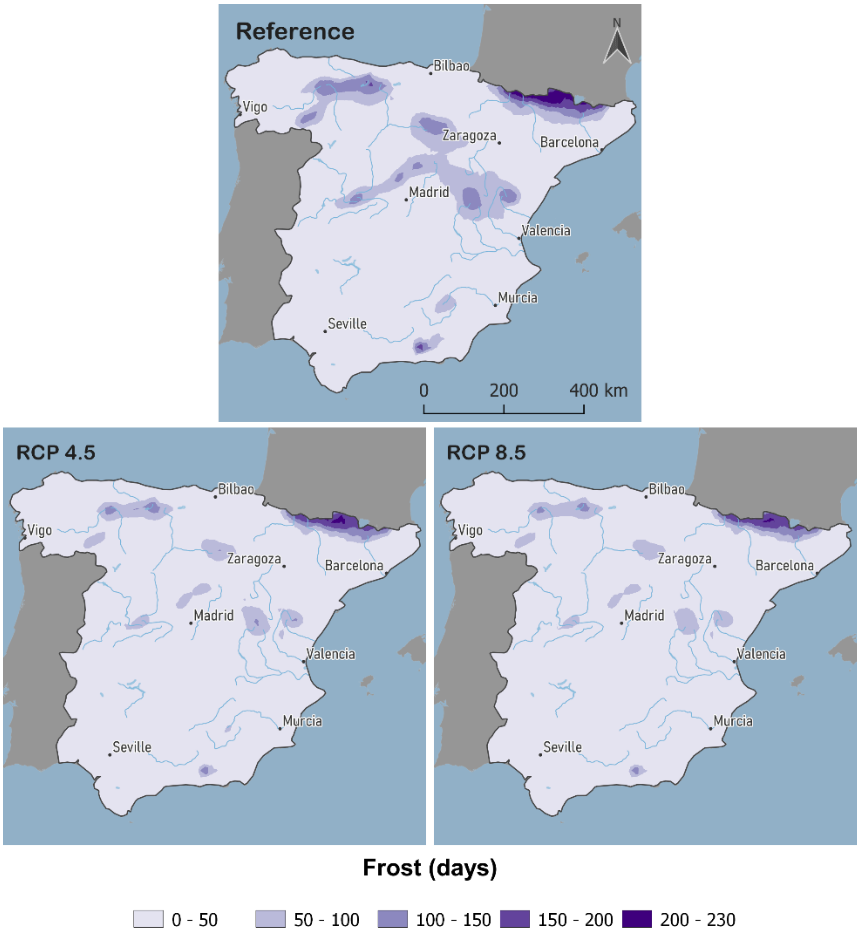

Figure 43: Spatial distribution of the mean annual number of days with minimum temperature below 0°C, for the reference period (top) and the future period (2031-2050) based on the RCP4.5 and RCP8.5 (bottom), peninsular Spain

The projected relative change (%) of the number of days with minimum temperature below 0°C, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, is summarized in Table 69. It may be concluded that for the short-term period, there is no significant difference between the scenarios, with an average 43% reduction, from the reference period. Furthermore, for the mid-term period there is a reduction of 88.5% on average for the two scenarios, while for the long-term period the reduction is similar to the mid-term for the RCP8.5 and a little smaller for the RCP4.5.

Table 69: Relative change (%) of the number of days with minimum temperature < 0°C, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, peninsular Spain

Frost days	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	-40	-46	-86	-91	-78	-91

Energy system

Hydropower generation rivers

The relative change (%) from the reference period of the hydropower generation of rivers, is shown in Table 70 for the examined future sub-periods and for both RCP4.5 and RCP8.5. Can be seen that the results for the two scenarios are the same for the short- and long-term periods and the trend is decreasing. Specifically, for the short-term period the deviation from the reference period is -3% and in the long-term period reaches up to -10%. As for the mid-term period the trend is -8% and -7% for the RCP4.5 and the RCP8.5 respectively.

Table 70: Relative change (%) of the hydropower generation rivers, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, peninsular Spain

Hydropower generation rivers	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	-3	-3	-8	-7	-10	-10

Hydropower generation reservoirs

The relative change (%) from the reference period of the hydropower generation of reservoirs, is shown in Table 71 for the examined future sub-periods and for both RCP4.5 and RCP8.5. Can be seen that the results for the two scenarios are very similar for the three sub-periods. Specifically, for the short-term period the deviation from the reference period is around 0%, for both scenarios, while for the RCP4.5 is 1% for mid- and long-term period. As for the RCP8.5 the change is -2% and -4% for the mid- and long-term periods respectively.

Table 71: Relative change (%) of the hydropower generation reservoirs, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, peninsular Spain

Hydropower generation reservoirs	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	-1	1	1	-2	1	-4

Solar photovoltaic power generation

The relative change (%) from the reference period of the solar photovoltaic power generation indicator, is shown in Table 72, for the examined future sub-periods and for both RCP4.5 and RCP8.5. Can be seen that there is almost no difference at all between the future and the reference period, since the relative change range from --0.1% to -1.6% for both scenarios. The maximum value of relative change (-1.6%) is for the RCP4.5 for the mid-term period, while the minimum value of relative change (-0.1%) is for the RCP8.5 for the mid- and long-term periods.

Table 72: Relative change (%) of solar photovoltaic power generation (ratio of actual generation over installed capacity), for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, peninsular Spain

Solar photovoltaic power generation	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	-1.3	0.2	-1.6	-0.1	-0.4	-0.1

Wind power generation

The relative change from the reference period of the wind power generation onshore indicator, is shown in Table 73, for the examined future sub-periods and for both RCP4.5 and RCP8.5. Can be seen that there is small difference between the future and the reference period, since the relative change range from +1.2% to -5% for both scenarios. The maximum value of relative change (-5%) is for the RCP8.5 for the long-term period, while the minimum value of relative change (+1.2%) is for the RCP4.5 for the mid-term period.

Table 73: Relative change (%) of wind power generation (ratio of actual generation over installed capacity), for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, peninsular Spain

Wind power generation	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	1.2	-4.4	1.2	-2.0	-3.7	-5.0

3.3.2 Exposure

In this section the results of the exposure assessment of peninsular Spain pilot for the food and energy systems are presented. The assessment is carried out at provincial level (NUTS3), which is the second-level territorial and administrative division of Spain.

Food system

In this sub-section the results of the assessment of the food exposure index related to the areas cultivated with the crops under study (wheat, maize, barley and olives) are presented.

Share of main crops

The share of areas cultivated with the main crops in each province to the total extent of each province, is depicted in Figure 44. As can be seen, the examined crops of wheat, maize, barley and olives are cultivated throughout Spain, with the highest share (60-77%) being observed at the northern provinces of Valladolid and Palencia.

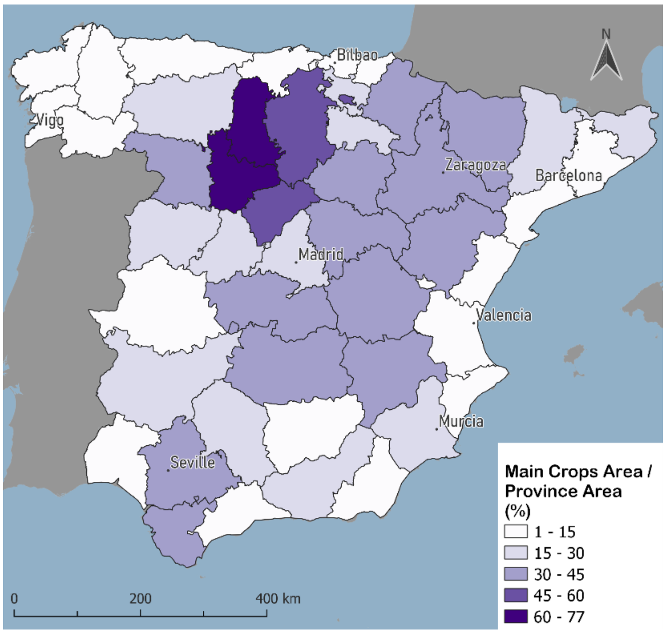

Figure 44: Food exposure index expressed as the share of the main crops area to the total municipality area, peninsular Spain

Energy system

The exposure indicators for the energy system related to the renewable energy intensity for the photovoltaic, wind and the hydropower energy systems, are presented next.

Renewable energy intensity

The photovoltaic intensity of each province of peninsular Spain in relation to the national photovoltaic intensity (%) is depicted in Figure 45. It can be seen that in the southern part of peninsular Spain, the photovoltaic intensity is mostly higher than the national intensity, up to 5 times higher at the province of Seville. For the rest of peninsular Spain, photovoltaic intensity is mainly lower than the national one.

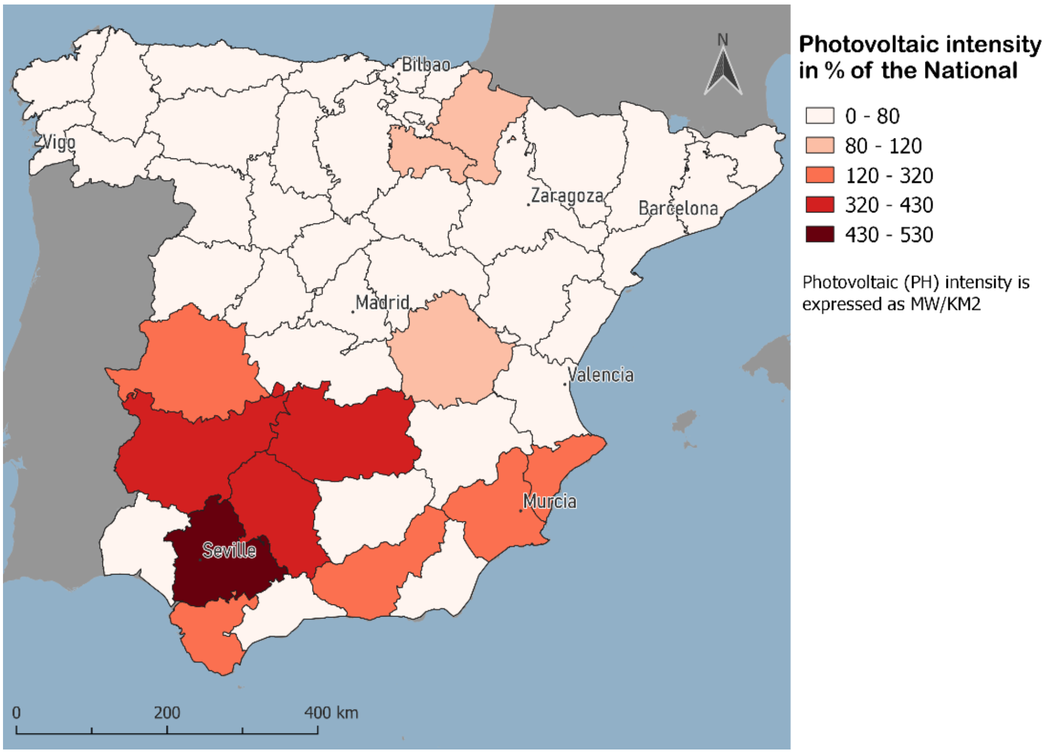

Figure 45: Energy exposure index expressed as photovoltaic energy intensity, peninsular Spain

The wind energy intensity of each province of peninsular Spain in relation to the national wind energy intensity (%) is depicted in Figure 46. It can be seen that the wind energy intensity at the provinces of Zaragoza, Castellón, Soria, A Coruña, Pontevedra, Albacete is 2.5-3 times higher than the national intensity; indeed, these regions display the highest wind energy intensity in peninsular Spain.

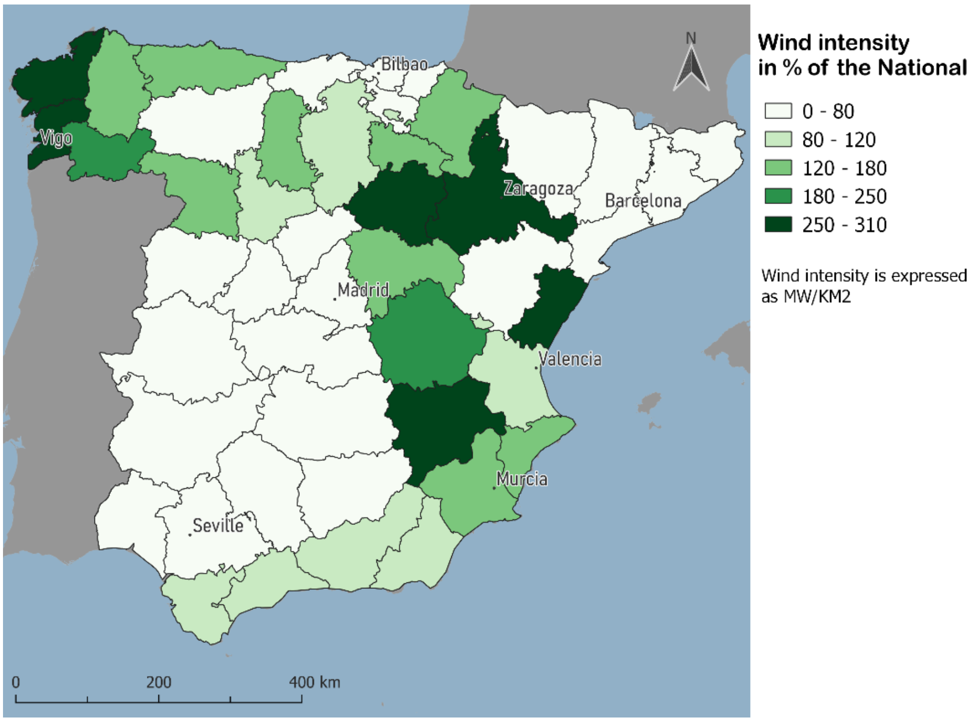

Figure 46: Energy exposure index expressed as wind energy intensity, peninsular Spain

The hydropower intensity of each province of peninsular Spain in relation to the national hydropower intensity (%) is depicted in Figure 47. Can be seen that at the provinces of Ourense and Valencia the hydropower intensity is up to 7-9 times higher compared to the national one. In addition, high hydropower intensity is observed at several provinces of northern peninsular Spain (up to 5 times higher than the national one).

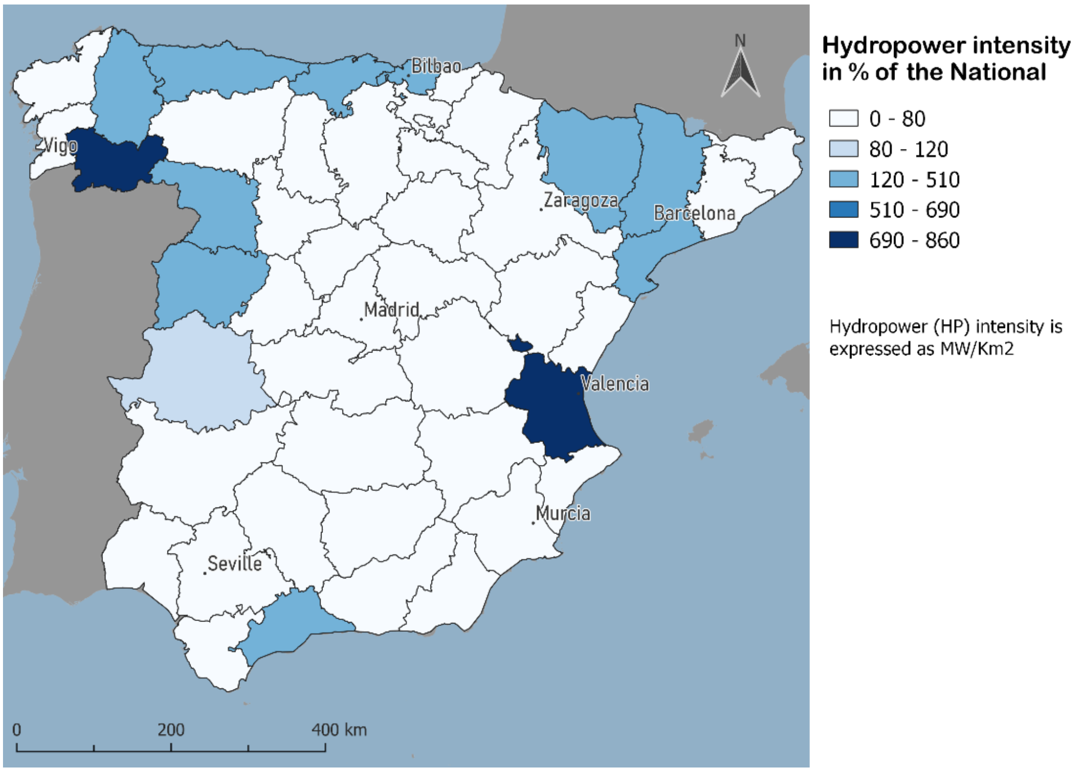

Figure 47: Energy exposure index expressed as hydropower energy intensity, peninsular Spain

3.3.3 Vulnerability

Water system

In this sub-section the results of the assessment of the water vulnerability indices (water exploitation index, share of agricultural water consumption) are presented, at river basin district (RBD) level for peninsular Spain.

Water exploitation index

The water exploitation index of the RBDs of peninsular Spain, is presented in Table 74. As can be seen, the WEI at the RBDs of peninsular Spain is 50% on average which indicates a severe water stress for the pilot. The highest WEI is observed at the RBD of Minho (202%) which reflects severe water stress beyond sustainability limits. On the other hand, the lowest WEI is observed at the RBDs of the Galician Coast and Eastern & Western Cantabrian (2-4%).

Table 74: Water vulnerability index expressed as Water Exploitation Index, peninsular Spain

River Basin District	Water Exploitation index
Galician Coast	**2%**
Eastern & Western Cantabrian	4%
Duero	17%
Tagus	20%
Ebro	26%

River Basin District	Water Exploitation index
Tinto, Odiel and Piedras	27%
Internal basins of Catalonia	36%
Andalusian Mediterranean Basins	36%
Júcar	54%
Guadalquivir	74%
Segura	76%
Guadiana	81%
Minho	**>202%**

<u>Share of agricultural water consumption</u>

The share of agricultural water consumption in the RBDs of peninsular Spain is shown in Table 75. Specifically the share of agricultural water consumption is 65% on average at peninsular Spain, with the highest value being observed at the Guadiana and Ebro RBDs (93%), and the lowest at the Galician Coast RBD (12%)

Table 75: Water vulnerability index expressed as share of agricultural water consumption, peninsular Spain

River Basin District	Share of agricultural water consumption
Galician Coast	**12%**
Eastern & Western Cantabrian	17%
Minho	24%
Internal basins of Catalonia	46%
Tagus	61%
Andalusian Mediterranean Basins	74%
Tinto, Odiel and Piedras	79%
Júcar	80%
Segura	84%
Guadalquivir	90%
Duero	90%
Guadiana	**93%**
Ebro	**93%**

Food system

In this sub-section the results of the assessment of the food vulnerability index related to agricultural income, are presented at regional level (NUTS2) for Spain.

Agricultural Income

The agricultural income of each pilot region compared to the average agricultural income of Spain is presented in Table 76. It is observed that the region of Andalucía has the highest agricultural income (5.9 times higher than the national average) compared to all the other regions of the country. On the contrary, Cantabria has the lowest agricultural income (4% of the average).

Table 76: Food vulnerability index expressed as agriculture income, peninsular Spain

Region	Agricultural income	
	Million Euro	% of national average
Average	**1851**	**100**
Galicia	1393	75
Principado de Asturias	125	7
Cantabria	**81**	**4**
País Vasco	260	14
Comunidad Foral de Navarra	577	31
La Rioja	502	27
Aragón	1583	85
Comunidad de Madrid	126	7
Castilla y León	2487	134
Castilla-la Mancha	3355	181
Extremadura	1324	72
Cataluña	1558	84
Comunitat Valenciana	2616	141
Illes Balears	152	8
Andalucía	**10846**	**586**
Región de Murcia	1923	104

Energy system

In this sub-section the results of the energy vulnerability assessment for the indices of the Renewable energy share and the Energy import dependency are presented. The results are presented at country level (Spain).

Renewable energy share

The contribution of renewable energy resources in the gross final energy consumption of Spain, along with the respective EU average, is shown in Table 77. As can be seen, the national share of energy from renewable resources (18.1%) is lower than the EU average (19.5%), although quite close to it. The higher the contribution, the higher the vulnerability of the energy system to a potential reduction in renewable energy generation due to climate change. The vulnerability related to this indicator is considered to be low to medium.

Table 77: Energy vulnerability index expressed as renewable energy share, peninsular Spain

Countries	Share of energy from renewable sources
European Union (EU 27 average)	19.5%
Spain	18.1%

Energy import dependency

The energy imports dependency of Spain along with the respective EU average, is presented in Table 78. As it is shown, the energy imports dependency (72%) is higher than the EU average (58%). The higher the import dependency of a country, the higher the vulnerability of the energy system to a potential reduction in renewable energy generation due to climate change. Thus, the vulnerability related to this indicator is considered to be high.

Table 78: Energy vulnerability index expressed as energy import dependency, peninsular Spain

Countries	Energy imports dependency
European Union (EU 27 average)	57.9%
Spain	72.4%

3.3.4 Adaptive capacity

In this section, the results of the assessment of the adaptive capacity of the peninsular Spain are presented. Specifically, the results refer to (i) the survey on the evaluation of the institutional readiness of the pilot as well as to (ii) the assessment of the GDP index for the pilot.

Institutional readiness

With respect to the institutional readiness survey, 17 stakeholders (SH) from the peninsular Spain pilot took part, who had different backgrounds, as shown in Figure 48. The majority of the participants are engaged in the food domain, while the rest of them are engaged in the water (32%) and environment (4%) sectors.

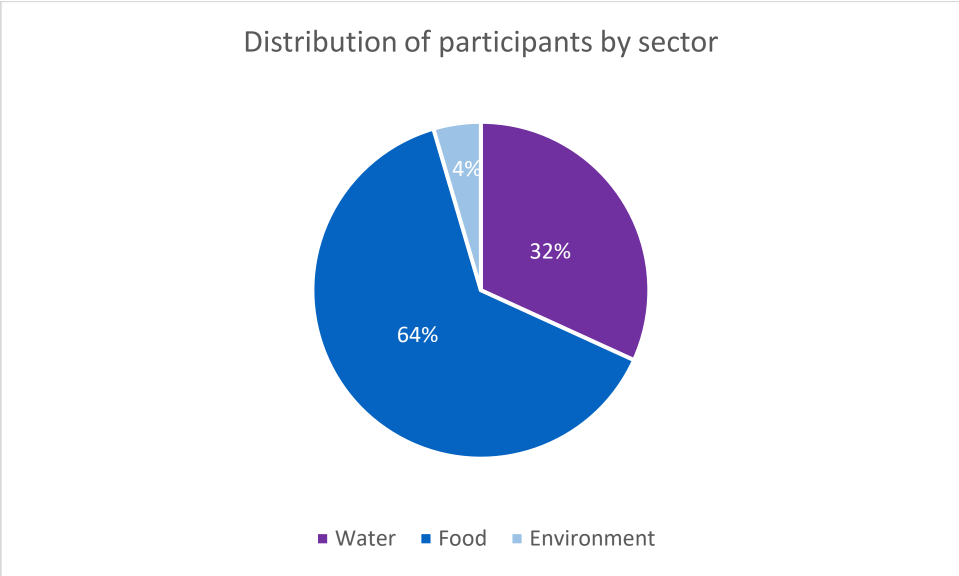

Figure 48: Distribution of participants to the adaptive capacity survey by domain, peninsular Spain

The results of the survey are presented below.

Part A: Assessment of the adaptive capacity components

Political Leadership

The results of the evaluation the institutional organization component against the criteria are presented below. It may be concluded with respect to the criterion 1, that the majority of the respondents (44% on average) rated it either as moderate or high. With respect to the evaluation of criterion 2, 47% of the respondents rated it as moderate, while regarding the criterion 3, 35% rated it either as limited or high.

	1. To what extent has the need for adaptation to climate change been recognized as a political priority?	*2. Evaluate the involvement of political leadership in designing strategies for adapting to climate change.*	*3. To what extent have policies and legislation related to climate change adaptation been adopted?*
None	0%	0%	0%
Limited	12%	18%	35%
Moderate	41%	47%	29%
High	47%	24%	35%
Don't know	0%	12%	0%

Institutional Organisation

The results of the evaluation of the Institutional Organisation component against three criteria, are presented below. With respect to the evaluation of criterion 1, 41% of the respondents replied that there are more than one research programs or projects that study climate change in the pilot area. With respect to criterion 2, 82% of the respondents answered that there are institutions in the area that are engaged with adaptation to climate change. Finally, with respect to criterion 3, the majority of the respondents (82%) replied that there is a fragmentation of responsibilities between the involved stakeholders.

	1. Are there -beyond REXUS- other research programs or projects that study climate change in the pilot area?
None	0%
1-2	41%
More than 2	41%
Don't know	18%

	2. Are there institutions in the area that are engaged with adaptation to climate change?	3. Do you think that there is a fragmentation of responsibilities between the involved stakeholders?
Yes	82%	82%
No	18%	12%
Don't know	0%	6%

Decision Making

The results of the evaluation of the Decision Making component against two criteria are presented below. With respect to the evaluation of criterion 1, the majority of the respondents (38%) replied that the extent to which stakeholders are involved in assessing the impact of climate change and policy making is limited. With respect to criterion 2, the majority of them (41%) replied that they are not aware if there is a decision-making framework used to adapt to climate change.

	1. To what extent are stakeholders involved in assessing the impact of climate change and policy-making?
None	6%
Limited	38%
Moderate	25%
High	25%
Don't know	6%

	2. Is there a decision-making framework used to adapt to climate change?
Yes	29%
No	29%
Don't know	41%

Funding

The results of the evaluation of the Funding component against the criterion are presented below. It may be concluded that, the majority of the respondents (41%) rated the availability of funding as moderate.

	How do you evaluate the availability of funding for adaptation to climate change?
None	12%
Limited	35%
Moderate	41%
High	6%
Don't know	0%

Public Awareness

The results of the evaluation of the Public Awareness component against two criteria are presented below. With respect to criterion 1, the majority of the respondents (47%) rated media coverage of climate change either as moderate or high. With respect to criterion 2, the majority of them (47%) answered that the public awareness of the need for climate change adaptation is moderate.

	1. How do you rate media coverage of climate change?	*2. How do you evaluate the public awareness of the need for climate change adaptation?*
None	0%	6%
Limited	6%	29%
Moderate	47%	47%
High	47%	18%
Don't know	0%	0%

Economic capacity

The economic capacity of the Spain peninsular pilot expressed as the GDP of the country in relation to the EU average is presented in the table that follows. As can be seen, the GDP of Spain is 25,260 Euros per capita which is close to the EU average (82%), thus reflecting a medium economic capacity of the pilot.

	GDP per capita (Euro)	in % of EU average
EU average (27 countries)	30632	100%
Spain	25260	82%

3.3.5 Overall Risk

In this section, the results of the climate risk assessment for the water, food and energy Nexus systems of the Spain peninsular pilot are presented, based on the RCP4.5 and RCP8.5 for the period 2031-2050. The results are presented at municipality level in geospatial form through maps as well as through tables. Specifically, the overall risk is presented qualitatively through maps, while detailed results are also presented both qualitatively, per risk component and quantitatively, at indicator level.

Water system

The results of the climate risk assessment, with respect to the water system, are depicted in Figure 49 as well as in Table 79, Table 80 and Table 89.

As can be seen in Figure 49, a "Low-Medium" level risk is expected at the provinces located mainly at the northern part of the pilot, while the risk for the other municipalities is characterized as "Medium" to "Medium-High", according to RCP4.5. The risk is expected to reach out "Medium-High" levels also at several provinces located at the south-eastern part of the pilot, based on the RCP8.5.

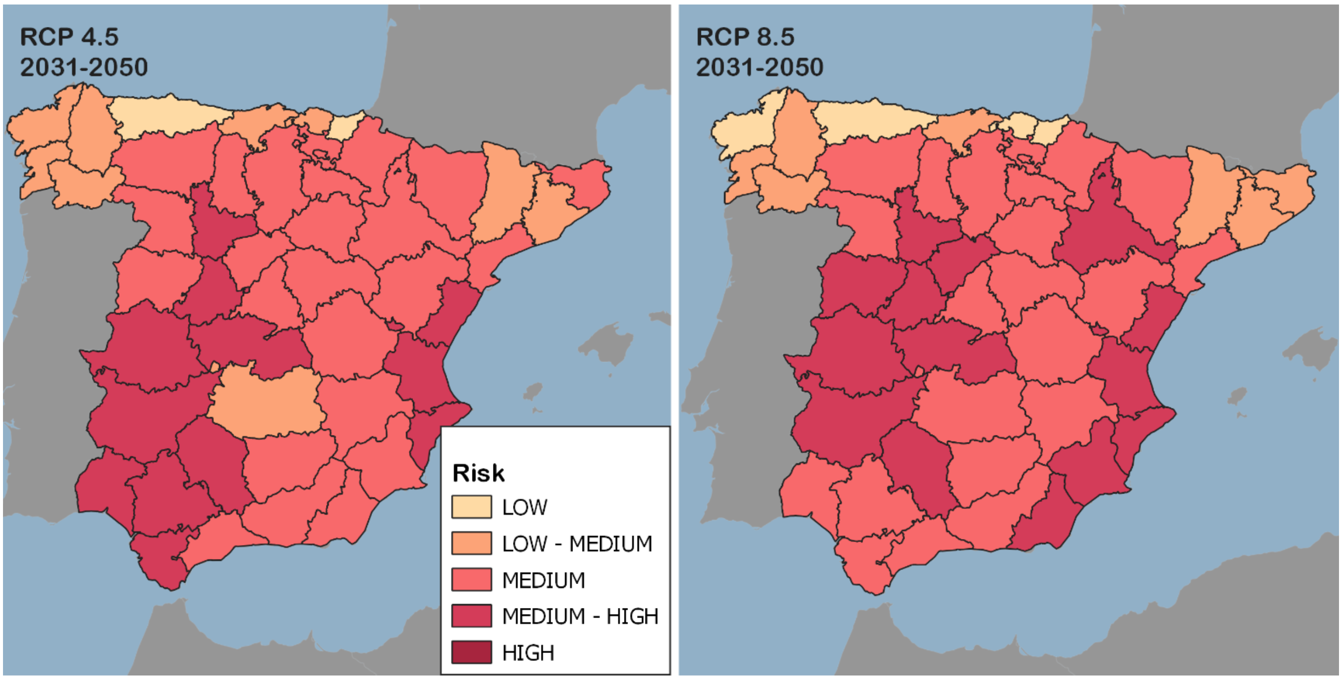

Figure 49: Qualitative climate risk assessment for the water system (RCP4.5 and RCP8.5), peninsular Spain

The results of the overall climate risk assessment are presented in more detail at the level of provinces in Table 79. As can be seen, the above-mentioned risk levels are the result of a “Low” to “Medium-High” range hazard for RCP4.5 and RCP8.5, in combination with a “Low” to “High” vulnerability.

Table 79: Qualitative climate risk assessment per risk component for the water system (RCP4.5 and RCP8.5), peninsular Spain

Administrative unit	Hazard		Vulnerability	Risk	
	4.5	8.5		4.5	8.5
Girona	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium
Huesca	Low-Medium	Low-Medium	Medium-High	Medium	Medium
Zamora	Medium	Medium	Medium-High	Medium	Medium
Toledo	Medium-High	Medium-High	Medium-High	Medium-High	Medium-High
León	Low-Medium	Medium	Medium	Medium	Medium
Cádiz	Medium	Low-Medium	Medium-High	Medium-High	Medium
Barcelona	Low-Medium	Low-Medium	Medium-High	Low-Medium	Low-Medium
Castellón/Castelló	Medium-High	Medium	High	Medium-High	Medium-High
Burgos	Medium	Medium	Medium-High	Medium	Medium
Tarragona	Low-Medium	Low-Medium	Medium-High	Medium	Medium
Alicante/Alacant	Medium	Medium-High	High	Medium-High	Medium-High

Lleida	Low-Medium	Low-Medium	Medium-High	Low-Medium	Low-Medium
Badajoz	Medium	Medium-High	High	Medium-High	Medium-High
Córdoba	Medium	Medium	High	Medium-High	Medium-High
Cáceres	Medium-High	Medium-High	Medium-High	Medium-High	Medium-High
Valencia/València	Medium	Medium-High	High	Medium-High	Medium-High
Almería	Low-Medium	Medium-High	Medium-High	Medium	Medium-High
Guadalajara	Medium	Medium	Medium-High	Medium	Medium
Huelva	Medium	Low-Medium	High	Medium-High	Medium
Valladolid	Medium-High	Medium-High	Medium-High	Medium-High	Medium-High
Salamanca	Medium	Medium-High	Medium-High	Medium	Medium-High
Albacete	Low-Medium	Medium	High	Medium	Medium
Granada	Low-Medium	Medium	High	Medium	Medium
Araba/Álava	Medium	Low-Medium	Medium-High	Medium	Medium
Gipuzkoa	Low	Low	Low-Medium	Low	Low
Palencia	Medium	Medium	Medium-High	Medium	Medium
Cantabria	Low-Medium	Low	Low-Medium	Low-Medium	Low-Medium
La Rioja	Medium	Medium	Medium-High	Medium	Medium
Teruel	Low-Medium	Medium	High	Medium	Medium
Pontevedra	Low-Medium	Low-Medium	Low	Low-Medium	Low-Medium
Ourense	Low-Medium	Medium	Low-Medium	Low-Medium	Low-Medium
Asturias	Low	Low	Low-Medium	Low	Low
Soria	Medium	Medium	Medium-High	Medium	Medium
Zaragoza	Medium	Medium-High	Medium-High	Medium	Medium-High
A Coruña	Low-Medium	Low-Medium	Low	Low-Medium	Low
Lugo	Low-Medium	Low-Medium	Low-Medium	Low-Medium	Low-Medium
Ciudad Real	Low-Medium	Medium	High	Low-Medium	Medium

Murcia	Low-Medium	Medium	High	Medium	Medium-High
Madrid	Medium	Medium	Medium-High	Medium	Medium
Sevilla	Medium	Medium	High	Medium-High	Medium
Ávila	Medium-High	Medium-High	Medium-High	Medium-High	Medium-High
Jaén	Low-Medium	Low-Medium	High	Medium	Medium
Málaga	Medium	Low-Medium	Medium-High	Medium	Medium
Navarra	Low-Medium	Medium	Medium-High	Medium	Medium
Segovia	Low-Medium	Medium-High	Medium-High	Medium	Medium-High
Cuenca	Low-Medium	Medium	High	Medium	Medium
Bizkaia	Low-Medium	Low	Low-Medium	Low-Medium	Low

The detailed results of the climate risk assessment for the RCP4.5 and RCP8.5 are presented quantitatively at normalized scale [-5, 5] in Table 80 and Table 81, respectively. The negative values of the hazard indicators have a beneficial effect and thus are considered to compensate risk.

Table 80: Quantitative (normalized) climate risk assessment at indicator level for the water system (RCP4.5), peninsular Spain

Administrative units	HAZARD			VULNERABILITY			Risk 4.5
	Aridity	Flood recurrence	Composite hazard indicator	Agricultural water consumption	Water exploitation	Composite vulnerability indicator	
Girona	3.1	0.3	**2.0**	**3.3**	3.6	**3.4**	**2.3**
Huesca	3.1	-0.6	**1.6**	**4.8**	2.6	**3.7**	**2.0**
Zamora	3.5	1.8	**2.8**	**4.8**	1.7	**3.2**	**2.9**
Toledo	3.6	3.0	**3.4**	**4.0**	2.0	**3.0**	**3.3**
León	3.0	0.4	**2.0**	**3.9**	1.1	**2.5**	**2.1**
Cádiz	4.2	0.6	**2.8**	**4.3**	3.6	**4.0**	**3.1**
Barcelona	3.3	-1.4	**1.4**	**3.3**	3.6	**3.4**	**1.9**
Castellón/Castelló	3.5	2.5	**3.1**	**4.5**	4.2	**4.4**	**3.4**
Burgos	3.1	1.0	**2.3**	**4.8**	2.1	**3.5**	**2.6**
Tarragona	3.6	-1.0	**1.8**	**4.1**	3.1	**3.6**	**2.2**
Alicante/Alacant	4.0	0.6	**2.6**	**4.5**	4.2	**4.4**	**3.1**
Lleida	3.1	-1.9	**1.1**	**4.8**	2.6	**3.7**	**1.6**
Badajoz	4.0	0.3	**2.5**	**4.8**	4.7	**4.8**	**3.0**
Córdoba	4.0	0.3	**2.5**	**4.8**	4.6	**4.7**	**3.0**
Cáceres	3.9	1.8	**3.1**	**4.0**	2.0	**3.0**	**3.0**
Valencia/València	3.9	1.1	**2.8**	**4.5**	4.2	**4.4**	**3.2**
Almería	4.1	-1.8	**1.8**	**4.3**	3.6	**4.0**	**2.2**
Guadalajara	3.5	0.3	**2.2**	**4.0**	2.0	**3.0**	**2.4**
Huelva	4.1	0.6	**2.7**	**4.8**	4.6	**4.7**	**3.2**

Valladolid	3.3	2.9	**3.1**	**4.8**	1.7	**3.2**	**3.2**
Salamanca	3.4	2.1	**2.9**	**4.8**	1.7	**3.2**	**3.0**
Albacete	3.8	-1.7	**1.6**	**4.6**	4.4	**4.5**	**2.2**
Granada	4.1	-1.2	**2.0**	**4.8**	4.6	**4.7**	**2.6**
Araba/Álava	2.8	1.1	**2.1**	**4.8**	2.6	**3.7**	**2.5**
Gipuzkoa	0.9	0.7	**0.8**	**1.7**	0.4	**1.1**	**0.9**
Palencia	3.2	1.4	**2.5**	**4.8**	1.7	**3.2**	**2.7**
Cantabria	1.4	1.6	**1.5**	**1.7**	0.4	**1.1**	**1.3**
La Rioja	3.1	0.9	**2.2**	**4.8**	2.6	**3.7**	**2.6**
Teruel	3.2	-0.1	**1.9**	**4.7**	3.4	**4.0**	**2.4**
Pontevedra	2.8	-0.4	**1.5**	**1.2**	0.2	**0.7**	**1.2**
Ourense	3.1	0.3	**2.0**	**2.2**	0.0	**1.1**	**1.6**
Asturias	1.0	0.2	**0.7**	**1.7**	0.4	**1.1**	**0.8**
Soria	3.1	0.4	**2.0**	**4.8**	1.7	**3.2**	**2.3**
Zaragoza	3.2	1.3	**2.5**	**4.8**	2.6	**3.7**	**2.8**
A Coruña	2.2	1.2	**1.8**	**1.2**	0.2	**0.7**	**1.3**
Lugo	1.9	0.0	**1.1**	**2.2**	0.0	**1.1**	**1.1**
Ciudad Real	3.7	-2.3	**1.3**	**4.8**	4.7	**4.8**	**1.9**
Murcia	4.0	-2.1	**1.6**	**4.6**	4.6	**4.6**	**2.2**
Madrid	3.6	0.5	**2.4**	**4.0**	2.0	**3.0**	**2.6**
Sevilla	4.1	0.5	**2.7**	**4.8**	4.6	**4.7**	**3.2**
Ávila	3.5	2.6	**3.2**	**4.5**	1.8	**3.1**	**3.1**
Jaén	4.1	-2.1	**1.6**	**4.8**	4.6	**4.7**	**2.2**
Málaga	4.2	0.3	**2.6**	**4.3**	3.6	**4.0**	**3.0**
Navarra	2.6	0.4	**1.7**	**4.8**	2.6	**3.7**	**2.1**
Segovia	3.2	0.1	**2.0**	**4.8**	1.7	**3.2**	**2.3**
Cuenca	3.6	-1.0	**1.7**	**4.5**	3.9	**4.2**	**2.3**
Bizkaia	1.0	1.6	**1.3**	**1.7**	0.4	**1.1**	**1.2**

Table 81: Quantitative (normalized) climate risk assessment at indicator level for the water system (RCP8.5), peninsular Spain

Administrative units	HAZARD			VULNERABILITY			Risk 8.5
	Aridity	Flood recurrence	Composite hazard indicator	Agricultural water consumption	Water exploitation	Composite vulnerability indicator	
Girona	2.9	-0.5	1.5	3.3	3.6	3.4	1.9
Huesca	3.0	0.0	1.8	4.8	2.6	3.7	2.2
Zamora	3.5	1.1	2.6	4.8	1.7	3.2	2.7
Toledo	3.7	3.8	3.8	4.0	2.0	3.0	3.5
León	3.1	0.4	2.0	3.9	1.1	2.5	2.2
Cádiz	4.3	-1.9	1.8	4.3	3.6	4.0	2.3
Barcelona	3.1	-1.1	1.4	3.3	3.6	3.4	1.8
Castellón/Castelló	3.3	1.6	2.6	4.5	4.2	4.4	3.1
Burgos	3.1	0.9	2.2	4.8	2.1	3.5	2.6
Tarragona	3.4	-0.5	1.9	4.1	3.1	3.6	2.3
Alicante/Alacant	4.0	3.5	3.8	4.5	4.2	4.4	4.0
Lleida	3.0	-1.8	1.1	4.8	2.6	3.7	1.6
Badajoz	4.1	1.9	3.2	4.8	4.7	4.8	3.6
Córdoba	4.1	0.1	2.5	4.8	4.6	4.7	3.0
Cáceres	4.0	1.6	3.0	4.0	2.0	3.0	3.0
Valencia/València	3.8	2.4	3.2	4.5	4.2	4.4	3.5
Almería	4.1	2.4	3.4	4.3	3.6	4.0	3.6

Guadalajara	3.3	0.5	**2.2**	**4.0**	2.0	**3.0**	**2.4**
Huelva	4.2	-2.5	**1.5**	**4.8**	4.6	**4.7**	**2.1**
Valladolid	3.4	2.4	**3.0**	**4.8**	1.7	**3.2**	**3.1**
Salamanca	3.5	4.1	**3.8**	**4.8**	1.7	**3.2**	**3.6**
Albacete	3.8	0.2	**2.3**	**4.6**	4.4	**4.5**	**2.8**
Granada	4.1	-0.8	**2.2**	**4.8**	4.6	**4.7**	**2.7**
Araba/Álava	2.8	0.7	**2.0**	**4.8**	2.6	**3.7**	**2.4**
Gipuzkoa	0.9	0.3	**0.6**	**1.7**	0.4	**1.1**	**0.8**
Palencia	3.2	1.2	**2.4**	**4.8**	1.7	**3.2**	**2.6**
Cantabria	1.5	0.2	**1.0**	**1.7**	0.4	**1.1**	**1.0**
La Rioja	3.0	1.1	**2.2**	**4.8**	2.6	**3.7**	**2.6**
Teruel	3.1	1.4	**2.4**	**4.7**	3.4	**4.0**	**2.8**
Pontevedra	3.0	-1.1	**1.4**	**1.2**	0.2	**0.7**	**1.1**
Ourense	3.2	0.6	**2.1**	**2.2**	0.0	**1.1**	**1.7**
Asturias	1.2	-0.3	**0.6**	**1.7**	0.4	**1.1**	**0.7**
Soria	3.1	0.7	**2.2**	**4.8**	1.7	**3.2**	**2.4**
Zaragoza	3.2	3.1	**3.2**	**4.8**	2.6	**3.7**	**3.3**
A Coruña	2.5	-0.9	**1.2**	**1.2**	0.2	**0.7**	**1.0**
Lugo	2.5	-1.0	**1.1**	**2.2**	0.0	**1.1**	**1.1**
Ciudad Real	3.7	0.0	**2.2**	**4.8**	4.7	**4.8**	**2.8**
Murcia	4.0	1.1	**2.8**	**4.6**	4.6	**4.6**	**3.3**
Madrid	3.6	1.8	**2.9**	**4.0**	2.0	**3.0**	**2.9**
Sevilla	4.2	-0.1	**2.5**	**4.8**	4.6	**4.7**	**3.0**
Ávila	3.5	3.1	**3.3**	**4.5**	1.8	**3.1**	**3.3**
Jaén	4.1	-1.7	**1.8**	**4.8**	4.6	**4.7**	**2.4**
Málaga	4.2	-1.5	**1.9**	**4.3**	3.6	**4.0**	**2.4**
Navarra	2.5	2.2	**2.4**	**4.8**	2.6	**3.7**	**2.7**
Segovia	3.2	3.6	**3.3**	**4.8**	1.7	**3.2**	**3.3**
Cuenca	3.4	1.0	**2.5**	**4.5**	3.9	**4.2**	**2.9**
Bizkaia	1.2	-0.1	**0.7**	**1.7**	0.4	**1.1**	**0.8**

Food system

The results of the climate risk assessment, with respect to the food system, are depicted in Figure 50 as well as in Table 82, Table 89 and Table 90.

As can be seen in Figure 50 a “Low” to “Low-Medium” level risk is expected at provinces on the northern part of the pilot, while the level of risk for the majority of the provinces is expected to be “Medium” to “Medium-High”, according to both scenarios.

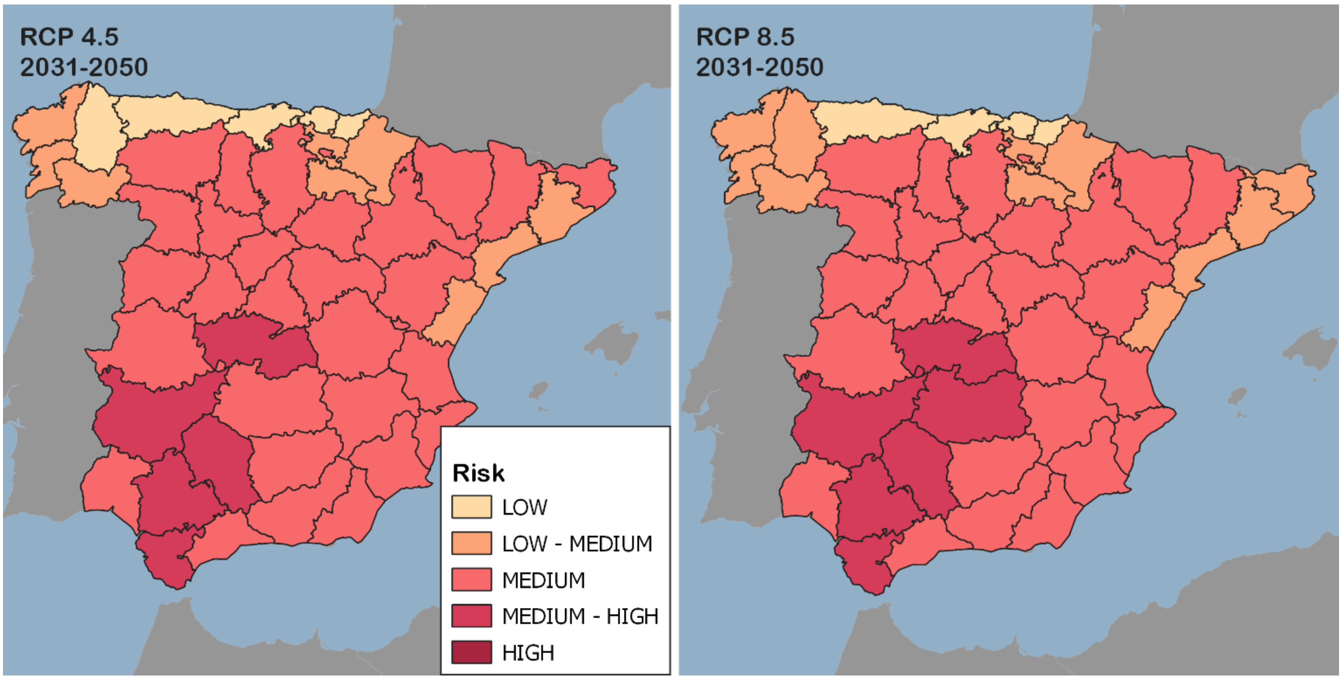

Figure 50: Qualitative climate risk assessment for the food system (RCP4.5 and RCP8.5), peninsular Spain

The results of the overall climate risk assessment are presented in more detail at the level of provinces in Table 82. As can be seen, the above-mentioned risk levels are the result of a “Low” to “Medium-High” range of hazard for both RCPs, in combination with a “Low” to “High” range of exposure and “Low” to “High” range of vulnerability.

Table 82: Qualitative climate risk assessment per risk component for the food system (RCP4.5 and RCP8.5), peninsular Spain

Administrative unit	Hazard		Exposure	Vulnerability	Risk	
	4.5	8.5			4.5	8.5
Girona	Low-Medium	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium
Huesca	Low-Medium	Low-Medium	Medium-High	Medium-High	Medium	Medium
Zamora	Medium	Medium	Medium-High	Medium-High	Medium	Medium
Toledo	Medium	Medium-High	Medium-High	Medium-High	Medium-High	Medium-High
León	Low-Medium	Low-Medium	Medium	Medium	Medium	Medium

Cádiz	Medium-High	Medium	Medium-High	High	Medium-High	Medium-High
Barcelona	Low-Medium	Low-Medium	Low-Medium	Medium-High	Low-Medium	Low-Medium
Castellón/Castelló	Medium	Medium	Low	High	Low-Medium	Low-Medium
Burgos	Low-Medium	Low-Medium	Medium-High	Medium-High	Medium	Medium
Tarragona	Medium	Medium	Low	Medium-High	Low-Medium	Low-Medium
Alicante/Alacant	Medium	Medium	Low	High	Medium	Medium
Lleida	Low-Medium	Low-Medium	Medium	Medium-High	Medium	Medium
Badajoz	Medium-High	Medium-High	Medium	Medium-High	Medium-High	Medium-High
Córdoba	Medium-High	Medium-High	Medium	High	Medium-High	Medium-High
Cáceres	Medium	Medium-High	Low-Medium	Medium	Medium	Medium
Valencia/València	Medium	Medium	Low	High	Medium	Medium
Almería	Medium	Medium	Low-Medium	High	Medium	Medium
Guadalajara	Medium	Medium	Medium	Medium-High	Medium	Medium
Huelva	Medium-High	Medium-High	Low-Medium	High	Medium	Medium
Valladolid	Medium	Medium	High	Medium-High	Medium	Medium
Salamanca	Medium	Medium	Medium	Medium-High	Medium	Medium
Albacete	Medium	Medium	Medium-High	High	Medium	Medium
Granada	Medium	Medium	Medium	High	Medium	Medium
Araba/Álava	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Low-Medium
Gipuzkoa	Low	Low	Low	Low	Low	Low
Palencia	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
Cantabria	Low	Low	Low	Low	Low	Low
La Rioja	Low-Medium	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
Teruel	Low-Medium	Medium	Medium	Medium-High	Medium	Medium
Pontevedra	Low-Medium	Low-Medium	Low	Low-Medium	Low-Medium	Low-Medium
Ourense	Low-Medium	Low-Medium	Low	Low-Medium	Low-Medium	Low-Medium

Asturias	Low	Low	Low	Low	Low	Low
Soria	Low-Medium	Low-Medium	Medium-High	Medium-High	Medium	Medium
Zaragoza	Medium	Medium	Medium-High	Medium-High	Medium	Medium
A Coruña	Low-Medium	Low-Medium	Low	Low-Medium	Low-Medium	Low-Medium
Lugo	Low	Low-Medium	Low	Low-Medium	Low	Low-Medium
Ciudad Real	Medium	Medium	Medium	High	Medium	Medium-High
Murcia	Medium	Medium	Medium	Medium-High	Medium	Medium
Madrid	Medium	Medium	Medium	Medium	Medium	Medium
Sevilla	Medium-High	Medium-High	Medium-High	High	Medium-High	Medium-High
Ávila	Medium	Medium	Medium	Medium-High	Medium	Medium
Jaén	Medium	Medium	Low	High	Medium	Medium
Málaga	Medium	Medium	Low-Medium	High	Medium	Medium
Navarra	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Low-Medium
Segovia	Low-Medium	Medium	Medium-High	Medium-High	Medium	Medium
Cuenca	Medium	Medium	Medium-High	High	Medium	Medium
Bizkaia	Low	Low	Low	Low	Low	Low

The detailed results of the climate risk assessment for the RCP4.5 and RCP8.5 are presented quantitatively at normalized scale [-5, 5] in Table 83 and Table 84, respectively. The negative values of the hazard indicators have a beneficial effect and thus are considered to compensate risk.

Table 83: Quantitative (normalized) climate risk assessment at indicator level for the food system (RCP4.5), peninsular Spain

Administrative units	HAZARD						Exposure	VULNERABILITY				Risk 4.5
	Growing Degree Days	Frost	Heat stress	Aridity	Flood recurrence	Composite hazard indicator	Share of main crops	Agricultural water consumption	Water exploitation	Agricultural income	Composite vulnerability indicator	
Girona	-1.3	1.5	1.3	3.1	0.3	**1.9**	**2.0**	3.3	3.6	2.2	**3.0**	**2.1**
Huesca	-2.3	3.1	1.5	3.1	-0.6	**2.0**	**3.0**	4.8	2.6	2.2	**3.2**	**2.4**
Zamora	-1.1	0.8	1.3	3.5	1.8	**2.1**	**3.1**	4.8	1.7	3.4	**3.3**	**2.5**
Toledo	-0.8	0.2	3.1	3.6	3.0	**2.8**	**3.0**	4.0	2.0	4.6	**3.6**	**3.0**
León	-1.4	3.0	0.5	3.0	0.4	**1.7**	**2.5**	3.9	1.1	3.4	**2.8**	**2.1**
Cádiz	-0.5	0.0	3.3	4.2	0.6	**3.0**	**3.0**	4.3	3.6	5.0	**4.3**	**3.2**
Barcelona	-0.9	0.9	1.4	3.3	-1.4	**1.9**	**1.5**	3.3	3.6	2.2	**3.0**	**2.0**
Castellón/Castelló	-0.7	0.2	1.4	3.5	2.5	**2.2**	**0.4**	4.5	4.2	3.6	**4.1**	**1.8**
Burgos	-1.2	1.3	0.6	3.1	1.0	**1.7**	**3.5**	4.8	2.1	3.4	**3.5**	**2.2**
Tarragona	-0.7	0.0	1.8	3.6	-1.0	**2.1**	**0.9**	4.1	3.1	2.2	**3.1**	**1.9**
Alicante/Alacant	-0.5	0.0	2.3	4.0	0.6	**2.5**	**0.7**	4.5	4.2	3.6	**4.1**	**2.1**
Lleida	-3.1	4.4	1.4	3.1	-1.9	**1.9**	**2.5**	4.8	2.6	2.2	**3.2**	**2.3**
Badajoz	-0.6	0.0	3.8	4.0	0.3	**3.0**	**2.6**	4.8	4.7	1.8	**3.8**	**3.1**
Córdoba	-0.7	0.0	4.2	4.0	0.3	**3.2**	**2.4**	4.8	4.6	5.0	**4.8**	**3.3**
Cáceres	-0.8	0.1	3.2	3.9	1.8	**2.9**	**1.1**	4.0	2.0	1.8	**2.6**	**2.4**
Valencia/València	-0.6	0.2	2.3	3.9	1.1	**2.6**	**0.5**	4.5	4.2	3.6	**4.1**	**2.0**
Almería	-0.7	0.3	2.1	4.1	-1.8	**2.3**	**1.2**	4.3	3.6	5.0	**4.3**	**2.3**
Guadalajara	-1.1	2.2	1.3	3.5	0.3	**2.1**	**2.8**	4.0	2.0	4.6	**3.6**	**2.5**
Huelva	-0.5	0.0	3.9	4.1	0.6	**3.2**	**1.0**	4.8	4.6	5.0	**4.8**	**2.7**

Valladolid	-1.0	0.6	1.6	3.3	2.9	**2.2**	**4.4**	4.8	1.7	3.4	**3.3**	**2.7**
Salamanca	-1.1	0.4	1.5	3.4	2.1	**2.1**	**2.6**	4.8	1.7	3.4	**3.3**	**2.4**
Albacete	-0.7	0.4	2.5	3.8	-1.7	**2.4**	**3.1**	4.6	4.4	4.6	**4.5**	**2.9**
Granada	-0.9	1.1	2.1	4.1	-1.2	**2.5**	**2.4**	4.8	4.6	5.0	**4.8**	**2.8**
Araba/Álava	-1.1	0.2	0.4	2.8	1.1	**1.4**	**2.6**	4.8	2.6	0.4	**2.6**	**1.8**
Gipuzkoa	-1.0	0.1	0.2	0.9	0.7	**0.5**	**0.6**	1.7	0.4	0.4	**0.8**	**0.6**
Palencia	-1.2	1.9	0.8	3.2	1.4	**1.9**	**4.1**	4.8	1.7	3.4	**3.3**	**2.5**
Cantabria	-1.1	0.9	0.1	1.4	1.6	**0.8**	**0.1**	1.7	0.4	0.1	**0.8**	**0.5**
La Rioja	-1.2	1.5	0.7	3.1	0.9	**1.7**	**1.8**	4.8	2.6	0.7	**2.7**	**1.9**
Teruel	-1.1	2.3	1.2	3.2	-0.1	**2.0**	**2.7**	4.7	3.4	2.2	**3.4**	**2.3**
Pontevedra	-0.8	0.0	0.7	2.8	-0.4	**1.4**	**0.4**	1.2	0.2	1.9	**1.1**	**1.1**
Ourense	-1.1	0.4	0.7	3.1	0.3	**1.6**	**0.7**	2.2	0.0	1.9	**1.4**	**1.3**
Asturias	-1.1	0.7	0.0	1.0	0.2	**0.5**	**0.8**	1.7	0.4	0.2	**0.8**	**0.6**
Soria	-1.2	2.4	0.9	3.1	0.4	**1.8**	**3.1**	4.8	1.7	3.4	**3.3**	**2.3**
Zaragoza	-0.9	0.3	2.0	3.2	1.3	**2.2**	**3.1**	4.8	2.6	2.2	**3.2**	**2.5**
A Coruña	-0.7	0.0	0.3	2.2	1.2	**1.1**	**0.8**	1.2	0.2	1.9	**1.1**	**1.0**
Lugo	-1.0	0.1	0.3	1.9	0.0	**0.9**	**0.9**	2.2	0.0	1.9	**1.4**	**1.0**
Ciudad Real	-0.7	0.2	3.1	3.7	-2.3	**2.5**	**2.8**	4.8	4.7	4.6	**4.7**	**2.9**
Murcia	-0.6	0.1	3.0	4.0	-2.1	**2.6**	**2.4**	4.6	4.6	2.7	**4.0**	**2.8**
Madrid	-1.1	0.9	2.2	3.6	0.5	**2.4**	**2.5**	4.0	2.0	0.2	**2.1**	**2.4**
Sevilla	-0.5	0.0	4.6	4.1	0.5	**3.4**	**3.2**	4.8	4.6	5.0	**4.8**	**3.6**
Ávila	-2.0	2.0	1.1	3.5	2.6	**2.2**	**2.6**	4.5	1.8	3.4	**3.2**	**2.4**
Jaén	-0.7	0.3	3.4	4.1	-2.1	**2.8**	**0.8**	4.8	4.6	5.0	**4.8**	**2.4**
Málaga	-0.6	0.0	2.4	4.2	0.3	**2.6**	**1.6**	4.3	3.6	5.0	**4.3**	**2.6**
Navarra	-1.0	0.4	0.9	2.6	0.4	**1.4**	**2.9**	4.8	2.6	0.8	**2.7**	**1.9**
Segovia	-1.2	1.6	1.2	3.2	0.1	**1.9**	**3.4**	4.8	1.7	3.4	**3.3**	**2.4**
Cuenca	-0.9	1.3	1.9	3.6	-1.0	**2.2**	**3.3**	4.5	3.9	4.6	**4.3**	**2.7**
Bizkaia	-0.9	0.0	0.3	1.0	1.6	**0.6**	**0.5**	1.7	0.4	0.4	**0.8**	**0.6**

Table 84: Quantitative (normalized) climate risk assessment at indicator level for the food system (RCP8.5), peninsular Spain

Administrative units	HAZARD						Exposure	Vulnerability				Risk 8.5
	Growing Degree Days	Frost	Heat stress	Aridity	Flood recurrence	Composite hazard indicator	Share of main crops	Agricultural water consumption	Water exploitation	Agricultural income	Composite vulnerability indicator	
Girona	-1.7	1.4	1.4	2.9	-0.5	**1.7**	**2.0**	3.3	3.6	2.2	**3.0**	**2.0**
Huesca	-5.0	2.9	1.5	3.0	0.0	**1.9**	**3.0**	4.8	2.6	2.2	**3.2**	**2.3**
Zamora	-1.2	0.7	1.5	3.5	1.1	**2.1**	**3.1**	4.8	1.7	3.4	**3.3**	**2.5**
Toledo	-0.9	0.1	3.3	3.7	3.8	**3.0**	**3.0**	4.0	2.0	4.6	**3.6**	**3.1**
León	-1.6	2.8	0.6	3.1	0.4	**1.8**	**2.5**	3.9	1.1	3.4	**2.8**	**2.1**
Cádiz	-0.6	0.0	3.6	4.3	-1.9	**2.9**	**3.0**	4.3	3.6	5.0	**4.3**	**3.2**
Barcelona	-1.1	0.7	1.5	3.1	-1.1	**1.8**	**1.5**	3.3	3.6	2.2	**3.0**	**1.9**
Castellón/Castelló	-1.0	0.2	1.6	3.3	1.6	**2.0**	**0.4**	4.5	4.2	3.6	**4.1**	**1.7**
Burgos	-1.5	1.2	0.7	3.1	0.9	**1.7**	**3.5**	4.8	2.1	3.4	**3.5**	**2.2**
Tarragona	-0.9	0.0	1.9	3.4	-0.5	**2.1**	**0.9**	4.1	3.1	2.2	**3.1**	**1.9**
Alicante/Alacant	-0.7	0.0	2.4	4.0	3.5	**2.8**	**0.7**	4.5	4.2	3.6	**4.1**	**2.3**
Lleida	-5.0	4.2	1.5	3.0	-1.8	**1.8**	**2.5**	4.8	2.6	2.2	**3.2**	**2.2**
Badajoz	-0.8	0.0	4.1	4.1	1.9	**3.3**	**2.6**	4.8	4.7	1.8	**3.8**	**3.2**
Córdoba	-0.8	0.0	4.4	4.1	0.1	**3.3**	**2.4**	4.8	4.6	5.0	**4.8**	**3.3**
Cáceres	-1.0	0.0	3.5	4.0	1.6	**3.0**	**1.1**	4.0	2.0	1.8	**2.6**	**2.4**
Valencia/València	-0.8	0.1	2.5	3.8	2.4	**2.6**	**0.5**	4.5	4.2	3.6	**4.1**	**2.1**

Almería	-0.9	0.2	2.2	4.1	2.4	**2.7**	**1.2**	4.3	3.6	5.0	**4.3**	**2.5**
Guadalajara	-1.4	2.0	1.4	3.3	0.5	**2.1**	**2.8**	4.0	2.0	4.6	**3.6**	**2.5**
Huelva	-0.6	0.0	4.2	4.2	-2.5	**3.1**	**1.0**	4.8	4.6	5.0	**4.8**	**2.7**
Valladolid	-1.1	0.5	1.7	3.4	2.4	**2.2**	**4.4**	4.8	1.7	3.4	**3.3**	**2.8**
Salamanca	-1.3	0.3	1.7	3.5	4.1	**2.4**	**2.6**	4.8	1.7	3.4	**3.3**	**2.6**
Albacete	-1.0	0.3	2.7	3.8	0.2	**2.5**	**3.1**	4.6	4.4	4.6	**4.5**	**3.0**
Granada	-1.2	1.0	2.3	4.1	-0.8	**2.5**	**2.4**	4.8	4.6	5.0	**4.8**	**2.8**
Araba/Álava	-1.4	0.2	0.5	2.8	0.7	**1.4**	**2.6**	4.8	2.6	0.4	**2.6**	**1.8**
Gipuzkoa	-1.2	0.0	0.2	0.9	0.3	**0.4**	**0.6**	1.7	0.4	0.4	**0.8**	**0.5**
Palencia	-1.4	1.7	1.0	3.2	1.2	**1.9**	**4.1**	4.8	1.7	3.4	**3.3**	**2.5**
Cantabria	-1.3	0.8	0.1	1.5	0.2	**0.7**	**0.1**	1.7	0.4	0.1	**0.8**	**0.5**
La Rioja	-1.5	1.5	0.8	3.0	1.1	**1.7**	**1.8**	4.8	2.6	0.7	**2.7**	**1.9**
Teruel	-1.4	2.1	1.3	3.1	1.4	**2.0**	**2.7**	4.7	3.4	2.2	**3.4**	**2.4**
Pontevedra	-0.9	0.0	0.8	3.0	-1.1	**1.5**	**0.4**	1.2	0.2	1.9	**1.1**	**1.1**
Ourense	-1.3	0.4	0.8	3.2	0.6	**1.7**	**0.7**	2.2	0.0	1.9	**1.4**	**1.3**
Asturias	-1.3	0.7	0.1	1.2	-0.3	**0.5**	**0.8**	1.7	0.4	0.2	**0.8**	**0.6**
Soria	-1.5	2.2	0.9	3.1	0.7	**1.8**	**3.1**	4.8	1.7	3.4	**3.3**	**2.3**
Zaragoza	-1.1	0.2	2.2	3.2	3.1	**2.3**	**3.1**	4.8	2.6	2.2	**3.2**	**2.6**
A Coruña	-0.8	0.0	0.3	2.5	-0.9	**1.1**	**0.8**	1.2	0.2	1.9	**1.1**	**1.0**
Lugo	-1.2	0.1	0.4	2.5	-1.0	**1.1**	**0.9**	2.2	0.0	1.9	**1.4**	**1.1**
Ciudad Real	-0.9	0.1	3.4	3.7	0.0	**2.7**	**2.8**	4.8	4.7	4.6	**4.7**	**3.1**
Murcia	-0.8	0.1	3.2	4.0	1.1	**2.9**	**2.4**	4.6	4.6	2.7	**4.0**	**3.0**
Madrid	-1.2	0.8	2.4	3.6	1.8	**2.5**	**2.5**	4.0	2.0	0.2	**2.1**	**2.4**
Sevilla	-0.6	0.0	4.8	4.2	-0.1	**3.5**	**3.2**	4.8	4.6	5.0	**4.8**	**3.6**
Ávila	-2.7	1.8	1.2	3.5	3.1	**2.2**	**2.6**	4.5	1.8	3.4	**3.2**	**2.5**
Jaén	-0.9	0.2	3.7	4.1	-1.7	**2.9**	**0.8**	4.8	4.6	5.0	**4.8**	**2.5**
Málaga	-0.8	0.0	2.6	4.2	-1.5	**2.6**	**1.6**	4.3	3.6	5.0	**4.3**	**2.6**
Navarra	-1.3	0.4	1.0	2.5	2.2	**1.6**	**2.9**	4.8	2.6	0.8	**2.7**	**2.0**
Segovia	-1.5	1.5	1.3	3.2	3.6	**2.2**	**3.4**	4.8	1.7	3.4	**3.3**	**2.6**
Cuenca	-1.2	1.1	2.0	3.4	1.0	**2.3**	**3.3**	4.5	3.9	4.6	**4.3**	**2.8**
Bizkaia	-1.1	0.0	0.3	1.2	-0.1	**0.6**	**0.5**	1.7	0.4	0.4	**0.8**	**0.6**

Energy system

The results of the climate risk assessment, with respect to the energy system, are presented in Table 85, Table 86 and Table 87.

As can be seen, the risk levels of the pilot are the result of a “Low” hazard for both scenarios, in combination with a “Low” to “Medium-High” exposure and “Medium” vulnerability.

Table 85: Qualitative climate risk assessment per risk component for the energy system (RCP4.5 and RCP8.5), peninsular Spain

Administrative unit	Hazard		Vulnerability		Risk	
	4.5	8.5	4.5	8.5	4.5	8.5
Girona	Low	Low	Low-Medium	Medium	Low	Low
Huesca	Low	Low	Low-Medium	Medium	Low	Low
Zamora	Low	Low	Medium-High	Medium	Low	Low
Toledo	Low	Low	Medium	Medium	Low	Low
León	Low	Low	Low-Medium	Medium	Low	Low
Cádiz	Low	Low	Medium-High	Medium	Low	Low
Barcelona	Low	Low	Low-Medium	Medium	Low	Low
Castellón/Castelló	Low	Low	Low-Medium	Medium	Low	Low
Burgos	Low	Low	Medium	Medium	Low	Low
Tarragona	Low	Low	Medium	Medium	Low	Low
Alicante/Alacant	Low	Low	Medium	Medium	Low	Low
Lleida	Low	Low	Low-Medium	Medium	Low	Low
Badajoz	Low	Low	Low-Medium	Medium	Low	Low
Córdoba	Low	Low	Medium	Medium	Low	Low
Cáceres	Low	Low	Medium	Medium	Low	Low
Valencia/València	Low	Low	Medium	Medium	Low	Low
Almería	Low	Low	Medium	Medium	Low	Low
Guadalajara	Low	Low	Medium-High	Medium	Low	Low
Huelva	Low	Low	Low-Medium	Medium	Low	Low
Valladolid	Low	Low	Medium	Medium	Low	Low
Salamanca	Low	Low	Medium	Medium	Low	Low
Albacete	Low	Low	Medium-High	Medium	Low	Low
Granada	Low	Low	Medium-High	Medium	Low	Low
Araba/Álava	Low	Low	Low	Medium	Low	Low
Gipuzkoa	Low	Low	Low	Medium	Low	Low
Palencia	Low	Low	Medium	Medium	Low	Low

Cantabria	Low	Low	Low-Medium	Medium	Low	Low
La Rioja	Low	Low	Low-Medium	Medium	Low	Low
Teruel	Low	Low	Low	Medium	Low	Low
Pontevedra	Low	Low	Low-Medium	Medium	Low	Low
Ourense	Low	Low	Medium	Medium	Low	Low
Asturias	Low	Low	Medium	Medium	Low	Low
Soria	Low	Low	Medium	Medium	Low	Low
Zaragoza	Low	Low	Medium	Medium	Low	Low
A Coruña	Low	Low	Low-Medium	Medium	Low	Low
Lugo	Low	Low	Medium	Medium	Low	Low
Ciudad Real	Low	Low	Medium-High	Medium	Low	Low
Murcia	Low	Low	Medium	Medium	Low	Low
Madrid	Low	Low	Low	Medium	Low	Low
Sevilla	Low	Low	Medium-High	Medium	Low	Low
Ávila	Low	Low	Low-Medium	Medium	Low	Low
Jaén	Low	Low	Low-Medium	Medium	Low	Low
Málaga	Low	Low	Medium-High	Medium	Low	Low
Navarra	Low	Low	Medium	Medium	Low	Low
Segovia	Low	Low	Low-Medium	Medium	Low	Low
Cuenca	Low	Low	Medium-High	Medium	Low	Low
Bizkaia	Low	Low	Low-Medium	Medium	Low	Low

The detailed results of the climate risk assessment for the RCP4.5 and 8.5 are presented quantitatively at normalized scale [-5, 5] in Table 86 and Table 87, respectively. The negative values of the hazard indicators have a beneficial effect and thus are considered to compensate risk.

Table 86: Quantitative (normalized) climate risk assessment at indicator level for the energy system (RCP4.5), peninsular Spain

Administrative units	Hazard				Exposure				Vulnerability			Risk				
	Energy crop composite (GDD, Frost, Heat stress)	Wind power generation	Solar photovoltaic power generation	Hydropower generation	Energy crop cultivation intensity	Wind energy intensity	Photovoltaic energy intensity	Hydropower energy intensity	Energy imports dependency	Renewable energy share	Composite vulnerability	energy crop	Wind energy	Photovoltaic energy	Hydropower energy	Overall Risk 4.5
Girona	0.1	0.0	0.0	0.4	0.4	2.7	0.0	1.9	4.3	1.8	**2.3**	0.2	0.1	0.0	0.7	**0.3**
Huesca	0.5	-0.1	0.0	0.4	0.6	2.0	0.3	4.7	4.3	1.8	**2.3**	0.7	0.0	0.1	0.9	**0.4**
Zamora	0.0	0.0	0.0	0.4	4.2	4.6	0.6	5.0	4.3	1.8	**2.3**	0.0	0.0	0.1	0.9	**0.2**
Toledo	0.4	0.0	0.0	0.4	4.7	0.6	2.5	2.2	4.3	1.8	**2.3**	1.0	0.0	0.1	0.8	**0.5**
León	0.6	0.0	0.0	0.4	4.2	0.9	0.0	1.7	4.3	1.8	**2.3**	1.1	0.0	0.0	0.7	**0.5**
Cádiz	0.5	0.1	0.0	0.4	4.9	3.4	5.0	0.0	4.3	1.8	**2.3**	1.0	0.3	0.1	0.0	**0.4**
Barcelona	0.0	0.0	0.0	0.4	0.4	1.7	0.5	2.0	4.3	1.8	**2.3**	0.1	0.0	0.1	0.7	**0.2**
Castellón/Castelló	-0.2	0.0	0.0	0.4	0.1	5.0	0.3	0.0	4.3	1.8	**2.3**	0.0	0.0	0.1	0.0	**0.0**
Burgos	0.0	-0.1	0.0	0.4	4.2	3.9	0.1	0.0	4.3	1.8	**2.3**	0.2	0.0	0.1	0.0	**0.1**
Tarragona	-0.2	0.0	0.0	0.4	0.4	2.6	0.5	4.6	4.3	1.8	**2.3**	0.0	0.0	0.1	0.9	**0.2**
Alicante/Alacant	0.0	0.0	0.0	0.4	0.1	4.1	4.5	0.0	4.3	1.8	**2.3**	0.0	0.0	0.1	0.0	**0.0**
Lleida	0.6	-0.1	0.0	0.4	0.4	0.4	0.8	4.7	4.3	1.8	**2.3**	0.7	0.0	0.1	0.9	**0.4**
Badajoz	0.7	0.0	0.0	0.4	0.6	0.6	5.0	1.0	4.3	1.8	**2.3**	0.9	0.1	0.1	0.7	**0.4**
Córdoba	0.9	0.0	0.0	0.4	4.9	0.4	5.0	0.1	4.3	1.8	**2.3**	1.5	0.1	0.1	0.4	**0.5**
Cáceres	0.5	0.0	0.0	0.4	0.6	0.0	5.0	3.2	4.3	1.8	**2.3**	0.7	0.0	0.1	0.8	**0.4**
Valencia/València	0.1	0.0	0.0	0.4	0.1	3.1	1.3	5.0	4.3	1.8	**2.3**	0.2	0.0	0.1	0.9	**0.3**
Almería	0.0	0.0	0.0	0.4	4.9	3.5	1.7	0.0	4.3	1.8	**2.3**	0.2	0.0	0.0	0.0	**0.1**
Guadalajara	0.4	0.0	0.0	0.4	4.7	4.8	0.0	2.8	4.3	1.8	**2.3**	1.0	0.0	0.0	0.8	**0.4**
Huelva	0.8	0.1	0.0	0.4	4.9	1.9	0.8	0.0	4.3	1.8	**2.3**	1.4	0.3	0.0	0.0	**0.4**

Valladolid	0.0	-0.1	0.0	0.4	4.2	3.6	1.9	0.0	4.3	1.8	**2.3**	0.0	0.0	0.1	0.0	**0.0**
Salamanca	-0.1	0.0	0.0	0.4	4.2	1.1	0.7	5.0	4.3	1.8	**2.3**	0.0	0.0	0.1	0.9	**0.3**
Albacete	0.3	-0.1	0.0	0.4	4.7	5.0	2.6	2.0	4.3	1.8	**2.3**	0.7	0.0	0.1	0.7	**0.4**
Granada	0.3	0.0	0.0	0.4	4.9	3.4	4.4	0.2	4.3	1.8	**2.3**	0.8	0.0	0.1	0.5	**0.3**
Araba/Álava	-0.3	0.0	0.0	0.4	0.5	1.5	0.0	1.1	4.3	1.8	**2.3**	0.0	0.0	0.0	0.7	**0.2**
Gipuzkoa	-0.3	0.0	0.0	0.4	0.5	0.0	0.0	0.0	4.3	1.8	**2.3**	0.0	0.0	0.0	0.0	**0.0**
Palencia	0.2	-0.1	0.0	0.4	4.2	4.3	0.2	0.0	4.3	1.8	**2.3**	0.7	0.0	0.1	0.0	**0.2**
Cantabria	-0.1	0.0	0.0	0.4	0.0	1.4	0.0	5.0	4.3	1.8	**2.3**	0.0	0.0	0.0	0.9	**0.2**
La Rioja	0.1	0.0	0.0	0.4	0.5	4.3	3.0	0.0	4.3	1.8	**2.3**	0.3	0.0	0.1	0.0	**0.1**
Teruel	0.5	-0.1	0.0	0.4	0.6	2.5	0.4	0.0	4.3	1.8	**2.3**	0.7	0.0	0.1	0.0	**0.2**
Pontevedra	-0.2	0.0	0.0	0.4	0.0	5.0	0.0	0.0	4.3	1.8	**2.3**	0.0	0.1	0.0	0.0	**0.0**
Ourense	-0.2	0.0	0.0	0.4	0.0	5.0	0.0	5.0	4.3	1.8	**2.3**	0.0	0.0	0.0	0.9	**0.2**
Asturias	-0.1	0.0	0.0	0.4	0.0	4.4	0.0	4.3	4.3	1.8	**2.3**	0.0	0.0	0.0	0.9	**0.2**
Soria	0.4	-0.1	0.0	0.4	4.2	5.0	0.4	0.0	4.3	1.8	**2.3**	0.9	0.0	0.1	0.0	**0.2**
Zaragoza	0.1	-0.1	0.0	0.4	0.6	5.0	0.9	2.5	4.3	1.8	**2.3**	0.2	0.0	0.1	0.8	**0.3**
A Coruña	-0.2	0.0	0.0	0.4	0.0	5.0	0.0	2.6	4.3	1.8	**2.3**	0.0	0.0	0.0	0.8	**0.2**
Lugo	-0.3	0.0	0.0	0.4	0.0	4.7	0.0	5.0	4.3	1.8	**2.3**	0.0	0.0	0.0	0.9	**0.2**
Ciudad Real	0.5	0.0	0.0	0.4	4.7	2.4	5.0	0.0	4.3	1.8	**2.3**	1.0	0.1	0.1	0.0	**0.3**
Murcia	0.3	0.0	0.0	0.4	0.0	4.0	5.0	0.0	4.3	1.8	**2.3**	0.0	0.0	0.1	0.0	**0.0**
Madrid	0.3	0.0	0.0	0.4	0.2	0.0	0.0	1.6	4.3	1.8	**2.3**	0.4	0.0	0.0	0.7	**0.3**
Sevilla	1.2	0.1	0.0	0.4	4.9	0.9	5.0	1.8	4.3	1.8	**2.3**	1.8	0.2	0.1	0.7	**0.7**
Ávila	0.0	0.0	0.0	0.4	4.2	2.2	0.5	0.9	4.3	1.8	**2.3**	0.2	0.0	0.1	0.6	**0.2**
Jaén	0.7	0.0	0.0	0.4	4.9	1.0	0.5	0.1	4.3	1.8	**2.3**	1.3	0.0	0.1	0.4	**0.5**
Málaga	0.1	0.0	0.0	0.4	4.9	3.3	0.8	5.0	4.3	1.8	**2.3**	0.4	0.2	0.0	0.9	**0.4**
Navarra	-0.1	0.0	0.0	0.4	0.7	4.2	3.8	0.2	4.3	1.8	**2.3**	0.0	0.0	0.1	0.5	**0.2**
Segovia	0.2	-0.1	0.0	0.4	4.2	1.2	0.0	0.0	4.3	1.8	**2.3**	0.5	0.0	0.0	0.0	**0.1**
Cuenca	0.3	0.0	0.0	0.4	4.7	5.0	4.0	0.6	4.3	1.8	**2.3**	0.8	0.0	0.2	0.6	**0.4**
Bizkaia	-0.3	0.0	0.0	0.4	0.5	2.5	0.0	4.0	4.3	1.8	**2.3**	0.0	0.0	0.0	0.9	**0.2**

Table 87: Quantitative (normalized) climate risk assessment at indicator level for the energy system (RCP8.5), peninsular Spain

Administrative units	Hazard				Exposure				Vulnerability			Risk				
	Energy crop composite (GDD, Frost, Heat stress)	Wind power generation	Solar photovoltaic power generation	Hydropower generation	Energy crop cultivation intensity	Wind energy intensity	Photovoltaic energy intensity	Hydropower energy intensity	Energy imports dependency	Renewable energy share	Composite vulnerability	energy crop	Wind energy	Photovoltaic energy	Hydropower energy	Overall Risk 8.5
Girona	0.0	0.0	0.0	0.2	0.4	2.7	0.0	1.9	4.3	1.8	2.3	0.0	0.2	0.0	0.6	0.2
Huesca	-0.5	0.0	0.0	0.2	0.6	2.0	0.3	4.7	4.3	1.8	2.3	0.0	0.1	0.1	0.7	0.2
Zamora	-0.1	0.2	0.0	0.2	4.2	4.6	0.6	5.0	4.3	1.8	2.3	0.0	0.5	0.0	0.7	0.3
Toledo	0.4	0.1	0.0	0.2	4.7	0.6	2.5	2.2	4.3	1.8	2.3	1.0	0.3	0.0	0.6	0.5
León	0.4	0.1	0.0	0.2	4.2	0.9	0.0	1.7	4.3	1.8	2.3	0.9	0.3	0.0	0.5	0.4
Cádiz	0.6	0.1	0.0	0.2	4.9	3.4	5.0	0.0	4.3	1.8	2.3	1.1	0.3	0.0	0.0	0.4
Barcelona	-0.1	0.0	0.0	0.2	0.4	1.7	0.5	2.0	4.3	1.8	2.3	0.0	0.2	0.1	0.6	0.2
Castellón/Castelló	-0.2	0.1	0.0	0.2	0.1	5.0	0.3	0.0	4.3	1.8	2.3	0.0	0.4	0.1	0.0	0.1
Burgos	-0.1	0.1	0.0	0.2	4.2	3.9	0.1	0.0	4.3	1.8	2.3	0.0	0.5	0.0	0.0	0.1
Tarragona	-0.2	0.0	0.0	0.2	0.4	2.6	0.5	4.6	4.3	1.8	2.3	0.0	0.2	0.1	0.7	0.2
Alicante/Alacant	0.0	0.1	0.0	0.2	0.1	4.1	4.5	0.0	4.3	1.8	2.3	0.0	0.3	0.1	0.0	0.1
Lleida	-0.1	0.0	0.0	0.2	0.4	0.4	0.8	4.7	4.3	1.8	2.3	0.0	0.0	0.1	0.7	0.2
Badajoz	0.8	0.1	0.0	0.2	0.6	0.6	5.0	1.0	4.3	1.8	2.3	1.0	0.2	0.0	0.5	0.4
Córdoba	1.0	0.1	0.0	0.2	4.9	0.4	5.0	0.1	4.3	1.8	2.3	1.6	0.2	0.0	0.3	0.5
Cáceres	0.5	0.1	0.0	0.2	0.6	0.0	5.0	3.2	4.3	1.8	2.3	0.7	0.0	0.0	0.6	0.3
Valencia/València	0.1	0.1	0.0	0.2	0.1	3.1	1.3	5.0	4.3	1.8	2.3	0.1	0.4	0.1	0.7	0.3
Almería	0.0	0.0	0.0	0.2	4.9	3.5	1.7	0.0	4.3	1.8	2.3	0.0	0.2	0.1	0.0	0.1
Guadalajara	0.3	0.2	0.0	0.2	4.7	4.8	0.0	2.8	4.3	1.8	2.3	0.8	0.5	0.0	0.6	0.5
Huelva	1.0	0.1	0.0	0.2	4.9	1.9	0.8	0.0	4.3	1.8	2.3	1.6	0.3	0.0	0.0	0.5
Valladolid	-0.1	0.2	0.0	0.2	4.2	3.6	1.9	0.0	4.3	1.8	2.3	0.0	0.5	0.0	0.0	0.1
Salamanca	-0.2	0.1	0.0	0.2	4.2	1.1	0.7	5.0	4.3	1.8	2.3	0.0	0.4	0.0	0.7	0.3

Albacete	0.2	0.1	0.0	0.2	4.7	5.0	2.6	2.0	4.3	1.8	2.3	0.6	0.5	0.0	0.6	0.4
Granada	0.3	0.0	0.0	0.2	4.9	3.4	4.4	0.2	4.3	1.8	2.3	0.7	0.2	0.0	0.4	0.3
Araba/Álava	-0.4	0.1	0.0	0.2	0.5	1.5	0.0	1.1	4.3	1.8	2.3	0.0	0.3	0.0	0.5	0.2
Gipuzkoa	-0.4	0.1	0.0	0.2	0.5	0.0	0.0	0.0	4.3	1.8	2.3	0.0	0.0	0.0	0.0	0.0
Palencia	0.1	0.1	0.0	0.2	4.2	4.3	0.2	0.0	4.3	1.8	2.3	0.4	0.4	0.0	0.0	0.2
Cantabria	-0.2	0.1	0.0	0.2	0.0	1.4	0.0	5.0	4.3	1.8	2.3	0.0	0.3	0.0	0.7	0.2
La Rioja	0.0	0.1	0.0	0.2	0.5	4.3	3.0	0.0	4.3	1.8	2.3	0.1	0.4	0.1	0.0	0.1
Teruel	0.3	0.2	0.0	0.2	0.6	2.5	0.4	0.0	4.3	1.8	2.3	0.6	0.5	0.1	0.0	0.3
Pontevedra	-0.3	0.1	-0.1	0.2	0.0	5.0	0.0	0.0	4.3	1.8	2.3	0.0	0.4	0.0	0.0	0.1
Ourense	-0.3	0.1	-0.1	0.2	0.0	5.0	0.0	5.0	4.3	1.8	2.3	0.0	0.4	0.0	0.7	0.3
Asturias	-0.2	0.1	0.0	0.2	0.0	4.4	0.0	4.3	4.3	1.8	2.3	0.0	0.4	0.0	0.7	0.3
Soria	0.3	0.2	0.0	0.2	4.2	5.0	0.4	0.0	4.3	1.8	2.3	0.7	0.6	0.0	0.0	0.3
Zaragoza	0.0	0.1	0.0	0.2	0.6	5.0	0.9	2.5	4.3	1.8	2.3	0.0	0.4	0.1	0.6	0.3
A Coruña	-0.3	0.1	0.0	0.2	0.0	5.0	0.0	2.6	4.3	1.8	2.3	0.0	0.4	0.0	0.6	0.3
Lugo	-0.4	0.1	0.0	0.2	0.0	4.7	0.0	5.0	4.3	1.8	2.3	0.0	0.4	0.0	0.7	0.3
Ciudad Real	0.5	0.1	0.0	0.2	4.7	2.4	5.0	0.0	4.3	1.8	2.3	1.0	0.4	0.0	0.0	0.3
Murcia	0.3	0.0	0.0	0.2	0.0	4.0	5.0	0.0	4.3	1.8	2.3	0.0	0.2	0.1	0.0	0.1
Madrid	0.3	0.1	0.0	0.2	0.2	0.0	0.0	1.6	4.3	1.8	2.3	0.4	0.0	0.0	0.5	0.2
Sevilla	1.3	0.1	0.0	0.2	4.9	0.9	5.0	1.8	4.3	1.8	2.3	1.9	0.2	0.0	0.5	0.7
Ávila	-0.2	0.1	0.0	0.2	4.2	2.2	0.5	0.9	4.3	1.8	2.3	0.0	0.3	0.0	0.5	0.2
Jaén	0.7	0.0	0.0	0.2	4.9	1.0	0.5	0.1	4.3	1.8	2.3	1.3	0.2	0.0	0.3	0.5
Málaga	0.1	0.0	0.0	0.2	4.9	3.3	0.8	5.0	4.3	1.8	2.3	0.4	0.2	0.0	0.7	0.3
Navarra	-0.2	0.0	0.0	0.2	0.7	4.2	3.8	0.2	4.3	1.8	2.3	0.0	0.2	0.1	0.4	0.2
Segovia	0.1	0.1	0.0	0.2	4.2	1.2	0.0	0.0	4.3	1.8	2.3	0.3	0.4	0.0	0.0	0.2
Cuenca	0.2	0.1	0.0	0.2	4.7	5.0	4.0	0.6	4.3	1.8	2.3	0.7	0.5	0.0	0.4	0.4
Bizkaia	-0.4	0.1	0.0	0.2	0.5	2.5	0.0	4.0	4.3	1.8	2.3	0.0	0.4	0.0	0.6	0.3

WEF Nexus systems

In this section, the results of the risk assessment for the period of 2031-2050 are summarized for all WEF systems and aggregated at pilot level, based on the area weighted average of the pilot administrative units. In addition, the result of the adaptive capacity assessment is presented in parallel, in order to examine the degree to which the overall risk can be influenced.

The results for the Spain pilot are presented in Table 88. As it may be seen, according to both scenarios the overall risk for the Water system is expected to be "Medium", for the Food system "Medium" and for the Energy system "Low". According to RCP8.5 the overall risk is expected to be higher for the Water and Food systems, estimated at "Low-Medium" level. According to RCP8.5 the overall risk is expected to be slightly higher for the Water and Food systems, but still in the same classification level.

Furthermore, the adaptive capacity is characterized as "Low-Medium" for the pilot, which theoretically is not sufficient to address the the expected risk for the Water and Food systems.

Table 88: Overall risk of the WEF Nexus systems and adaptive capacity, peninsular Spain

System	Overall risk		Adaptive Capacity
	RCP4.5	RCP8.5	
Water	(2.3) Medium	(2.5) Medium	(1.9) Low-Medium
Food	(2.1) Medium	(2.2) Medium	
Energy	(0.3) Low	(0.3) Low	

3.4 Climate Risk Assessment: Isonzo-Soča river basin

In this section the results of the hazard, exposure and vulnerability assessment, as well as the results from the adaptive capacity's and the overall climate risk assessment are provided, for the Isonzo-Soča river basin.

3.4.1 Hazard

In the following paragraphs, the results for the hazard indicators are given, for the food, water and energy systems.

Water system

<u>Aridity Index</u>

The spatial distribution of the Aridity index is depicted in Figure 51. It is observed that, for the reference period there are hyper-humid conditions at the greater part of the basin, while humid conditions are observed at the south-western part of the basin. For the future period according to the RCP4.5 the distribution remains the same with the reference period, while based on RCP8.5, drier conditions occur in the southern part of the basin from dry sub-humid to semi-arid.

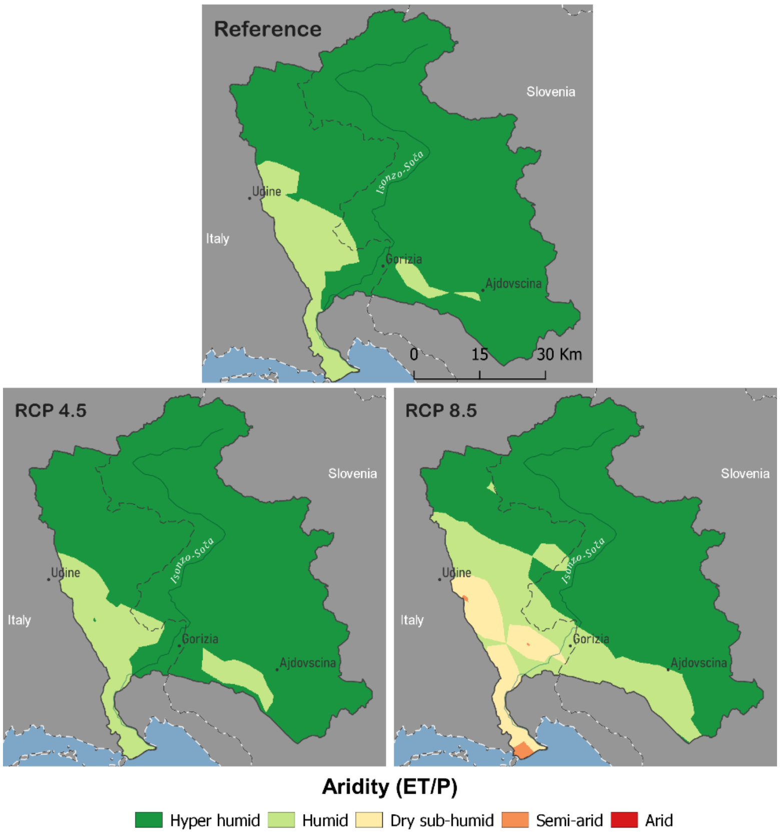

Figure 51: Spatial distribution of the mean annual Aridity indicator (potential evapotranspiration/precipitation) for the reference period (top) and the future period (2011-2070) based on the RCP4.5 and RCP8.5 (bottom), Isonzo-Soča river basin

The relative change (%) of the aridity index in the future compared to the reference period for both scenarios, is shown in Table 89. Can be seen that for the RCP8.5 there is an increase of aridity for all the three future sub-periods compared to the reference period. Specifically, for the short-term period the deviation from the reference period is 16%, while for the mid-term period reaches up to 41% which is the highest value for the scenario. As for the RCP4.5 a 4.5% decrease on average is projected for the short- and mid-term periods, while a 52% increase is projected for the long-term period.

Table 89: Relative change (%) of the mean annual aridity (potential evapotranspiration/precipitation), for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Isonzo-Soča river basin

Aridity Index	2011-2040		2041-2070		2071-2100	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	-4	16	-5	41	52	23

Food system

Growing Degree Days

Regarding the spatial distribution of the GDD for the period 2031-2050, as this is depicted in Figure 52, it is observed that during the reference period the GDD range starts from 0°C to 1800°C per year at the mountains of the North part of the pilot and reaches up to 3600°C moving towards the south part of the basin. During the future period, the minimum GDD remain similar to the reference period, but in a much smaller area. As for the maximum GDD for the future period, ranges between 3600°C and 4200°C for both scenarios, with a substantial increase of the area where the maximum GDD is expected, in the case of RCP8.5.

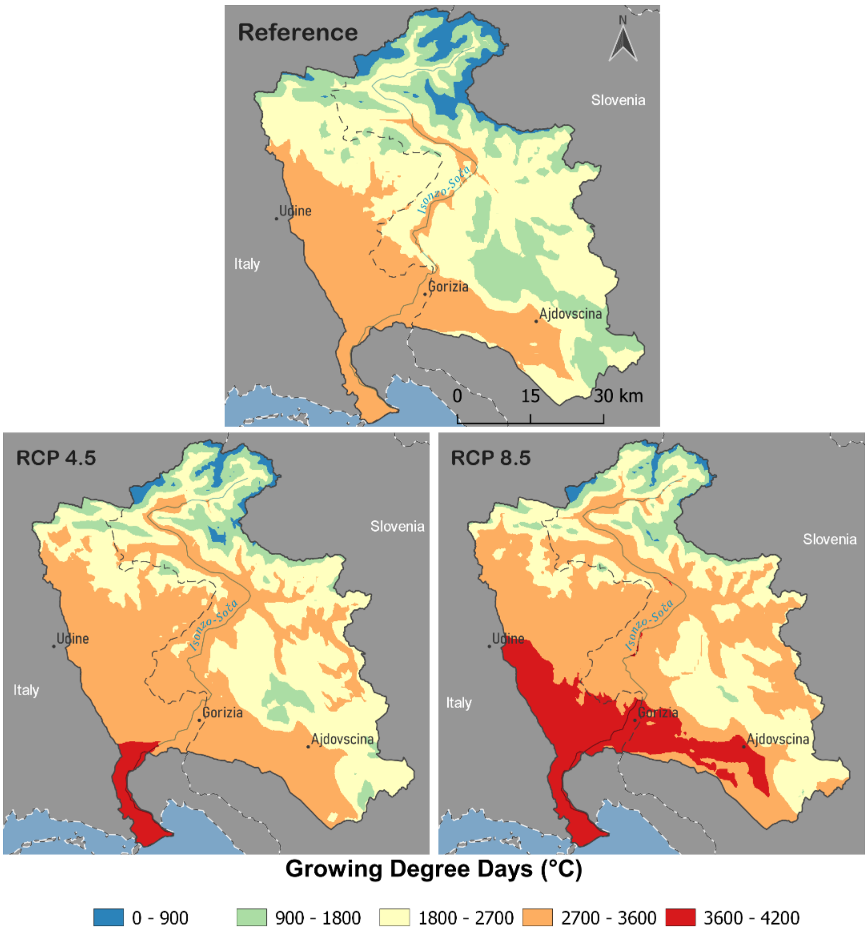

Figure 52: Spatial distribution of the mean annual Growing Degree Days with base temperature 5°C, for the reference period (top) and the future period (2031-2050) based on the RCP4.5 and RCP8.5 (bottom), Isonzo-Soča river basin

The relative change in percentage (%) of the GDD indicator for the examined future periods in relation to the reference period is given in Table 90. Can be seen that the trend for all the periods and scenarios is increasing. More specific, for the RCP4.5 the change expected to be 27%, compared to the reference period, for the near-term period (2031-2050), while it is expected this difference to reach up to 42% at the long-term period. Similarly, for the RCP8.5, the change expected to be 48% for the near-term period and 118% for the long-term period.

Table 90: Relative change (%) of the growing degree days, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Isonzo-Soča river basin

Growing degree days Tmean > 5°C	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	27	48	36	85	42	118

Heat Stress Days >21°C

The spatial distribution of the mean annual number of days with maximum temperature above 21°C for the Isonzo-Soča river basin, is depicted in Figure 53. It is observed that during the reference period, the number of heat stress days per year ranges from 0 to150, with the lowest number of days (up to 30) being observed at the northern part of the basin. This number gradually increases reaching the maximum values at the south of the basin. For the future period, the range of heat stress days will remain the same, while the area where the highest values (120-150 days) are observed, will be significantly expanded compared to the reference period, according to both scenarios.

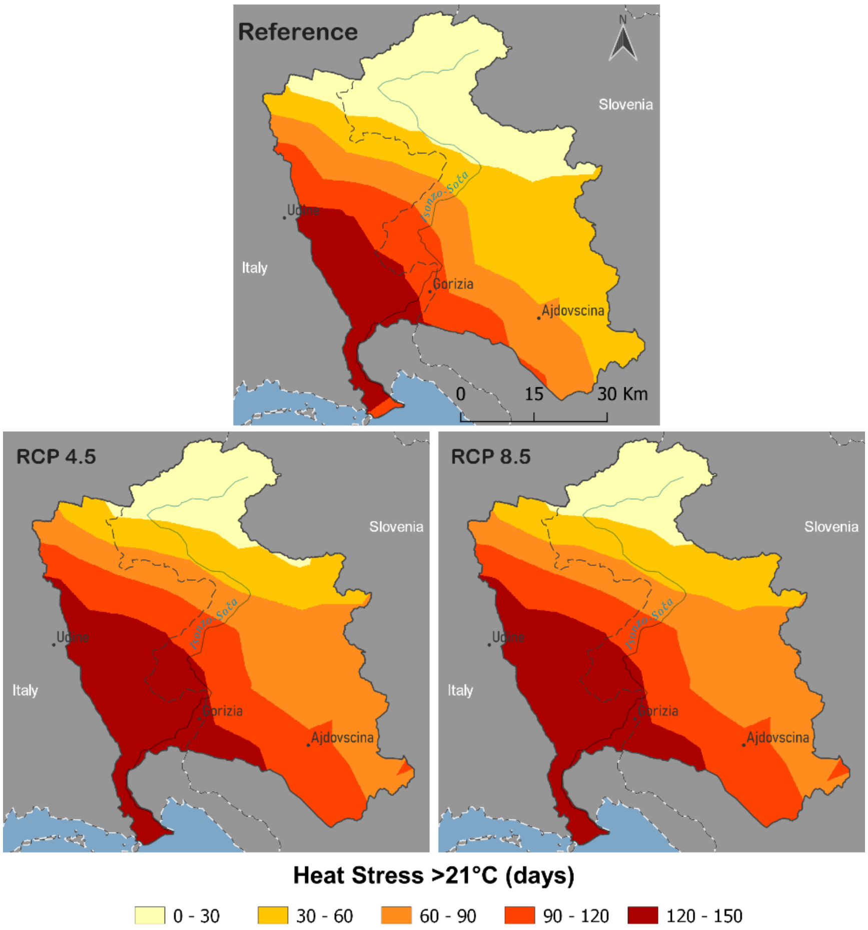

Figure 53: Spatial distribution of the mean annual number of days with maximum daily temperature > 21°C, for the reference period (top) and the future period (2031-2050) based on the RCP4.5 and RCP8.5 (bottom), Isonzo-Soča river basin

The relative change (%) of the number of heat stress days >21°C expected for the future, is summarized in Table 91. As can be seen, an increase of 37% on average is projected for the near-term period (2031-2050) with insignificant differentiation among the two scenarios. For the long-term period (2071-2090), the increase for RCP4.5 is expected to be lower (16%) compared to the near-term period, while for RCP8.5 a considerable increase of 68% is expected. In contrast, for the mid-term period a decrease of 39% and 19% is expected based on RCP4.5 and RCP8.5 respectively, which is considered an anomaly for the climatic trends.

Table 91: Relative change (%) of the mean annual number of days with maximum temperature > 21°C, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Isonzo-Soča river basin

Heat stress days Tmax > 21°C	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	36	38	-39	-19	16	64

<u>Heat Stress Days >30°C</u>

The spatial distribution of the mean annual number of days with maximum temperature above 30°C for the Isonzo-Soča river basin, is depicted in Figure 54. It is observed that during the reference period, the number of heat stress days per year ranges from 0 to 5, for the whole basin. For the future period, more than the half basin is expected to have 0 to 5 days per year with maximum temperature >30°C. From about the middle of the basin and towards the south, this number gradually increases, reaching 18-22 days in the southern, coastal part of the pilot area.

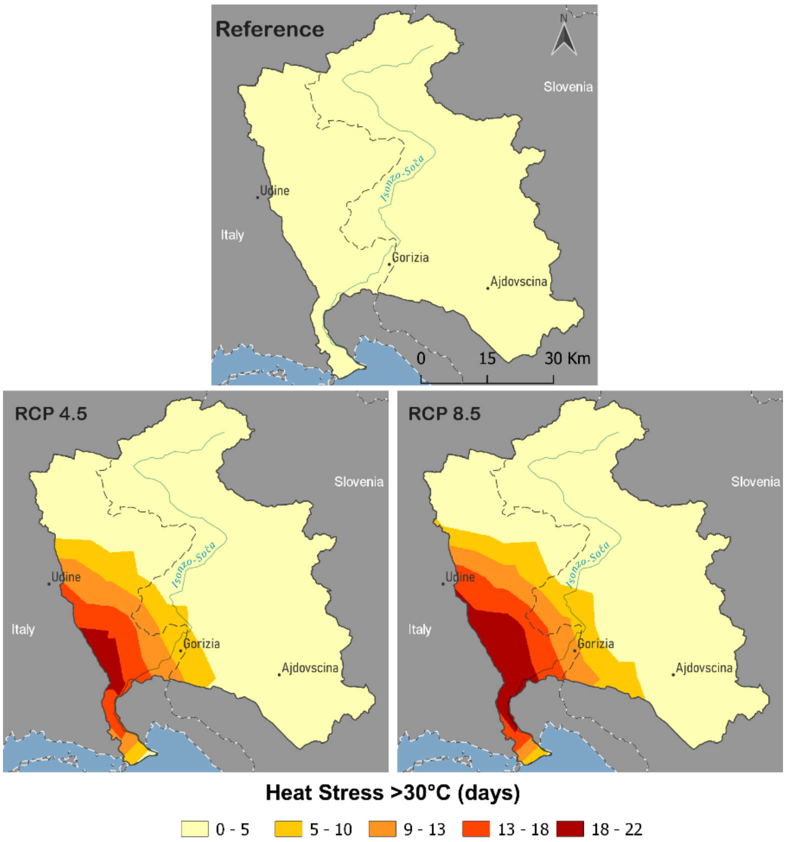

Figure 54: Spatial distribution of the mean annual number of days with maximum daily temperature > 30°C, for the reference period (top) and the future period (2031-2050) based on the RCP4.5 and RCP8.5 (bottom), Isonzo-Soča river basin

The relative change (%) of the number of heat stress days >30°C expected for the future, is summarized in Table 92, for the Isonzo-Soča river basin. As can be seen, the change is remarkably strong for all the three sub-periods and for both scenarios. Specifically, for the RCP4.5, an increase of 423% is projected for the near-term period and 366% for the long-term period. For the RCP8.5, the increase is even stronger, 615% and 1470% for the short- and mid-term periods respectively. In contrast, for the mid-term period a decrease of 100%, for both scenarios is projected, which is considered an anomaly for the climatic trends.

Table 92: Relative change (%) of the mean annual number of days with maximum temperature > 30°C, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Isonzo-Soča river basin

Heat stress days Tmax > 30°C	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change(%)	423	615	-100	-100	366	1470

Frost Days

The spatial distribution of the number of frost days is depicted in Figure 55: Spatial distribution of the mean annual number of days with minimum temperature below 0°C, for the reference period (top) and the future period (2031-2050) based on the RCP4.5 and RCP8.5 (bottom), Isonzo-Soča river basin. It is observed that during the reference period the number of days starts from 0 days at the south of the basin, and reaches up to 180 days at the mountains, at the northern part of the area. During the future period, the days with no frost (or up to 35 days) are observed at a greater area than the reference period, but in general, the spatial distribution of the index remains very similar to the reference period.

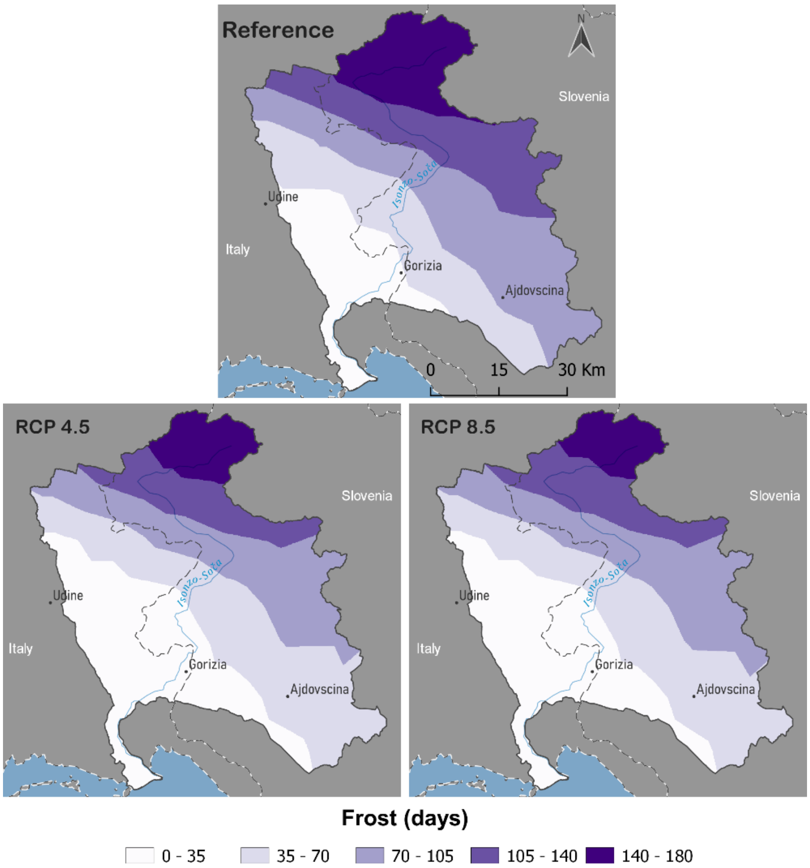

Figure 55: Spatial distribution of the mean annual number of days with minimum temperature below 0°C, for the reference period (top) and the future period (2031-2050) based on the RCP4.5 and RCP8.5 (bottom), Isonzo-Soča river basin

The projected relative change (%) of the number of days with minimum temperature below 0°C, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, is summarized in Table 93. It may be concluded that for the short-term period, there is no significant difference between the scenarios, with an average 22.5% reduction, from the reference period. Furthermore, for the mid-term period there is a reduction of 81.5% on average for the two scenarios, while for the long-term period the reduction is similar to the mid-term for the RCP8.5 and a little smaller for the RCP4.5.

Table 93: Relative change (%) of the number of days with minimum temperature < 0°C, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Isonzo-Soča river basin

Frost days	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	-22	-23	-76	-87	-61	-84

Energy system

Hydropower generation rivers

The relative change (%) from the reference period of the hydropower generation of rivers, is shown in Table 94 for the examined future sub-periods and for both RCP4.5 and RCP8.5. Can be seen that the results for the two scenarios are the almost the same for the three sub-periods and the trend is increasing. Specifically, for the short-term period the deviation from the reference period is +3.3% and in the long-term period reaches up to +4.3%.

Table 94: Relative change (%) of the hydropower generation rivers, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Isonzo-Soča river basin

Hydropower generation rivers	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	3.3	3.3	4.2	4.4	4.3	4.3

Hydropower generation reservoirs

The relative change (%) from the reference period of the hydropower generation of reservoirs, is shown Table 95 for the examined future sub-periods and for both RCP4.5 and RCP8.5. Can be seen that the results for the two scenarios are very similar for the three sub-periods and the trend is increasing. Specifically, for the short-term period the deviation from the reference period is +3.6% on average and in the long-term period reaches up to +5.5%, for the two scenarios.

Table 95: Relative change (%) of the hydropower generation reservoirs, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Isonzo-Soča river basin

Hydropower generation reservoirs	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	2.7	4.5	3.3	5.2	4.3	6.8

Solar photovoltaic power generation

The relative change (%) from the reference period of the solar photovoltaic power generation indicator, is shown in Table 96, for the examined future sub-periods and for both RCP4.5 and RCP8.5. Can be seen that there is small difference between the future and the reference period, since the relative change range from -0.3% to -1.8% for both scenarios. The maximum value of relative change (-1.8%) is for the RCP8.5 for the long-term period, while the minimum value of relative change (-0.3%) is for the RCP8.5 for the short-term period.

Table 96: Relative change (%) of solar photovoltaic power generation (ratio of actual generation over installed capacity), for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Isonzo-Soča river basin

Solar photovoltaic power generation	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	-0.4	-0.3	-1.5	-1.7	1.2	-1.8

Wind power generation

The relative change (%) from the reference period of the solar photovoltaic power generation indicator, is shown in Table 97, for the examined future sub-periods and for both RCP4.5 and RCP8.5. Can be seen that there is small difference between the future and the reference period and the trend is decreasing, since the relative change range from -2.3% to -6.7% for both scenarios. The maximum value of relative change (-6.7%) is for the RCP8.5 for the short-term period, while the minimum value of relative change (-2.3%) is for the RCP4.5 for the mid-term period.

Table 97: Relative change (%) of wind power generation (ratio of actual generation over installed capacity), for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Isonzo-Soča river basin

Wind power generation	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	-5.3	-6.7	-2.3	-4.1	-4.5	-4.2

3.4.2 Exposure

In this section the results of the exposure assessment of the Isonzo-Soča river basin, for the food and energy systems are presented.

Food system

In this sub-section the results of the assessment of the food exposure index related to the areas cultivated with the crops under study (green maize, cereals, vineyards) are presented.

Share of main crops

The share of areas cultivated with the main crops in each administrative unit[2] to the total area of the administrative unit for the Isonzo-Soča river basin, is depicted in Figure 56. As can be seen, the examined crops of green maize, cereals, vineyards are cultivated in great extent (40-70%) at the south-western part of the pilot. On the contrary, at the north-eastern part of the pilot the main crops are rarely cultivated (0-5%). Thus, it is observed that areas mostly cultivated with main crops are located at the Italian part of the pilot.

[2] Administrative unit: Italy and Slovenia

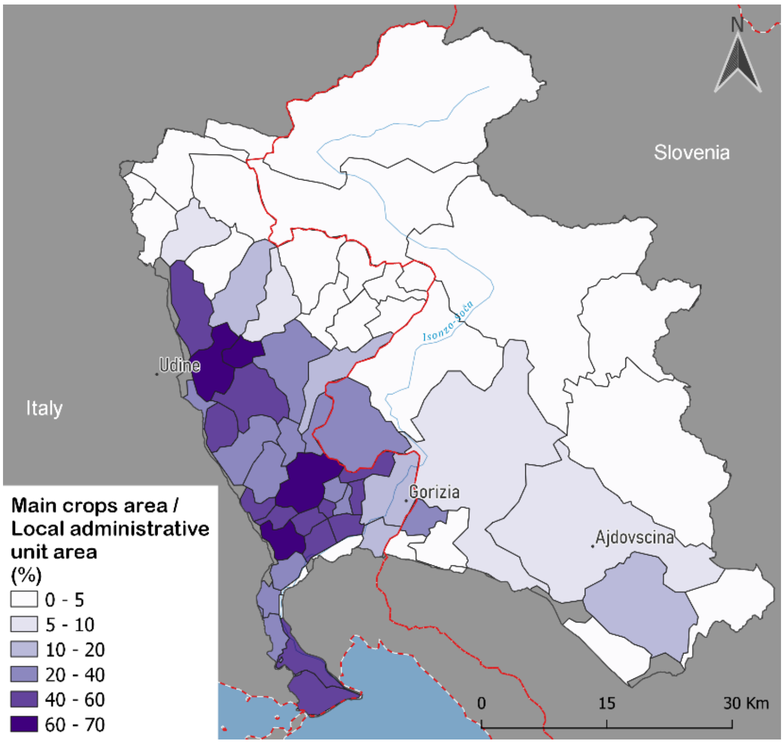

Figure 56: Food exposure index expressed as the share of the main crops area to the total municipality area, Isonzo-Soča river basin

Energy system

In this sub-section the results of the assessment of the energy exposure index related to the renewable energy intensity at the Isonzo-Soča pilot, are presented.

<u>Renewable energy intensity</u>

As shown in Table 98, for the case of Italy, the photovoltaic energy intensity of the pilot is 2.5 times higher compared to the national intensity. Moreover, hydropower energy intensity of the Slovenian part of the pilot is 2.7 times higher compared to the national one. Therefore, the exposure of the hydropower sector fir the Slovenian part of the pilot is considered high, while the photovoltaic sector of the Italian part of the pilot is high.

Table 98: Energy exposure index expressed as renewable energy intensity, Isonzo-Soča river basin

country	Renewable energy intensity	Photovoltaic	Wind	Hydropower
Italy	Pilot (MWp/ Km2p)	0.062	-	0.857
	Country (MWc /Km2c)	0.006	-	0.063
	Pilot in % of National	**1030%**	**-**	**1360%**
Slovenia	Pilot (MWp/ Km2p)	-	-	0.378
	Country (MWc /Km2c)	-	-	0.178
	Pilot in % of National	**-**	**-**	**212%**

3.4.3 Vulnerability

In this section the results of the vulnerability assessment of Isonzo-Soča river basin for the food, water and energy systems are presented.

Water system

In this sub-section the results of the assessment of the water vulnerability indices (Water exploitation index, Share of agricultural water consumption) are presented, at river basin district (RBD) level, for the Italian and the Slovenian part of the Isonzo-Soča pilot. Specifically the relevant river basin districts of the pilot are the Eastern Alps RBD (Italy) and the North Adriatic RBD (Slovenia).

Water exploitation index

The WEI for the Isonzo-Soča pilot is presented at river basin district level, in Table 99. Specifically, it is estimated that for the Italian district of the pilot (Eastern Alps), the WEI is 45.4% which is above the threshold (40%) which, indicates severe water stress and as a result it can be a limiting factor on economic development for the region. On the other hand, for the Slovenian district of the pilot (North Adriatic) the WEI is 0.5%.

Table 99: Water vulnerability index expressed as Water Exploitation Index, Isonzo-Soča river basin

River Basin District	Water Exploitation index
Eastern Alps (IT)	45.4%
North Adriatic (SL)	0.5%

Share of agricultural water consumption

The share of agricultural water consumption in Isonzo-Soča river basin districts is shown in Table 100. Specifically the highest share of agricultural water consumption is observed at the Italian part (39.9%), which is considered to indicate medium vulnerability. The respective share for Slovenia is 8.7%, which is considered to indicate low vulnerability.

Table 100: Water vulnerability index expressed as share of agricultural water consumption, Isonzo-Soča river basin

River Basin District	Share of agricultural water consumption
Eastern Alps RBD (IT)	39.9%
North Adriatic RBD (SL)	8.7%

Food system

In this sub-section the results of the assessment of the food vulnerability index related to agricultural income, are presented at national level (Italy-Slovenia).

Agricultural Income

The agricultural income of the pilot region, compared to the average national agricultural income of each country is presented in Table 101. It is observed that the agricultural income of Friuli-Venezia Giulia region (Italy), is low compared to the average national agricultural income (49%), while the Goriška (Slovenia) has almost the same value (98%), compared to the average agricultural income of Slovenia.

Table 101: Food vulnerability index expressed as agriculture income, Isonzo-Soča river basin

Country	Region	Agricultural income	
		Million Euro	% of national average
Italy	Regional average	1468	100
	Friuli-Venezia Giulia	717	49%
Slovenia	Regional average	76	100
	Goriška	75	98%

Energy system

In this sub-section the results of the energy vulnerability assessment for the indices of the Renewable energy share and the Energy import dependency are presented, at country level (Italy-Slovenia).

Renewable energy share

The contribution of renewable energy resources in the gross final energy consumption of Italy and Slovenia, along with the respective EU average, is shown in Table 102. As can be seen, the share of energy from renewable sources of the Slovenia is higher (22.4%) than EU average (19.5%), while the Italian is lower (18.4%), although both of them are quite close to it. The higher the contribution, the higher the vulnerability of the energy system to a potential reduction in renewable energy generation due to climate change.

Table 102: Energy vulnerability index expressed as renewable energy share, Isonzo-Soča river basin

Countries	Share of energy from renewable sources
European Union (EU 27 average)	19.5%
Italy	18.4%
Slovenia	22.4%

Energy import dependency

The energy imports dependency of the pilot's countries along with the respective EU average, is presented in Table 103. As it is shown, the energy imports dependency of the Italian is higher (76.4%) than EU average (57.9%), while the Slovenian is lower (49.8%). The higher the import dependency of a country, the higher the vulnerability of the energy system to a potential reduction in renewable energy generation due to climate change.

Table 103: Energy vulnerability index expressed as energy import dependency, Isonzo-Soča river basin

Countries	Energy imports dependency
European Union (EU 27 average)	57.9%
Italy	76.4%
Slovenia	49.8%

3.4.4 Adaptive capacity

In this section, the results of the assessment of the adaptive capacity of the Isonzo-Soča river basin are presented. Specifically, the results refer to (i) the survey on the evaluation of the institutional readiness of the pilot as well as to (ii) the assessment of the GDP index for the pilot.

Institutional readiness

With respect to the institutional readiness survey, 17 stakeholders (SH) from the Isonzo-Soča pilot took part, who had different backgrounds, as shown in Figure 57. Specifically, there were 13 participants from Italy and 4 from Slovenia. The majority of participants are engaged in the water and the environment domains (90%).

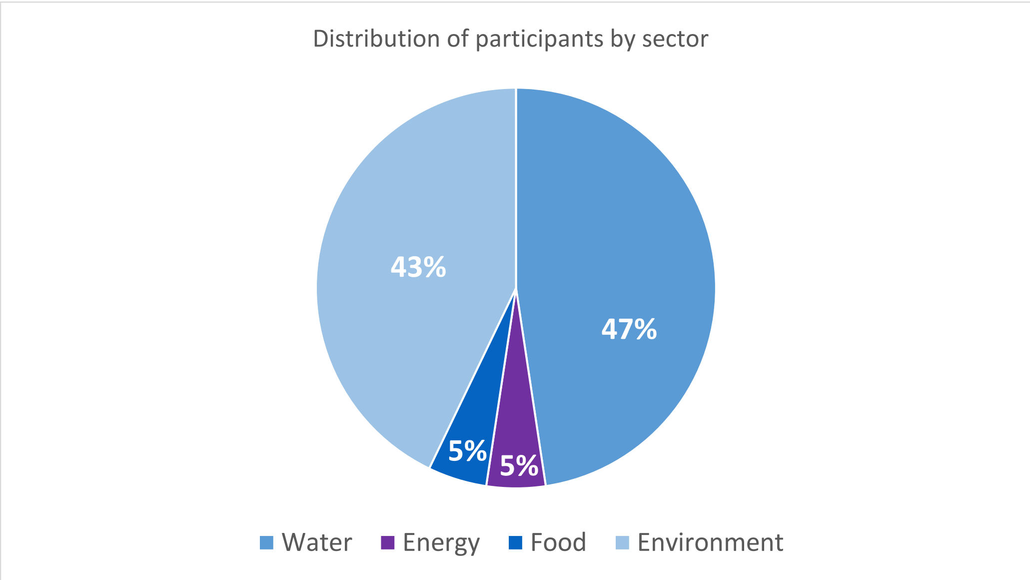

Figure 57: Distribution of participants to the adaptive capacity survey by domain, Isonzo-Soča river basin

The results of the survey are presented below.

Part A: Assessment of the adaptive capacity components

Political Leadership

The results of the evaluation the institutional organization component against the criteria are presented below. It may be concluded with respect to the criterion 1 and 3, that the majority of the respondents (56% on average) rated them as limited. With respect to the evaluation of criterion 2, 35% of the respondents rated it as limited, while the other 35% rated it as moderate.

	1.To what extent has the need for adaptation to climate change been recognized as a political priority?			*2.Evaluate the involvement of political leadership in designing strategies for adapting to climate change.*			*3.To what extent have policies and legislation related to climate change adaptation been adopted?*		
	Italian SH	*Slovenian SH*	*Total*	*Italian SH*	*Slovenian SH*	*Total*	*Italian SH*	*Slovenian SH*	*Total*
None	8%	25%	12%	38%	0%	29%	38%	25%	35%
Limited	69%	25%	59%	38%	25%	35%	46%	75%	53%
Moderate	15%	50%	24%	24%	75%	35%	15%	0%	12%
High	8%	0%	6%	0%	0%	0%	0%	0%	0%

Institutional Organisation

The results of the evaluation of the Institutional Organisation component against three criteria, are presented below. With respect to the evaluation of criterion 1, almost the half of the respondents replied that there are more than 1 research programs or projects that study climate change in the pilot area. With respect to criterion 2, 71% of the respondents answered that there are institutions in the area that are engaged with adaptation to climate change. Finally, with respect to Criterion 3, the total of the respondents replied that there is a fragmentation of responsibilities between the involved stakeholders.

	1.Are there -beyond REXUS- other research programs or projects that study climate change in the pilot area?		
	Italian SH	*Slovenian SH*	*Total*
None	25%	75%	38%
1-2	50%	25%	44%
More than 2	25%	0%	19%

	2.Are there institutions in the area that are engaged with adaptation to climate change?			*3.Do you think that there is a fragmentation of responsibilities between the involved stakeholders?*		
	Italian SH	*Slovenian SH*	*Total*	*Italian SH*	*Slovenian SH*	*Total*
Yes	69%	75%	71%	100%	100%	100%
No	31%	25%	29%	0%	0%	0%

Decision Making

The results of the evaluation of the Decision Making component against two criteria are presented below. With respect to the evaluation of criterion 1, the majority of the respondents (63%) replied that the extent to which stakeholders are involved in assessing the impact of climate change and policy making is limited. With respect to criterion 2, the majority of them (56%) replied that there is a decision-making framework used to adapt to climate change, while 44% replied that there is not.

	1.To what extent are stakeholders involved in assessing the impact of climate change and policy-making?		
	Italian SH	*Slovenian SH*	*Total*
None	33%	0%	25%
Limited	50%	100%	63%
Moderate	17%	0%	13%

	2.Is there a decision-making framework used to adapt to climate change?		
	Italian SH	*Slovenian SH*	*Total*
Yes	58%	50%	56%
No	42%	50%	44%

High	0%	0%	0%

Funding

The results of the evaluation of the Funding component against the criterion are presented below, by country of origin of the participants and as a total percentage. It may be concluded that, the majority of the respondents (63%) rated the availability of funding as limited.

	How do you evaluate the availability of funding for adaptation to climate change?		
	Italian SH	*Slovenian SH*	*Total*
None	17%	25%	19%
Limited	58%	75%	63%
Moderate	25%	0%	19%
High	0%	0%	0%

Public Awareness

The results of the evaluation of the Public Awareness component against two criteria are presented below, by country of origin of the participants and as a total percentage. With respect to criterion 1, the majority of the respondents (65%) rated media coverage of climate change as moderate. With respect to criterion 2, the majority of them (65%) answered that there is limited public awareness of the need for climate change adaptation.

	1.How do you rate media coverage of climate change?			*2.How do you evaluate the public awareness of the need for climate change adaptation?*		
	Italian SH	*Slovenian SH*	*Total*	*Italian SH*	*Slovenian SH*	*Total*
None	8%	0%	6%	15%	0%	12%
Limited	23%	25%	24%	69%	50%	65%
Moderate	62%	75%	65%	15%	25%	18%
High	8%	0%	6%	0%	25%	6%

Economic capacity

The economic capacity of the Isonzo-Soča river basin pilot expressed as the GDP of each country in relation to the EU average is presented in the table that follows. As can be seen, the GDP of Italy is 29,304 Euros per capita which is almost the same as the EU average (96%). In the case of Slovenia, the GDP is 22,624 Euros per capita which is below of the EU average (74%).

Table 104: Economic capacity per country of the Isonzo-Soča river basin

	GDP per capita (Euro)	in % of EU average
EU average (27 countries)	30632	100%
Italy	29304	96%
Slovenia	22624	74%

3.4.5 Overall Risk

In this section, the results of the climate risk assessment for the water, food and energy Nexus systems of the Isonzo-Soča river basin pilot are presented, based on the RCP4.5 and RCP8.5 for the period 2031-2050. The results are presented at municipality level in geospatial form through maps as well as through tables. Specifically, the overall risk is presented qualitatively through maps, while detailed results are also presented both qualitatively, per risk component and quantitatively, at indicator level.

Water system

The results of the climate risk assessment, with respect to the water system, are depicted in Figure 58 as well as in Table 105, Table 106 and Table 107.

As can be seen in Figure 58, a "Medium-High" level risk is expected at the municipalities located mainly at the North-western areas on the Italian part of the pilot, while the risk for the other municipalities on the Italian part of the pilot is characterized "Low-Medium" to "Medium", according to RCP4.5. The risk is expected to be "Medium-High" also at several municipalities located at the Northern areas and "Medium" at the southern areas on the Italian part of the pilot, based on the RCP8.5. Furthermore, a "Low-Medium" level risk is expected at the majority of the municipalities on the Slovenian part of the pilot for both scenarios.

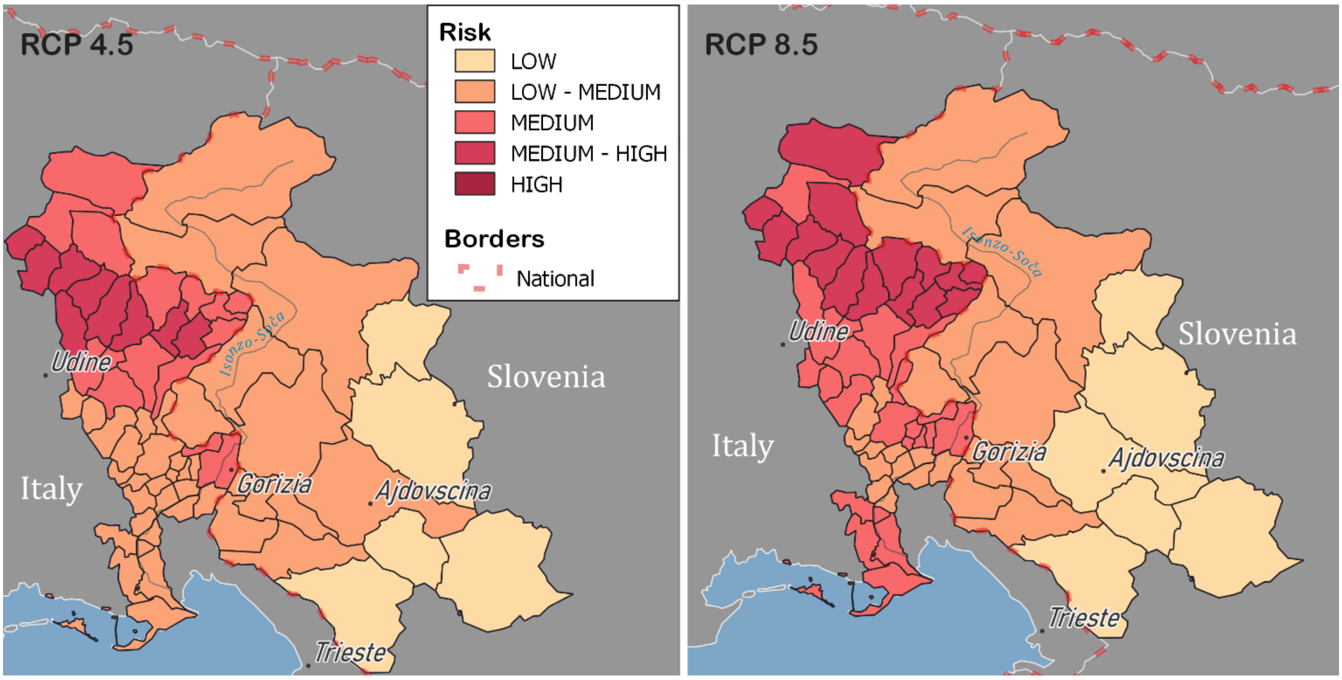

Figure 58: Qualitative climate risk assessment for the water system (RCP4.5 and RCP8.5), Isonzo-Soča river basin

The results of the overall climate risk assessment are presented in more detail at the level of municipalities in Table 105. As can be seen, the above-mentioned risk levels are the result of a "Low" to "Medium-High" range hazard for RCP4.5 and RCP8.5, in combination with a "Medium-High" vulnerability with respect to the Italian part of the pilot. Furthermore, as the Slovenian part of the pilot is considered the above-mentioned risk levels are the result of a "Low" to "Medium" range hazard for RCP4.5 and RCP8.5, in combination with a "Low" vulnerability.

Table 105: Qualitative climate risk assessment per risk component for the water system (RCP4.5 and RCP8.5), Isonzo-Soča river basin

Country	Administrative units	Hazard		Vulnerability	Risk	
		4.5	8.5		4.5	8.5
Italy	Attimis	Medium	Medium	Medium-High	Medium-High	Medium-High
	Buttrio	Low-Medium	Medium	Medium-High	Low-Medium	Medium
	Chiopris-Viscone	Low	Low-Medium	Medium-High	Low-Medium	Low-Medium
	Cividale del Friuli	Medium	Medium	Medium-High	Medium	Medium
	Corno di Rosazzo	Low-Medium	Low-Medium	Medium-High	Low-Medium	Low-Medium
	Drenchia	Medium	Medium	Medium-High	Medium	Medium-High
	Faedis	Medium	Medium-High	Medium-High	Medium-High	Medium-High
	Grimacco	Medium	Medium	Medium-High	Medium	Medium-High
	Lusevera	Medium	Medium	Medium-High	Medium	Medium
	Manzano	Low	Low-Medium	Medium-High	Low-Medium	Medium
	Moimacco	Medium	Medium	Medium-High	Medium	Medium
	Montenars	Medium	Medium	Medium-High	Medium-High	Medium-High
	Nimis	Medium	Medium	Medium-High	Medium-High	Medium-High
	Povoletto	Medium	Medium	Medium-High	Medium-High	Medium
	Pradamano	Low-Medium	Low-Medium	Medium-High	Low-Medium	Medium
	Premariacco	Low-Medium	Low-Medium	Medium-High	Medium	Medium
	Prepotto	Medium	Low-Medium	Medium-High	Medium	Medium
	Pulfero	Medium	Medium	Medium-High	Medium	Medium-High
	Remanzacco	Low-Medium	Medium	Medium-High	Medium	Medium
	Resia	Medium	Medium	Medium-High	Medium	Medium-High
	Ruda	Low	Low-Medium	Medium-High	Low-Medium	Medium
	San Giovanni al Natisone	Low	Low-Medium	Medium-High	Low-Medium	Low-Medium
	San Leonardo	Medium	Medium-High	Medium-High	Medium-High	Medium-High

	San Pietro al Natisone	Medium	Medium	Medium-High	Medium-High	Medium-High
	Savogna	Medium	Medium	Medium-High	Medium	Medium-High
	Stregna	Medium	Medium	Medium-High	Medium	Medium-High
	Taipana	Medium	Medium	Medium-High	Medium	Medium-High
	Tarcento	Medium	Medium	Medium-High	Medium-High	Medium-High
	Torreano	Medium	Medium-High	Medium-High	Medium-High	Medium-High
	Fiumicello Villa Vicentina	Low	Low-Medium	Medium-High	Low-Medium	Medium
	Capriva del Friuli	Low-Medium	Low-Medium	Medium-High	Low-Medium	Medium
	Cormons	Low-Medium	Low-Medium	Medium-High	Low-Medium	Medium
	Dolegna del Collio	Low-Medium	Low-Medium	Medium-High	Low-Medium	Medium
	Farra d'Isonzo	Low-Medium	Low-Medium	Medium-High	Low-Medium	Low-Medium
	Gorizia	Low-Medium	Low-Medium	Medium-High	Medium	Medium
	Gradisca d'Isonzo	Low-Medium	Low-Medium	Medium-High	Low-Medium	Low-Medium
	Grado	Low	Low-Medium	Medium-High	Low-Medium	Medium
	Mariano del Friuli	Low-Medium	Low-Medium	Medium-High	Low-Medium	Low-Medium
	Medea	Low	Low-Medium	Medium-High	Low-Medium	Low-Medium
	Moraro	Low-Medium	Low-Medium	Medium-High	Low-Medium	Medium
	Mossa	Low-Medium	Low-Medium	Medium-High	Low-Medium	Medium
	Romans d'Isonzo	Low	Low-Medium	Medium-High	Low-Medium	Low-Medium
	Sagrado	Low	Low-Medium	Medium-High	Low-Medium	Low-Medium
	San Canzian d'Isonzo	Low	Low-Medium	Medium-High	Low-Medium	Medium
	San Floriano del Collio-Števerjan	Low-Medium	Low-Medium	Medium-High	Medium	Medium
	San Lorenzo Isontino	Low-Medium	Low-Medium	Medium-High	Low-Medium	Medium
	San Pier d'Isonzo	Low	Low-Medium	Medium-High	Low-Medium	Low-Medium
	Savogna d'Isonzo-Sovodnje ob Soči	Low-Medium	Low-Medium	Medium-High	Low-Medium	Low-Medium
	Turriaco	Low	Low-Medium	Medium-High	Low-Medium	Medium

	Villesse	Low	Low-Medium	Medium-High	Low-Medium	Low-Medium
Slovenia	Tolmin	Medium	Medium	Low	Low-Medium	Low-Medium
	Šempeter - Vrtojba	Medium	Medium	Low	Low-Medium	Low-Medium
	Renče - Vogrsko	Low-Medium	Low-Medium	Low	Low-Medium	Low-Medium
	Bovec	Medium	Medium	Low	Low-Medium	Low-Medium
	Brda	Low-Medium	Low-Medium	Low	Low-Medium	Low-Medium
	Kanal	Medium	Medium	Low	Low-Medium	Low-Medium
	Kobarid	Medium	Medium	Low	Low-Medium	Low-Medium
	Miren - Kostanjevica	Low-Medium	Low-Medium	Low	Low-Medium	Low-Medium
	Nova Gorica	Medium	Medium	Low	Low-Medium	Low-Medium
	Sežana	Low	Low	Low	Low	Low
	Vipava	Low	Low	Low	Low	Low
	Ajdovščina	Low-Medium	Low-Medium	Low	Low-Medium	Low
	Cerkno	Low-Medium	Low-Medium	Low	Low	Low
	Idrija	Low	Low-Medium	Low	Low	Low
	Postojna	Low	Low	Low	Low	Low

The detailed results of the climate risk assessment for the RCP4.5 and RCP8.5 are presented quantitatively at normalized scale [-5, 5] in Table 106 and Table 107, respectively. The negative values of the hazard indicators have a beneficial effect and thus are considered to compensate risk.

Table 106: Quantitative (normalized) climate risk assessment at indicator level for the water system (RCP4.5), Isonzo-Soča river basin

Country	Administrative units	HAZARD			VULNERABILITY			Risk 4.5
		Aridity	Heavy precipitation	Composite hazard indicator	Agricultural water consumption	Water exploitation	Composite vulnerability indicator	
Italy	Attimis	0.6	5.0	**2.8**	3.0	4.1	**3.5**	**3.0**
	Buttrio	1.1	1.2	**1.2**	3.0	4.1	**3.5**	**1.6**
	Chiopris-Viscone	1.2	0.4	**0.8**	3.0	4.1	**3.5**	**1.2**
	Cividale del Friuli	0.8	3.8	**2.3**	3.0	4.1	**3.5**	**2.6**
	Corno di Rosazzo	1.0	1.3	**1.2**	3.0	4.1	**3.5**	**1.6**
	Drenchia	0.5	5.0	**2.7**	3.0	4.1	**3.5**	**3.0**
	Faedis	0.7	5.0	**2.8**	3.0	4.1	**3.5**	**3.0**
	Grimacco	0.5	5.0	**2.7**	3.0	4.1	**3.5**	**3.0**
	Lusevera	0.4	5.0	**2.7**	3.0	4.1	**3.5**	**2.9**
	Manzano	1.0	0.8	**0.9**	3.0	4.1	**3.5**	**1.4**
	Moimacco	1.0	3.2	**2.1**	3.0	4.1	**3.5**	**2.5**
	Montenars	0.6	5.0	**2.8**	3.0	4.1	**3.5**	**3.0**
	Nimis	0.6	5.0	**2.8**	3.0	4.1	**3.5**	**3.0**
	Povoletto	0.9	4.8	**2.9**	3.0	4.1	**3.5**	**3.1**
	Pradamano	1.2	1.1	**1.1**	3.0	4.1	**3.5**	**1.6**
	Premariacco	1.0	2.1	**1.6**	3.0	4.1	**3.5**	**2.0**
	Prepotto	0.7	3.9	**2.3**	3.0	4.1	**3.5**	**2.6**
	Pulfero	0.5	5.0	**2.7**	3.0	4.1	**3.5**	**3.0**
	Remanzacco	1.1	2.4	**1.7**	3.0	4.1	**3.5**	**2.1**
	Resia	0.3	5.0	**2.7**	3.0	4.1	**3.5**	**2.9**
	Ruda	1.4	0.4	**0.9**	3.0	4.1	**3.5**	**1.4**
	San Giovanni al Natisone	1.1	0.5	**0.8**	3.0	4.1	**3.5**	**1.2**
	San Leonardo	0.6	5.0	**2.8**	3.0	4.1	**3.5**	**3.0**
	San Pietro al Natisone	0.6	5.0	**2.8**	3.0	4.1	**3.5**	**3.0**
	Savogna	0.4	5.0	**2.7**	3.0	4.1	**3.5**	**2.9**
	Stregna	0.6	5.0	**2.8**	3.0	4.1	**3.5**	**3.0**
	Taipana	0.4	5.0	**2.7**	3.0	4.1	**3.5**	**2.9**
	Tarcento	0.7	5.0	**2.9**	3.0	4.1	**3.5**	**3.0**
	Torreano	0.7	5.0	**2.8**	3.0	4.1	**3.5**	**3.0**
	Fiumicello Villa Vicentina	1.4	0.3	**0.9**	3.0	4.1	**3.5**	**1.3**
	Capriva del Friuli	1.0	1.7	**1.4**	3.0	4.1	**3.5**	**1.8**
	Cormons	1.1	1.1	**1.1**	3.0	4.1	**3.5**	**1.6**
	Dolegna del Collio	1.0	2.2	**1.6**	3.0	4.1	**3.5**	**2.0**
	Farra d'Isonzo	0.9	1.4	**1.2**	3.0	4.1	**3.5**	**1.7**
	Gorizia	0.9	2.9	**1.9**	3.0	4.1	**3.5**	**2.3**
	Gradisca d'Isonzo	1.0	1.1	**1.1**	3.0	4.1	**3.5**	**1.5**
	Grado	1.5	0.3	**0.9**	3.0	4.1	**3.5**	**1.4**
	Mariano del Friuli	1.0	1.1	**1.1**	3.0	4.1	**3.5**	**1.5**

	Medea	1.2	0.5	**0.9**	3.0	4.1	**3.5**	**1.3**
	Moraro	1.0	1.5	**1.3**	3.0	4.1	**3.5**	**1.7**
	Mossa	1.0	2.0	**1.5**	3.0	4.1	**3.5**	**1.9**
	Romans d'Isonzo	1.2	0.6	**0.9**	3.0	4.1	**3.5**	**1.4**
	Sagrado	0.9	1.0	**1.0**	3.0	4.1	**3.5**	**1.4**
	San Canzian d'Isonzo	1.5	0.3	**0.9**	3.0	4.1	**3.5**	**1.3**
	San Floriano del Collio-Števerjan	1.0	2.5	**1.8**	3.0	4.1	**3.5**	**2.2**
	San Lorenzo Isontino	1.0	1.8	**1.4**	3.0	4.1	**3.5**	**1.9**
	San Pier d'Isonzo	1.2	0.6	**0.9**	3.0	4.1	**3.5**	**1.4**
	Savogna d'Isonzo-Sovodnje ob Soči	0.9	1.4	**1.1**	3.0	4.1	**3.5**	**1.6**
	Turriaco	1.4	0.4	**0.9**	3.0	4.1	**3.5**	**1.4**
	Villesse	1.3	0.6	**0.9**	3.0	4.1	**3.5**	**1.4**
Slovenia	Tolmin	0.4	5.0	**2.7**	0.9	0.0	**0.5**	**1.6**
	Šempeter – Vrtojba	0.9	4.1	**2.5**	0.9	0.0	**0.5**	**1.5**
	Renče – Vogrsko	1.0	3.0	**2.0**	0.9	0.0	**0.5**	**1.3**
	Bovec	0.3	5.0	**2.7**	0.9	0.0	**0.5**	**1.6**
	Brda	0.9	2.9	**1.9**	0.9	0.0	**0.5**	**1.2**
	Kanal	0.6	5.0	**2.8**	0.9	0.0	**0.5**	**1.6**
	Kobarid	0.4	5.0	**2.7**	0.9	0.0	**0.5**	**1.6**
	Miren – Kostanjevica	0.9	1.9	**1.4**	0.9	0.0	**0.5**	**1.0**
	Nova Gorica	0.7	5.0	**2.8**	0.9	0.0	**0.5**	**1.6**
	Sežana	0.8	0.9	**0.8**	0.9	0.0	**0.5**	**0.7**
	Vipava	0.7	0.9	**0.8**	0.9	0.0	**0.5**	**0.7**
	Ajdovščina	0.7	2.2	**1.4**	0.9	0.0	**0.5**	**1.0**
	Cerkno	0.5	2.1	**1.3**	0.9	0.0	**0.5**	**1.0**
	Idrija	0.5	1.5	**1.0**	0.9	0.0	**0.5**	**0.8**
	Postojna	0.7	0.3	**0.5**	0.9	0.0	**0.5**	**0.5**

Table 107: Quantitative (normalized) climate risk assessment at indicator level for the water system (RCP8.5), Isonzo-Soča river basin

Country	Administrative units	HAZARD			VULNERABILITY			Risk 8.5
		Aridity	Heavy precipitation	Composite hazard indicator	Agricultural water consumption	Water exploitation	Composite vulnerability indicator	
Italy	Attimis	0.9	5.0	**3.0**	3.0	4.1	**3.5**	**3.1**
	Buttrio	2.7	1.3	**2.0**	3.0	4.1	**3.5**	**2.4**
	Chiopris-Viscone	2.1	0.6	**1.4**	3.0	4.1	**3.5**	**1.8**
	Cividale del Friuli	1.4	3.0	**2.2**	3.0	4.1	**3.5**	**2.5**
	Corno di Rosazzo	1.8	1.2	**1.5**	3.0	4.1	**3.5**	**2.0**
	Drenchia	0.8	5.0	**2.9**	3.0	4.1	**3.5**	**3.1**
	Faedis	1.0	5.0	**3.0**	3.0	4.1	**3.5**	**3.2**
	Grimacco	0.8	5.0	**2.9**	3.0	4.1	**3.5**	**3.1**
	Lusevera	0.6	5.0	**2.8**	3.0	4.1	**3.5**	**3.0**

	Manzano	2.3	1.0	1.6	3.0	4.1	3.5	2.1
	Moimacco	1.8	2.6	2.2	3.0	4.1	3.5	2.5
	Montenars	0.6	5.0	2.8	3.0	4.1	3.5	3.0
	Nimis	0.8	5.0	2.9	3.0	4.1	3.5	3.1
	Povoletto	1.5	3.5	2.5	3.0	4.1	3.5	2.8
	Pradamano	2.7	1.2	2.0	3.0	4.1	3.5	2.4
	Premariacco	2.1	1.9	2.0	3.0	4.1	3.5	2.4
	Prepotto	1.2	2.7	1.9	3.0	4.1	3.5	2.3
	Pulfero	0.8	5.0	2.9	3.0	4.1	3.5	3.1
	Remanzacco	2.0	2.0	2.0	3.0	4.1	3.5	2.4
	Resia	0.7	5.0	2.9	3.0	4.1	3.5	3.0
	Ruda	2.8	0.4	1.6	3.0	4.1	3.5	2.0
	San Giovanni al Natisone	2.1	0.8	1.4	3.0	4.1	3.5	1.9
	San Leonardo	1.1	5.0	3.0	3.0	4.1	3.5	3.2
	San Pietro al Natisone	0.9	5.0	3.0	3.0	4.1	3.5	3.1
	Savogna	0.7	5.0	2.9	3.0	4.1	3.5	3.0
	Stregna	1.0	4.9	2.9	3.0	4.1	3.5	3.1
	Taipana	0.7	5.0	2.9	3.0	4.1	3.5	3.1
	Tarcento	0.8	5.0	2.9	3.0	4.1	3.5	3.1
	Torreano	1.0	5.0	3.0	3.0	4.1	3.5	3.2
	Fiumicello Villa Vicentina	2.8	0.4	1.6	3.0	4.1	3.5	2.0
	Capriva del Friuli	2.6	1.2	1.9	3.0	4.1	3.5	2.3
	Cormons	2.2	1.0	1.6	3.0	4.1	3.5	2.0
	Dolegna del Collio	1.6	1.7	1.7	3.0	4.1	3.5	2.1
	Farra d'Isonzo	2.1	1.0	1.5	3.0	4.1	3.5	2.0
	Gorizia	1.6	2.0	1.8	3.0	4.1	3.5	2.2
	Gradisca d'Isonzo	1.7	0.8	1.2	3.0	4.1	3.5	1.7
	Grado	3.0	0.3	1.7	3.0	4.1	3.5	2.1
	Mariano del Friuli	1.9	0.8	1.4	3.0	4.1	3.5	1.8
	Medea	2.3	0.6	1.5	3.0	4.1	3.5	1.9
	Moraro	2.6	1.0	1.8	3.0	4.1	3.5	2.2
	Mossa	2.2	1.3	1.8	3.0	4.1	3.5	2.2
	Romans d'Isonzo	2.5	0.5	1.5	3.0	4.1	3.5	2.0
	Sagrado	1.7	0.7	1.2	3.0	4.1	3.5	1.6
	San Canzian d'Isonzo	2.8	0.3	1.6	3.0	4.1	3.5	2.0
	San Floriano del Collio-Števerjan	1.5	1.6	1.6	3.0	4.1	3.5	2.0
	San Lorenzo Isontino	2.6	1.2	1.9	3.0	4.1	3.5	2.3
	San Pier d'Isonzo	2.3	0.4	1.4	3.0	4.1	3.5	1.8
	Savogna d'Isonzo-Sovodnje ob Soči	1.9	0.9	1.4	3.0	4.1	3.5	1.9
	Turriaco	2.8	0.4	1.6	3.0	4.1	3.5	2.0
	Villesse	2.5	0.4	1.4	3.0	4.1	3.5	1.9
Slovenia	Tolmin	0.6	4.3	2.4	0.9	0.0	0.5	1.5
	Šempeter – Vrtojba	1.7	2.9	2.3	0.9	0.0	0.5	1.4
	Renče – Vogrsko	1.7	2.0	1.8	0.9	0.0	0.5	1.2
	Bovec	0.4	5.0	2.7	0.9	0.0	0.5	1.6
	Brda	1.2	2.0	1.6	0.9	0.0	0.5	1.1
	Kanal	0.8	3.7	2.3	0.9	0.0	0.5	1.4

	Kobarid	0.7	5.0	**2.8**	0.9	0.0	**0.5**	**1.6**
	Miren – Kostanjevica	1.8	1.3	**1.6**	0.9	0.0	**0.5**	**1.1**
	Nova Gorica	0.8	4.6	**2.7**	0.9	0.0	**0.5**	**1.6**
	Sežana	1.2	0.8	**1.0**	0.9	0.0	**0.5**	**0.8**
	Vipava	1.0	0.8	**0.9**	0.9	0.0	**0.5**	**0.7**
	Ajdovščina	0.9	1.7	**1.3**	0.9	0.0	**0.5**	**0.9**
	Cerkno	0.6	1.7	**1.2**	0.9	0.0	**0.5**	**0.9**
	Idrija	0.6	1.4	**1.0**	0.9	0.0	**0.5**	**0.8**
	Postojna	0.7	0.5	**0.6**	0.9	0.0	**0.5**	**0.5**

Food system

The results of the climate risk assessment, with respect to the food system, are depicted in Figure 59 as well as in Table 108, Table 109 and Table 110.

As can be seen in Figure 59, a "Medium" level risk is expected at municipalities located at the Weastern areas on the Italian part of the pilot, while the risk for the others is characterized "Low" to "Low-Medium", according to RCP 4.5. Additionally it is expected that the level of risk will reach out "Medium" levels at almost all municipalities of the Southern areas of the Italian part of the pilot, according to RCP8.5. Furthermore, a "Low" level risk is expected at the Northern municipalities of the Slovenian part of the pilot, while the risk for the Southern municipalities is characterized as "Low-Medium", according to both scenarios.

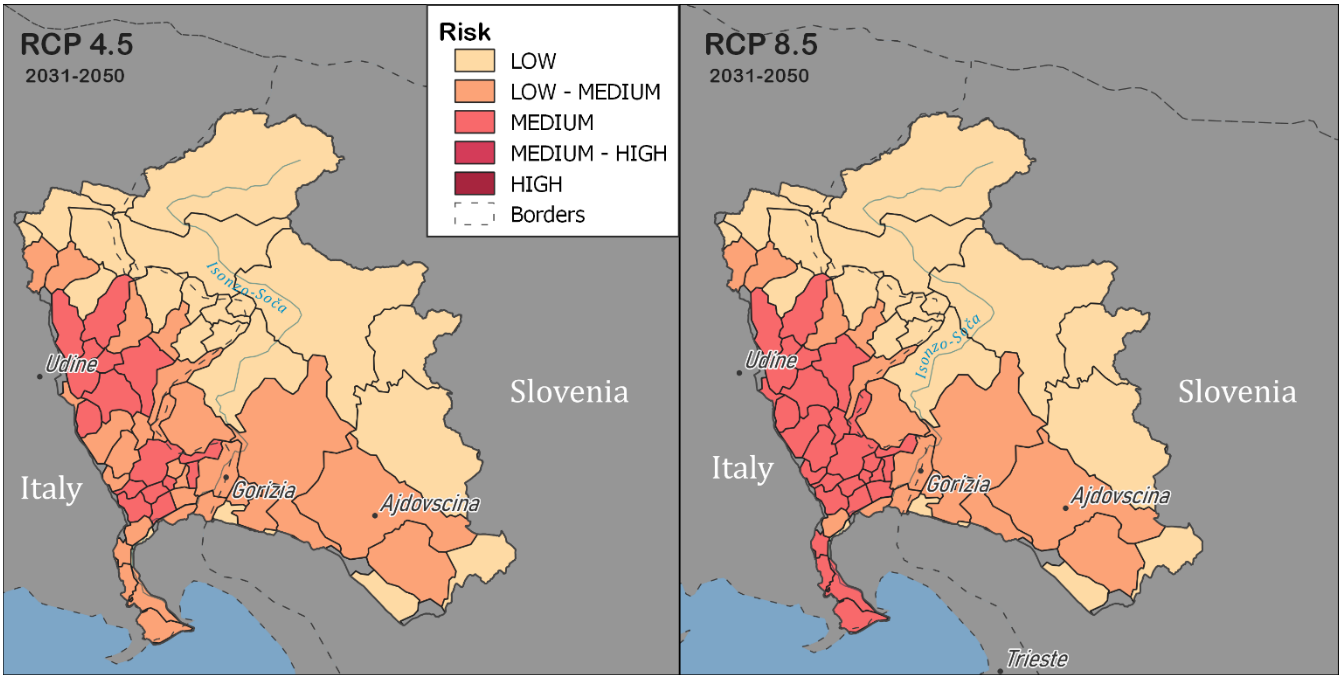

Figure 59: Qualitative climate risk assessment for the food system (RCP4.5 and RCP8.5), Isonzo-Soča river basin

The results of the overall climate risk assessment are presented in more detail at the level of municipalities in Table 108. As can be seen, the above-mentioned risk levels are the result of a "Low-Medium" to "Medium" range of hazard for RCP4.5 and RCP8.5, in combination with a "Low" to "High" range of exposure and "Medium" vulnerability with respect to the Italian part of the pilot. Furthermore, as the Slovenian part of the pilot is considered the above-mentioned risk levels are the result of a "Low-Medium" to "Medium" range hazard for RCP4.5 and RCP8.5, in combination with a "Low" to "Medium" range of exposure and a "Low-Medium" vulnerability.

Table 108: Qualitative climate risk assessment per risk component for the food system (RCP4.5 and RCP8.5), Isonzo-Soča river basin

Country	Administrative units	Hazard		Exposure	Vulnerability	Risk	
		4.5	8.5			4.5	8.5
Italy	Attimis	Medium	Medium	Low	Medium	Low	Low
	Buttrio	Low-Medium	Low-Medium	Medium-High	Medium	Medium	Medium

	Chiopris-Viscone	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Medium
	Cividale del Friuli	Low-Medium	Low-Medium	Medium	Medium	Medium	Medium
	Corno di Rosazzo	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Medium
	Drenchia	Medium	Medium	Low	Medium	Low	Low
	Faedis	Medium	Medium	Low-Medium	Medium	Medium	Medium
	Grimacco	Medium	Medium	Low	Medium	Low	Low
	Lusevera	Low-Medium	Low-Medium	Low	Medium	Low	Low
	Manzano	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Medium
	Moimacco	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Montenars	Medium	Medium	Low	Medium	Low	Low
	Nimis	Medium	Medium	Low	Medium	Low-Medium	Low-Medium
	Povoletto	Medium	Low-Medium	Medium-High	Medium	Medium	Medium
	Pradamano	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Medium
	Premariacco	Low-Medium	Low-Medium	Medium-High	Medium	Medium	Medium
	Prepotto	Low-Medium	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Pulfero	Medium	Medium	Low	Medium	Low	Low
	Remanzacco	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Resia	Low-Medium	Low-Medium	Low	Medium	Low	Low
	Ruda	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Medium
	San Giovanni al Natisone	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Medium
	San Leonardo	Medium	Medium	Low	Medium	Low	Low
	San Pietro al Natisone	Medium	Medium	Low	Medium	Low-Medium	Low-Medium
	Savogna	Medium	Medium	Low	Medium	Low	Low
	Stregna	Medium	Medium	Low	Medium	Low	Low
	Taipana	Low-Medium	Low-Medium	Low	Medium	Low	Low
	Tarcento	Medium	Medium	Low	Medium	Low-Medium	Low-Medium
	Torreano	Medium	Medium	Low	Medium	Low-Medium	Low-Medium
	Fiumicello Villa Vicentina	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Medium
	Capriva del Friuli	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Medium

	Cormons	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Dolegna del Collio	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Medium
	Farra d'Isonzo	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Medium
	Gorizia	Low-Medium	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Gradisca d'Isonzo	Low-Medium	Low-Medium	Medium-High	Medium	Medium	Medium
	Grado	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Medium
	Mariano del Friuli	Low-Medium	Low-Medium	Medium-High	Medium	Medium	Medium
	Medea	Low-Medium	Low-Medium	Medium-High	Medium	Medium	Medium
	Moraro	Low-Medium	Low-Medium	Medium-High	Medium	Medium	Medium
	Mossa	Low-Medium	Low-Medium	Medium-High	Medium	Medium	Medium
	Romans d'Isonzo	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Sagrado	Low-Medium	Low-Medium	Low	Medium	Low-Medium	Low-Medium
	San Canzian d'Isonzo	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Medium
	San Floriano del Collio-Števerjan	Low-Medium	Low-Medium	Medium-High	Medium	Medium	Medium
	San Lorenzo Isontino	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Medium
	San Pier d'Isonzo	Low-Medium	Low-Medium	Low	Medium	Low	Low
	Savogna d'Isonzo-Sovodnje ob Soči	Low-Medium	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Turriaco	Low-Medium	Low-Medium	Low	Medium	Low	Low
	Villesse	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Low-Medium
Slovenia	Tolmin	Low-Medium	Low-Medium	Low	Low-Medium	Low	Low
	Šempeter - Vrtojba	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium	Low-Medium
	Renče - Vogrsko	Low-Medium	Low-Medium	Low	Low-Medium	Low-Medium	Low-Medium
	Bovec	Low-Medium	Low-Medium	Low	Low-Medium	Low	Low
	Brda	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium	Low-Medium
	Kanal	Medium	Low-Medium	Low	Low-Medium	Low	Low
	Kobarid	Low-Medium	Low-Medium	Low	Low-Medium	Low	Low

	Miren - Kostanjevica	Low-Medium	Low-Medium	Low	Low-Medium	Low	Low
	Nova Gorica	Low-Medium	Low-Medium	Low	Low-Medium	Low-Medium	Low-Medium
	Sežana	Low-Medium	Low-Medium	Low	Low-Medium	Low	Low
	Vipava	Low-Medium	Low-Medium	Low-Medium	Low-Medium	Low-Medium	Low-Medium
	Ajdovščina	Low-Medium	Low-Medium	Low	Low-Medium	Low-Medium	Low-Medium
	Cerkno	Low-Medium	Low-Medium	Low	Low-Medium	Low	Low
	Idrija	Low-Medium	Low-Medium	Low	Low-Medium	Low	Low
	Postojna	Low-Medium	Low-Medium	Low	Low-Medium	Low	Low

The detailed results of the climate risk assessment for the RCP4.5 and RCP8.5 are presented quantitatively at normalized scale [-5, 5] in Table 109 and Table 110, respectively. The negative values of the hazard indicators have a beneficial effect and thus are considered to compensate risk.

Table 109: Quantitative (normalized) climate risk assessment at indicator level for the food system (RCP4.5), Isonzo-Soča river basin

Country	Administrative units	HAZARD						Exposure	VULNERABILITY				Risk 4.5
		Growing Degree Days	Frost	Heat stress	Aridity	Heavy precipitation	Composite hazard indicator	Share of main crops	Agricultural water consumption	Water exploitation	Agricultural income	Composite vulnerability indicator	
Italy	Attimis	-1.0	2.8	1.7	0.6	5.0	**2.0**	**0.0**	3.0	4.1	1.2	**2.4**	**0.0**
	Buttrio	-0.8	0.9	2.5	1.1	1.2	**1.6**	**3.6**	3.0	4.1	1.2	**2.4**	**2.1**
	Chiopris-Viscone	-0.7	0.7	2.6	1.2	0.4	**1.5**	**3.4**	3.0	4.1	1.2	**2.4**	**2.0**
	Cividale del Friuli	-0.8	1.4	2.2	0.8	3.8	**1.9**	**2.4**	3.0	4.1	1.2	**2.4**	**2.1**
	Corno di Rosazzo	-0.8	0.8	2.4	1.0	1.3	**1.6**	**2.9**	3.0	4.1	1.2	**2.4**	**2.0**
	Drenchia	-1.0	5.0	1.2	0.5	5.0	**2.0**	**0.0**	3.0	4.1	1.2	**2.4**	**0.0**
	Faedis	-0.9	2.6	1.8	0.7	5.0	**2.0**	**1.9**	3.0	4.1	1.2	**2.4**	**2.1**
	Grimacco	-0.9	4.8	1.4	0.5	5.0	**2.1**	**0.0**	3.0	4.1	1.2	**2.4**	**0.0**
	Lusevera	-1.4	5.0	1.0	0.4	5.0	**1.9**	**0.0**	3.0	4.1	1.2	**2.4**	**0.0**
	Manzano	-0.8	0.8	2.5	1.0	0.8	**1.6**	**2.9**	3.0	4.1	1.2	**2.4**	**1.9**
	Moimacco	-0.8	1.2	2.2	1.0	3.2	**1.8**	**4.0**	3.0	4.1	1.2	**2.4**	**2.3**
	Montenars	-1.1	4.5	1.4	0.6	5.0	**2.1**	**0.0**	3.0	4.1	1.2	**2.4**	**0.0**
	Nimis	-0.9	3.4	1.6	0.6	5.0	**2.0**	**0.7**	3.0	4.1	1.2	**2.4**	**1.7**
	Povoletto	-0.8	1.7	2.1	0.9	4.8	**2.1**	**3.8**	3.0	4.1	1.2	**2.4**	**2.4**
	Pradamano	-0.8	0.9	2.4	1.2	1.1	**1.6**	**2.4**	3.0	4.1	1.2	**2.4**	**1.9**
	Premariacco	-0.8	0.9	2.4	1.0	2.1	**1.7**	**3.8**	3.0	4.1	1.2	**2.4**	**2.1**
	Prepotto	-0.8	1.6	2.1	0.7	3.9	**1.9**	**1.4**	3.0	4.1	1.2	**2.4**	**1.8**
	Pulfero	-1.1	4.3	1.4	0.5	5.0	**2.0**	**0.0**	3.0	4.1	1.2	**2.4**	**0.5**
	Remanzacco	-0.8	1.1	2.3	1.1	2.4	**1.8**	**4.3**	3.0	4.1	1.2	**2.4**	**2.2**
	Resia	-2.1	5.0	0.5	0.3	5.0	**1.6**	**0.0**	3.0	4.1	1.2	**2.4**	**0.0**
	Ruda	-0.7	0.5	2.5	1.4	0.4	**1.5**	**2.7**	3.0	4.1	1.2	**2.4**	**1.9**
	San Giovanni al Natisone	-0.8	0.7	2.5	1.1	0.5	**1.5**	**2.4**	3.0	4.1	1.2	**2.4**	**1.8**
	San Leonardo	-0.9	3.1	1.7	0.6	5.0	**2.1**	**0.0**	3.0	4.1	1.2	**2.4**	**0.0**

	San Pietro al Natisone	-0.9	3.3	1.7	0.6	5.0	**2.1**	**0.4**	3.0	4.1	1.2	**2.4**	**1.5**
	Savogna	-1.2	5.0	1.4	0.4	5.0	**2.1**	**0.0**	3.0	4.1	1.2	**2.4**	**0.0**
	Stregna	-0.9	3.7	1.5	0.6	5.0	**2.0**	**0.0**	3.0	4.1	1.2	**2.4**	**0.0**
	Taipana	-1.3	5.0	1.0	0.4	5.0	**1.9**	**0.0**	3.0	4.1	1.2	**2.4**	**0.0**
	Tarcento	-0.9	3.2	1.7	0.7	5.0	**2.1**	**0.4**	3.0	4.1	1.2	**2.4**	**1.6**
	Torreano	-1.0	2.5	1.8	0.7	5.0	**2.0**	**0.8**	3.0	4.1	1.2	**2.4**	**1.7**
	Fiumicello Villa Vicentina	-0.7	0.4	2.5	1.4	0.3	**1.5**	**2.6**	3.0	4.1	1.2	**2.4**	**1.8**
	Capriva del Friuli	-0.8	0.8	2.4	1.0	1.7	**1.7**	**2.8**	3.0	4.1	1.2	**2.4**	**2.0**
	Cormons	-0.8	0.8	2.5	1.1	1.1	**1.6**	**4.1**	3.0	4.1	1.2	**2.4**	**2.1**
	Dolegna del Collio	-0.8	1.2	2.3	1.0	2.2	**1.7**	**2.7**	3.0	4.1	1.2	**2.4**	**2.0**
	Farra d'Isonzo	-0.7	0.8	2.4	0.9	1.4	**1.6**	**3.0**	3.0	4.1	1.2	**2.4**	**2.0**
	Gorizia	-0.8	1.1	2.2	0.9	2.9	**1.8**	**1.6**	3.0	4.1	1.2	**2.4**	**1.8**
	Gradisca d'Isonzo	-0.7	0.7	2.5	1.0	1.1	**1.6**	**3.6**	3.0	4.1	1.2	**2.4**	**2.0**
	Grado	-0.7	0.1	2.3	1.5	0.3	**1.4**	**3.3**	3.0	4.1	1.2	**2.4**	**1.8**
	Mariano del Friuli	-0.7	0.7	2.5	1.0	1.1	**1.6**	**3.9**	3.0	4.1	1.2	**2.4**	**2.1**
	Medea	-0.7	0.7	2.6	1.2	0.5	**1.6**	**3.7**	3.0	4.1	1.2	**2.4**	**2.0**
	Moraro	-0.7	0.8	2.4	1.0	1.5	**1.6**	**3.1**	3.0	4.1	1.2	**2.4**	**2.0**
	Mossa	-0.8	0.9	2.3	1.0	2.0	**1.7**	**3.0**	3.0	4.1	1.2	**2.4**	**2.0**
	Romans d'Isonzo	-0.7	0.7	2.6	1.2	0.6	**1.6**	**4.2**	3.0	4.1	1.2	**2.4**	**2.1**
	Sagrado	-0.8	0.7	2.4	0.9	1.0	**1.5**	**0.2**	3.0	4.1	1.2	**2.4**	**1.1**
	San Canzian d'Isonzo	-0.7	0.3	2.4	1.5	0.3	**1.5**	**3.4**	3.0	4.1	1.2	**2.4**	**1.9**
	San Floriano del Collio-Števerjan	-0.8	1.0	2.3	1.0	2.5	**1.7**	**3.4**	3.0	4.1	1.2	**2.4**	**2.1**
	San Lorenzo Isontino	-0.7	0.8	2.4	1.0	1.8	**1.7**	**2.5**	3.0	4.1	1.2	**2.4**	**1.9**
	San Pier d'Isonzo	-0.7	0.6	2.6	1.2	0.6	**1.6**	**0.0**	3.0	4.1	1.2	**2.4**	**0.0**
	Savogna d'Isonzo-Sovodnje ob Soči	-0.8	0.7	2.3	0.9	1.4	**1.5**	**1.6**	3.0	4.1	1.2	**2.4**	**1.7**
	Turriaco	-0.7	0.5	2.5	1.4	0.4	**1.5**	**0.0**	3.0	4.1	1.2	**2.4**	**0.7**
	Villesse	-0.7	0.6	2.6	1.3	0.6	**1.6**	**2.9**	3.0	4.1	1.2	**2.4**	**1.9**
Slovenia	Tolmin	-1.2	5.0	0.9	0.4	5.0	**1.9**	**0.0**	0.9	0.0	2.0	**1.2**	**0.0**
	Šempeter - Vrtojba	-0.8	1.4	2.1	0.9	4.1	**1.9**	**2.6**	0.9	0.0	2.0	**1.2**	**1.9**
	Renče - Vogrsko	-0.8	1.2	2.1	1.0	3.0	**1.7**	**0.3**	0.9	0.0	2.0	**1.2**	**1.1**
	Bovec	-5.0	5.0	0.2	0.3	5.0	**1.3**	**0.0**	0.9	0.0	2.0	**1.2**	**0.0**

	Brda	-0.8	1.3	2.2	0.9	2.9	**1.8**	**2.7**	0.9	0.0	2.0	**1.2**	1.8
	Kanal	-0.9	3.2	1.7	0.6	5.0	**2.0**	**0.0**	0.9	0.0	2.0	**1.2**	0.0
	Kobarid	-1.6	5.0	0.8	0.4	5.0	**1.8**	**0.0**	0.9	0.0	2.0	**1.2**	0.0
	Miren - Kostanjevica	-0.8	0.9	2.2	0.9	1.9	**1.6**	**0.2**	0.9	0.0	2.0	**1.2**	0.9
	Nova Gorica	-1.1	2.9	1.7	0.7	5.0	**2.0**	**0.5**	0.9	0.0	2.0	**1.2**	1.4
	Sežana	-1.0	2.2	1.8	0.8	0.9	**1.4**	**0.0**	0.9	0.0	2.0	**1.2**	0.0
	Vipava	-1.1	3.2	1.6	0.7	0.9	**1.4**	**1.1**	0.9	0.0	2.0	**1.2**	1.3
	Ajdovščina	-1.2	3.4	1.6	0.7	2.2	**1.6**	**0.5**	0.9	0.0	2.0	**1.2**	1.2
	Cerkno	-1.1	5.0	1.0	0.5	2.1	**1.5**	**0.0**	0.9	0.0	2.0	**1.2**	0.0
	Idrija	-1.2	5.0	1.2	0.5	1.5	**1.5**	**0.0**	0.9	0.0	2.0	**1.2**	0.0
	Postojna	-1.4	4.2	1.4	0.7	0.3	**1.4**	**0.0**	0.9	0.0	2.0	**1.2**	0.0

Table 110: Quantitative (normalized) climate risk assessment at indicator level for the food system (RCP8.5), Isonzo-Soča river basin

Country	Administrative units	HAZARD						Exposure	VULNERABILITY				Risk 8.5
		Growing Degree Days	Frost	Heat stress	Aridity	Heavy precipitation	Composite hazard indicator	Share of main crops	Agricultural water consumption	Water exploitation	Agricultural income	Composite vulnerability indicator	
Italy	Attimis	-1.0	2.7	1.7	0.9	5.0	**2.1**	**0.0**	3.0	4.1	1.2	**2.4**	0.0
	Buttrio	-0.8	0.8	2.7	2.7	1.3	**2.0**	**3.6**	3.0	4.1	1.2	**2.4**	2.3
	Chiopris-Viscone	-0.7	0.6	2.8	2.1	0.6	**1.8**	**3.4**	3.0	4.1	1.2	**2.4**	2.2
	Cividale del Friuli	-0.8	1.3	2.3	1.4	3.0	**1.9**	**2.4**	3.0	4.1	1.2	**2.4**	2.1
	Corno di Rosazzo	-0.8	0.8	2.6	1.8	1.2	**1.8**	**2.9**	3.0	4.1	1.2	**2.4**	2.1
	Drenchia	-1.0	5.0	1.2	0.8	5.0	**2.1**	**0.0**	3.0	4.1	1.2	**2.4**	0.0
	Faedis	-0.9	2.6	1.8	1.0	5.0	**2.1**	**1.9**	3.0	4.1	1.2	**2.4**	2.1
	Grimacco	-0.9	4.7	1.3	0.8	5.0	**2.1**	**0.0**	3.0	4.1	1.2	**2.4**	0.0
	Lusevera	-1.4	5.0	1.0	0.6	5.0	**2.0**	**0.0**	3.0	4.1	1.2	**2.4**	0.0
	Manzano	-0.8	0.7	2.7	2.3	1.0	**1.9**	**2.9**	3.0	4.1	1.2	**2.4**	2.1
	Moimacco	-0.8	1.1	2.3	1.8	2.6	**1.9**	**4.0**	3.0	4.1	1.2	**2.4**	2.3

	Montenars	-1.1	4.4	1.4	0.6	5.0	**2.1**	**0.0**	3.0	4.1	1.2	**2.4**	**0.0**
	Nimis	-0.9	3.3	1.6	0.8	5.0	**2.1**	**0.7**	3.0	4.1	1.2	**2.4**	**1.7**
	Povoletto	-0.8	1.6	2.2	1.5	3.5	**2.0**	**3.8**	3.0	4.1	1.2	**2.4**	**2.3**
	Pradamano	-0.8	0.8	2.6	2.7	1.2	**1.9**	**2.4**	3.0	4.1	1.2	**2.4**	**2.1**
	Premariacco	-0.8	0.8	2.5	2.1	1.9	**1.9**	**3.8**	3.0	4.1	1.2	**2.4**	**2.3**
	Prepotto	-0.8	1.6	2.1	1.2	2.7	**1.8**	**1.4**	3.0	4.1	1.2	**2.4**	**1.8**
	Pulfero	-1.1	4.2	1.5	0.8	5.0	**2.1**	**0.0**	3.0	4.1	1.2	**2.4**	**0.5**
	Remanzacco	-0.8	1.0	2.4	2.0	2.0	**1.9**	**4.3**	3.0	4.1	1.2	**2.4**	**2.3**
	Resia	-2.1	5.0	0.6	0.7	5.0	**1.7**	**0.0**	3.0	4.1	1.2	**2.4**	**0.0**
	Ruda	-0.7	0.4	2.7	2.8	0.4	**1.8**	**2.7**	3.0	4.1	1.2	**2.4**	**2.1**
	San Giovanni al Natisone	-0.8	0.6	2.8	2.1	0.8	**1.8**	**2.4**	3.0	4.1	1.2	**2.4**	**2.0**
	San Leonardo	-0.9	3.0	1.8	1.1	5.0	**2.1**	**0.0**	3.0	4.1	1.2	**2.4**	**0.0**
	San Pietro al Natisone	-0.9	3.2	1.8	0.9	5.0	**2.1**	**0.4**	3.0	4.1	1.2	**2.4**	**1.6**
	Savogna	-1.2	5.0	1.3	0.7	5.0	**2.1**	**0.0**	3.0	4.1	1.2	**2.4**	**0.0**
	Stregna	-0.9	3.7	1.5	1.0	4.9	**2.1**	**0.0**	3.0	4.1	1.2	**2.4**	**0.0**
	Taipana	-1.3	5.0	1.1	0.7	5.0	**2.0**	**0.0**	3.0	4.1	1.2	**2.4**	**0.0**
	Tarcento	-0.9	3.1	1.7	0.8	5.0	**2.1**	**0.4**	3.0	4.1	1.2	**2.4**	**1.6**
	Torreano	-1.0	2.4	1.9	1.0	5.0	**2.1**	**0.8**	3.0	4.1	1.2	**2.4**	**1.8**
	Fiumicello Villa Vicentina	-0.7	0.3	2.6	2.8	0.4	**1.8**	**2.6**	3.0	4.1	1.2	**2.4**	**2.0**
	Capriva del Friuli	-0.8	0.7	2.5	2.6	1.2	**1.9**	**2.8**	3.0	4.1	1.2	**2.4**	**2.1**
	Cormons	-0.8	0.7	2.7	2.2	1.0	**1.8**	**4.1**	3.0	4.1	1.2	**2.4**	**2.3**
	Dolegna del Collio	-0.8	1.1	2.4	1.6	1.7	**1.8**	**2.7**	3.0	4.1	1.2	**2.4**	**2.0**
	Farra d'Isonzo	-0.7	0.7	2.5	2.1	1.0	**1.7**	**3.0**	3.0	4.1	1.2	**2.4**	**2.1**
	Gorizia	-0.8	1.0	2.3	1.6	2.0	**1.7**	**1.6**	3.0	4.1	1.2	**2.4**	**1.8**
	Gradisca d'Isonzo	-0.7	0.6	2.7	1.7	0.8	**1.7**	**3.6**	3.0	4.1	1.2	**2.4**	**2.1**
	Grado	-0.7	0.1	2.4	3.0	0.3	**1.6**	**3.3**	3.0	4.1	1.2	**2.4**	**2.0**
	Mariano del Friuli	-0.7	0.6	2.7	1.9	0.8	**1.8**	**3.9**	3.0	4.1	1.2	**2.4**	**2.2**
	Medea	-0.7	0.6	2.8	2.3	0.6	**1.8**	**3.7**	3.0	4.1	1.2	**2.4**	**2.2**
	Moraro	-0.7	0.7	2.6	2.6	1.0	**1.9**	**3.1**	3.0	4.1	1.2	**2.4**	**2.2**
	Mossa	-0.8	0.8	2.5	2.2	1.3	**1.8**	**3.0**	3.0	4.1	1.2	**2.4**	**2.1**
	Romans d'Isonzo	-0.7	0.6	2.8	2.5	0.5	**1.9**	**4.2**	3.0	4.1	1.2	**2.4**	**2.3**
	Sagrado	-0.8	0.6	2.6	1.7	0.7	**1.7**	**0.2**	3.0	4.1	1.2	**2.4**	**1.1**
	San Canzian d'Isonzo	-0.7	0.1	2.6	2.8	0.3	**1.7**	**3.4**	3.0	4.1	1.2	**2.4**	**2.1**

	San Floriano del Collio-Števerjan	-0.8	0.9	2.4	1.5	1.6	**1.7**	**3.4**	3.0	4.1	1.2	**2.4**	**2.1**
	San Lorenzo Isontino	-0.7	0.7	2.5	2.6	1.2	**1.8**	**2.5**	3.0	4.1	1.2	**2.4**	**2.1**
	San Pier d'Isonzo	-0.7	0.5	2.8	2.3	0.4	**1.8**	**0.0**	3.0	4.1	1.2	**2.4**	**0.0**
	Savogna d'Isonzo-Sovodnje ob Soči	-0.8	0.6	2.4	1.9	0.9	**1.7**	**1.6**	3.0	4.1	1.2	**2.4**	**1.8**
	Turriaco	-0.7	0.4	2.7	2.8	0.4	**1.8**	**0.0**	3.0	4.1	1.2	**2.4**	**0.8**
	Villesse	-0.7	0.5	2.8	2.5	0.4	**1.8**	**2.9**	0.9	0.0	1.2	**0.8**	**1.7**
Slovenia	Tolmin	-1.2	5.0	0.9	0.6	4.3	**1.8**	**0.0**	0.9	0.0	2.0	**1.2**	**0.0**
	Šempeter - Vrtojba	-0.8	1.4	2.1	1.7	2.9	**1.9**	**2.6**	0.9	0.0	2.0	**1.2**	**1.8**
	Renče - Vogrsko	-0.8	1.2	2.2	1.7	2.0	**1.7**	**0.3**	0.9	0.0	2.0	**1.2**	**1.1**
	Bovec	-5.0	5.0	0.3	0.4	5.0	**1.3**	**0.0**	0.9	0.0	2.0	**1.2**	**0.0**
	Brda	-0.8	1.2	2.3	1.2	2.0	**1.7**	**2.7**	0.9	0.0	2.0	**1.2**	**1.8**
	Kanal	-0.9	3.1	1.7	0.8	3.7	**1.9**	**0.0**	0.9	0.0	2.0	**1.2**	**0.0**
	Kobarid	-1.6	5.0	0.8	0.7	5.0	**1.8**	**0.0**	0.9	0.0	2.0	**1.2**	**0.0**
	Miren - Kostanjevica	-0.8	0.8	2.3	1.8	1.3	**1.7**	**0.2**	0.9	0.0	2.0	**1.2**	**1.0**
	Nova Gorica	-1.1	2.9	1.7	0.8	4.6	**2.0**	**0.5**	0.9	0.0	2.0	**1.2**	**1.4**
	Sežana	-1.0	2.3	1.8	1.2	0.8	**1.4**	**0.0**	0.9	0.0	2.0	**1.2**	**0.0**
	Vipava	-1.1	3.2	1.6	1.0	0.8	**1.4**	**1.1**	0.9	0.0	2.0	**1.2**	**1.3**
	Ajdovščina	-1.2	3.5	1.6	0.9	1.7	**1.6**	**0.5**	0.9	0.0	2.0	**1.2**	**1.2**
	Cerkno	-1.1	5.0	1.0	0.6	1.7	**1.5**	**0.0**	0.9	0.0	2.0	**1.2**	**0.0**
	Idrija	-1.2	5.0	1.2	0.6	1.4	**1.5**	**0.0**	0.9	0.0	2.0	**1.2**	**0.0**
	Postojna	-1.4	4.3	1.4	0.7	0.5	**1.4**	**0.0**	0.0	0.0	2.0	**1.0**	**0.0**

Energy system

The results of the climate risk assessment, with respect to the energy system, are presented in Table 111, Table 112 and Table 113. As can be seen, the risk levels of the pilot are the result of a "Low" hazard for both scenarios, in combination with a "Low" to "Medium-High" exposure and "Medium" vulnerability.

Table 111: Qualitative climate risk assessment per risk component for the energy system (RCP4.5 and RCP8.5), Isonzo-Soča river basin

Country	Administrative units	Hazard		Exposure	Vulnerability	Risk	
		4.5	8.5			4.5	8.5
Italy	Attimis	Low	Low	Medium	Medium	Low	Low
	Buttrio	Low	Low	Medium	Medium	Low	Low
	Chiopris-Viscone	Low	Low	Medium	Medium	Low	Low
	Cividale del Friuli	Low	Low	Medium	Medium	Low	Low
	Corno di Rosazzo	Low	Low	Medium	Medium	Low	Low
	Drenchia	Low	Low	Medium	Medium	Low	Low
	Faedis	Low	Low	Medium	Medium	Low	Low
	Grimacco	Low	Low	Medium	Medium	Low	Low
	Lusevera	Low	Low	Medium	Medium	Low	Low
	Manzano	Low	Low	Medium	Medium	Low	Low
	Moimacco	Low	Low	Medium	Medium	Low	Low
	Montenars	Low	Low	Medium	Medium	Low	Low
	Nimis	Low	Low	Medium	Medium	Low	Low
	Povoletto	Low	Low	Medium	Medium	Low	Low
	Pradamano	Low	Low	Medium	Medium	Low	Low
	Premariacco	Low	Low	Medium	Medium	Low	Low
	Prepotto	Low	Low	Medium	Medium	Low	Low
	Pulfero	Low	Low	Medium	Medium	Low	Low
	Remanzacco	Low	Low	Medium	Medium	Low	Low
	Resia	Low	Low	Medium	Medium	Low	Low
	Ruda	Low	Low	Medium	Medium	Low	Low
	San Giovanni al Natisone	Low	Low	Medium	Medium	Low	Low
	San Leonardo	Low	Low	Medium	Medium	Low	Low
	San Pietro al Natisone	Low	Low	Medium	Medium	Low	Low
	Savogna	Low	Low	Medium	Medium	Low	Low
	Stregna	Low	Low	Medium	Medium	Low	Low
	Taipana	Low	Low	Medium	Medium	Low	Low
	Tarcento	Low	Low	Medium	Medium	Low	Low
	Torreano	Low	Low	Medium	Medium	Low	Low
	Fiumicello Villa Vicentina	Low	Low	Medium	Medium	Low	Low
	Capriva del Friuli	Low	Low	Medium	Medium	Low	Low
	Cormons	Low	Low	Medium	Medium	Low	Low
	Dolegna del Collio	Low	Low	Medium	Medium	Low	Low
	Farra d'Isonzo	Low	Low	Medium	Medium	Low	Low
	Gorizia	Low	Low	Medium	Medium	Low	Low
	Gradisca d'Isonzo	Low	Low	Medium	Medium	Low	Low
	Grado	Low	Low	Medium	Medium	Low	Low
	Mariano del Friuli	Low	Low	Medium	Medium	Low	Low
	Medea	Low	Low	Medium	Medium	Low	Low
	Moraro	Low	Low	Medium	Medium	Low	Low

	Mossa	Low	Low	Medium	Medium	Low	Low
	Romans d'Isonzo	Low	Low	Medium	Medium	Low	Low
	Sagrado	Low	Low	Medium	Medium	Low	Low
	San Canzian d'Isonzo	Low	Low	Medium	Medium	Low	Low
	San Floriano del Collio-Števerjan	Low	Low	Medium	Medium	Low	Low
	San Lorenzo Isontino	Low	Low	Medium	Medium	Low	Low
	San Pier d'Isonzo	Low	Low	Medium	Medium	Low	Low
	Savogna d'Isonzo-Sovodnje ob Soči	Low	Low	Medium	Medium	Low	Low
	Turriaco	Low	Low	Medium	Medium	Low	Low
	Villesse	Low	Low	Medium	Medium	Low	Low
Slovenia	Tolmin	Low	Low	Medium	Medium	Low	Low
	Šempeter - Vrtojba	Low	Low	Medium	Medium	Low	Low
	Renče - Vogrsko	Low	Low	Medium	Medium	Low	Low
	Bovec	Low	Low	Medium	Medium	Low	Low
	Brda	Low	Low	Medium	Medium	Low	Low
	Kanal	Low	Low	Medium	Medium	Low	Low
	Kobarid	Low	Low	Medium	Medium	Low	Low
	Miren - Kostanjevica	Low	Low	Medium	Medium	Low	Low
	Nova Gorica	Low	Low	Medium	Medium	Low	Low
	Sežana	Low	Low	Medium	Medium	Low	Low
	Vipava	Low	Low	Medium	Medium	Low	Low
	Ajdovščina	Low	Low	Medium	Medium	Low	Low
	Cerkno	Low	Low	Medium	Medium	Low	Low
	Idrija	Low	Low	Medium	Medium	Low	Low
	Postojna	Low	Low	Medium	Medium	Low	Low

The detailed results of the climate risk assessment for the RCP4.5 and 8.5 are presented quantitatively at normalized scale [-5, 5] in Table 112 and Table 113, respectively. The negative values of the hazard indicators have a beneficial effect and thus are considered to compensate risk.

Table 112: Quantitative (normalized) climate risk assessment at indicator level for the energy system (RCP4.5), Isonzo-Soča river basin

Country	Administrative units	Hazard				Exposure				Vulnerability			Risk				
		Energy crop composite (GDD, Frost, Heat stress)	Wind power generation	Solar photovoltaic power generation	Hydropower generation	Energy crop cultivation intensity	Wind energy intensity	Photovoltaic energy	Hydropower energy	Energy imports	Renewable energy share	Composite vulnerability	energy crop	Wind energy	Photovoltaic energy	Hydropower energy	**Overall Risk 4.5**
Italy	Attimis	0.6	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	1.0	0.0	0.1	-1.1	**0.0**
	Buttrio	0.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.7	0.0	0.1	-1.1	**-0.1**
	Chiopris-Viscone	0.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.7	0.0	0.1	-1.1	**-0.1**
	Cividale del Friuli	0.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.7	0.0	0.1	-1.1	**-0.1**
	Corno di Rosazzo	0.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.6	0.0	0.1	-1.1	**-0.1**
	Drenchia	1.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	1.6	0.0	0.1	-1.1	**0.1**
	Faedis	0.6	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	1.0	0.0	0.1	-1.1	**0.0**
	Grimacco	1.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	1.6	0.0	0.1	-1.1	**0.1**
	Lusevera	1.2	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	1.5	0.0	0.1	-1.1	**0.1**
	Manzano	0.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.7	0.0	0.1	-1.1	**-0.1**
	Moimacco	0.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.6	0.0	0.1	-1.1	**-0.1**
	Montenars	1.2	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	1.5	0.0	0.1	-1.1	**0.1**
	Nimis	0.8	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	1.2	0.0	0.1	-1.1	**0.0**
	Povoletto	0.4	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.8	0.0	0.1	-1.1	**-0.1**
	Pradamano	0.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.7	0.0	0.1	-1.1	**-0.1**
	Premariacco	0.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.6	0.0	0.1	-1.1	**-0.1**
	Prepotto	0.4	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.7	0.0	0.1	-1.1	**-0.1**
	Pulfero	1.1	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	1.4	0.0	0.1	-1.1	**0.1**
	Remanzacco	0.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.7	0.0	0.1	-1.1	**-0.1**
	Resia	1.0	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	1.3	0.0	0.1	-1.1	**0.1**
	Ruda	0.2	0.1	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.5	0.0	0.1	-1.1	**-0.1**

	San Giovanni al Natisone	0.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.7	0.0	0.1	-1.1	**-0.1**
	San Leonardo	0.8	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	1.1	0.0	0.1	-1.1	**0.0**
	San Pietro al Natisone	0.9	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	1.2	0.0	0.1	-1.1	**0.0**
	Savogna	1.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	1.5	0.0	0.1	-1.1	**0.1**
	Stregna	1.0	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	1.3	0.0	0.1	-1.1	**0.1**
	Taipana	1.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	1.5	0.0	0.1	-1.1	**0.1**
	Tarcento	0.8	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	1.1	0.0	0.1	-1.1	**0.0**
	Torreano	0.6	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	1.0	0.0	0.1	-1.1	**0.0**
	Fiumicello Villa Vicentina	0.1	0.1	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.4	0.0	0.1	-1.1	**-0.2**
	Capriva del Friuli	0.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.6	0.0	0.1	-1.1	**-0.1**
	Cormons	0.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.6	0.0	0.1	-1.1	**-0.1**
	Dolegna del Collio	0.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.7	0.0	0.1	-1.1	**-0.1**
	Farra d'Isonzo	0.2	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.6	0.0	0.1	-1.1	**-0.1**
	Gorizia	0.2	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.6	0.0	0.1	-1.1	**-0.1**
	Gradisca d'Isonzo	0.3	0.1	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.6	0.0	0.1	-1.1	**-0.1**
	Grado	0.0	0.1	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.0	0.0	0.1	-1.1	**-0.3**
	Mariano del Friuli	0.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.6	0.0	0.1	-1.1	**-0.1**
	Medea	0.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.7	0.0	0.1	-1.1	**-0.1**
	Moraro	0.3	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.6	0.0	0.1	-1.1	**-0.1**
	Mossa	0.2	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.5	0.0	0.1	-1.1	**-0.1**
	Romans d'Isonzo	0.3	0.1	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.7	0.0	0.1	-1.1	**-0.1**
	Sagrado	0.2	0.1	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.5	0.0	0.1	-1.1	**-0.1**
	San Canzian d'Isonzo	0.1	0.1	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.3	0.0	0.1	-1.1	**-0.2**
	San Floriano del Collio-Števerjan	0.2	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.5	0.0	0.1	-1.1	**-0.1**
	San Lorenzo Isontino	0.2	0.0	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.6	0.0	0.1	-1.1	**-0.1**
	San Pier d'Isonzo	0.3	0.1	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.6	0.0	0.1	-1.1	**-0.1**
	Savogna d'Isonzo-Sovodnje ob Soči	0.2	0.1	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.5	0.0	0.1	-1.1	**-0.2**
	Turriaco	0.2	0.1	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.5	0.0	0.1	-1.1	**-0.1**
	Villesse	0.3	0.1	0.0	-0.5	1.7	0.0	5.0	5.0	4.4	1.8	2.4	0.6	0.0	0.1	-1.1	**-0.1**
Slovenia	Tolmin	1.3	0.1	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	1.5	0.0	0.0	-	**0.4**
	Šempeter - Vrtojba	0.3	0.0	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	0.7	0.0	0.0	-	**0.2**
	Renče - Vogrsko	0.3	0.0	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	0.6	0.0	0.0	-	**0.1**
	Bovec	0.0	0.0	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	0.0	0.0	0.0	-	**0.0**

	Brda	0.3	0.1	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	0.6	0.0	0.0	-	**0.2**
	Kanal	0.8	0.0	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	1.1	0.0	0.0	-	**0.3**
	Kobarid	1.1	0.0	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	1.4	0.0	0.0	-	**0.3**
	Miren - Kostanjevica	0.2	0.1	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	0.5	0.0	0.0	-	**0.1**
	Nova Gorica	0.6	0.0	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	1.0	0.0	0.0	-	**0.2**
	Sežana	0.4	0.1	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	0.8	0.0	0.0	-	**0.2**
	Vipava	0.7	0.1	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	1.0	0.0	0.0	-	**0.3**
	Ajdovščina	0.8	0.0	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	1.1	0.0	0.0	-	**0.3**
	Cerkno	1.3	0.1	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	1.5	0.0	0.0	-	**0.4**
	Idrija	1.3	0.0	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	1.5	0.0	0.0	-	**0.4**
	Postojna	0.9	0.1	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	1.2	0.0	0.0	-	**0.3**

Table 113: Quantitative (normalized) climate risk assessment at indicator level for the energy system (RCP8.5), Isonzo-Soča river basin

Country	**Administrative units**	**Hazard**					**Exposure**			**Vulnerability**			**Risk**				
		Energy crop composite (GDD, Frost, Heat stress)	**Wind power generation**	**Solar photovoltaic power generation**	**Hydropower generation**	**Energy crop cultivation intensity**	**Wind energy intensity**	**Photovoltaic energy intensity**	**Hydropower energy intensity**	**Energy imports dependency**	**Renewable energy share**	**Composite vulnerability**	**energy crop**	**Wind energy**	**Photovoltaic energy**	**Hydropower energy**	**Overall Risk 8.5**
Italy	Attimis	0.6	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	1.0	0.0	0.0	0.0	**0.3**
	Buttrio	0.4	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.7	0.0	0.1	0.0	**0.2**
	Chiopris-Viscone	0.4	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.7	0.0	0.1	0.0	**0.2**
	Cividale del Friuli	0.4	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.7	0.0	0.0	0.0	**0.2**
	Corno di Rosazzo	0.3	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.7	0.0	0.0	0.0	**0.2**
	Drenchia	1.3	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	1.6	0.0	0.0	0.0	**0.4**
	Faedis	0.6	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	1.0	0.0	0.0	0.0	**0.3**
	Grimacco	1.3	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	1.5	0.0	0.0	0.0	**0.4**
	Lusevera	1.2	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	1.5	0.0	0.0	0.0	**0.4**

	Manzano	0.3	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.7	0.0	0.1	0.0	**0.2**
	Moimacco	0.3	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.7	0.0	0.0	0.0	**0.2**
	Montenars	1.2	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	1.5	0.0	0.0	0.0	**0.4**
	Nimis	0.8	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	1.2	0.0	0.0	0.0	**0.3**
	Povoletto	0.4	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.8	0.0	0.0	0.0	**0.2**
	Pradamano	0.3	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.7	0.0	0.1	0.0	**0.2**
	Premariacco	0.3	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.6	0.0	0.0	0.0	**0.2**
	Prepotto	0.4	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.7	0.0	0.0	0.0	**0.2**
	Pulfero	1.1	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	1.4	0.0	0.0	0.0	**0.4**
	Remanzacco	0.3	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.7	0.0	0.0	0.0	**0.2**
	Resia	1.0	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	1.3	0.0	0.0	0.0	**0.3**
	Ruda	0.2	0.1	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.6	0.0	0.1	0.0	**0.2**
	San Giovanni al Natisone	0.3	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.7	0.0	0.1	0.0	**0.2**
	San Leonardo	0.8	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	1.1	0.0	0.0	0.0	**0.3**
	San Pietro al Natisone	0.9	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	1.2	0.0	0.0	0.0	**0.3**
	Savogna	1.3	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	1.5	0.0	0.0	0.0	**0.4**
	Stregna	1.0	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	1.3	0.0	0.0	0.0	**0.3**
	Taipana	1.3	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	1.5	0.0	0.0	0.0	**0.4**
	Tarcento	0.8	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	1.1	0.0	0.0	0.0	**0.3**
	Torreano	0.6	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	1.0	0.0	0.0	0.0	**0.2**
	Fiumicello Villa Vicentina	0.2	0.1	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.5	0.0	0.1	0.0	**0.1**
	Capriva del Friuli	0.3	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.6	0.0	0.0	0.0	**0.2**
	Cormons	0.3	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.7	0.0	0.0	0.0	**0.2**
	Dolegna del Collio	0.4	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.7	0.0	0.0	0.0	**0.2**
	Farra d'Isonzo	0.3	0.1	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.6	0.0	0.0	0.0	**0.2**
	Gorizia	0.3	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.6	0.0	0.0	0.0	**0.2**
	Gradisca d'Isonzo	0.3	0.1	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.7	0.0	0.1	0.0	**0.2**
	Grado	0.0	0.1	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.0	0.0	0.1	0.0	**0.0**
	Mariano del Friuli	0.3	0.1	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.7	0.0	0.1	0.0	**0.2**
	Medea	0.3	0.1	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.7	0.0	0.1	0.0	**0.2**
	Moraro	0.3	0.1	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.6	0.0	0.1	0.0	**0.2**

	Mossa	0.3	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.6	0.0	0.0	0.0	**0.2**
	Romans d'Isonzo	0.3	0.1	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.7	0.0	0.1	0.0	**0.2**
	Sagrado	0.3	0.1	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.6	0.0	0.1	0.0	**0.2**
	San Canzian d'Isonzo	0.1	0.1	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.3	0.0	0.1	0.0	**0.1**
	San Floriano del Collio-Števerjan	0.3	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.6	0.0	0.0	0.0	**0.1**
	San Lorenzo Isontino	0.3	0.0	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.6	0.0	0.0	0.0	**0.2**
	San Pier d'Isonzo	0.3	0.1	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.6	0.0	0.1	0.0	**0.2**
	Savogna d'Isonzo-Sovodnje ob Soči	0.2	0.1	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.5	0.0	0.0	0.0	**0.1**
	Turriaco	0.2	0.1	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.6	0.0	0.1	0.0	**0.2**
	Villesse	0.3	0.1	0.0	-0.9	1.7	0.0	5.0	0.0	4.4	1.8	2.4	0.7	0.0	0.1	0.0	**0.2**
Slovenia	Tolmin	1.3	0.1	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	1.5	0.0	0.0	-	**0.4**
	Šempeter - Vrtojba	0.4	0.0	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	0.7	0.0	0.0	-	**0.2**
	Renče - Vogrsko	0.3	0.0	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	0.6	0.0	0.0	-	**0.2**
	Bovec	0.0	0.0	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	0.0	0.0	0.0	-	**0.0**
	Brda	0.3	0.1	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	0.6	0.0	0.0	-	**0.2**
	Kanal	0.8	0.0	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	1.1	0.0	0.0	-	**0.3**
	Kobarid	1.1	0.0	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	1.4	0.0	0.0	-	**0.3**
	Miren - Kostanjevica	0.2	0.1	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	0.5	0.0	0.0	-	**0.1**
	Nova Gorica	0.7	0.0	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	1.0	0.0	0.0	-	**0.2**
	Sežana	0.5	0.1	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	0.8	0.0	0.0	-	**0.2**
	Vipava	0.7	0.1	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	1.1	0.0	0.0	-	**0.3**
	Ajdovščina	0.8	0.0	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	1.1	0.0	0.0	-	**0.3**
	Cerkno	1.3	0.1	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	1.5	0.0	0.0	-	**0.4**
	Idrija	1.3	0.1	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	1.5	0.0	0.0	-	**0.4**
	Postojna	1.0	0.1	0.0	-	1.5	0.0	0.0	5.0	3.5	2.1	2.4	1.3	0.0	0.0	-	**0.3**

WEF Nexus systems

In this section, the results of the risk assessment for the period of 2031-2050 are summarized for all WEF systems and aggregated at pilot level, based on the area weighted average of the pilot administrative units. In addition, the result of the adaptive capacity assessment is presented in parallel, in order to examine the degree to which the overall risk can be influenced.

The results for the Isonzo-Soča river basin pilot are presented in Table 114. As can be seen, according to RCP4.5 the overall risk for the Water system is expected to be "Low-Medium", for the Food system "Low-Medium" and for the Energy system "Low". According to RCP8.5 the overall risk is expected to be slightly higher for the Water system estimated at "Medium" level.

Furthermore, the adaptive capacity is characterized as "Medium" for the pilot, which could theoretically offset the expected risk for the Water, Food and Energy systems.

Table 114: Overall risk of the WEF Nexus systems and adaptive capacity, Isonzo-Soča river basin

System	Overall risk		Adaptive Capacity
	RCP4.5	RCP8.5	
Water	(1.9) Low-Medium	(2.1) Medium	(2.1) Medium
Food	(1.1) Low-Medium	(1.1) Low-Medium	
Energy	(0.3) Low	(0.3) Low	

3.5 Climate Risk Assessment: Nima-Amaime subwatershed

In this section the results of the hazard, exposure and vulnerability assessment, as well as the results from the adaptive capacity's and the overall climate risk assessment are provided, for the Nima-Amaime subwatershed. Unfortunately, as the availability of hazard indicators in the relevant datasets of C3S was limited, it was not possible to carry out the climate risk assessment for all WEF sectors. Therefore, when selecting the available indicators, priority was given to the food sector based on the challenges described for the Nimes pilot. Furthermore, as the spatial resolution for Latin America was coarse (48.8*48.8 km), it was decided to provide tables instead of maps, for the presentation of the results.

3.5.1 Hazard

In the following paragraphs, the results for the growing degree days, heat stress days and heavy precipitation days indicators are given.

Growing Degree Days

The relative change in percentage (%) of the GDD indicator for the examined future periods in relation to the reference period is given in Table 115. It can be seen that the trend for all the periods and scenarios is increasing. More specific, for the RCP4.5 the change expected to be 10.5%, compared to the reference period, for the near-term period (2031-2050), while it is expected this difference to reach up to 18% at the long-term period. Similarly, for the RCP8.5, the change expected to be 13% for the near-term period and 32% for the long-term period.

Table 115: Relative change (%) of the growing degree days, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Nima-Amaime subwatershed

Growing degree days (Tmean > 5°C)	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	10.5	13	13	22	18	32

Heat Stress Days

The projected relative change (%) of the number of days with maximum temperature above 25°C, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, is summarized in Table 116. It may be concluded that for the short-term period, there is no significant difference between the scenarios, with an average 13.5% increase, from the reference period. Furthermore, this increase continues into the long-term period reaching 21% for RCP4.5 and 25% for RCP8.5.

Table 116: Relative change (%) of the number of days with maximum temperature >25°C, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Nima-Amaime subwatershed

Heat stress days (>25°C)	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	13	14	21	22	21	25

Heavy Precipitation Days

The relative change (%) of the number of heavy precipitation days with total precipitation >20mm expected for the future, is summarized in Table 117. As can be seen, a decrease of 34% on average is projected for the near-term period (2031-2050). For the mid-term period, an increasing trend is expected for RCP8.5 (54%), while no change is projected in case of the RCP4.5. With respect to the long-term period an increase of 151% is expected according to RCP4.5, while a drecrease of 22% is expected for the RCP8.5.

Table 117: Relative change (%) of the number of days with total precipitation >20mm, for the future sub-periods based on the RCP4.5 and RCP8.5, compared to the reference period, Nima-Amaime subwatershed

Heavy precipitation days (>20mm)	2031-2050		2051-2070		2071-2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5	RCP4.5	RCP8.5
relative change (%)	-21	-46	0	54	151	-22

3.5.2 Exposure

In this section the results of the exposure assessment of Nima-Amaime subwetershed for the food system are presented.

Food system

In this sub-section the results of the assessment of the food exposure index related to the areas cultivated with the crops are presented.

Share of main crops

The share of areas cultivated with crops to the total extend of the Nima-Amaime subwetershed, is presented in Table 118. As can be seen, crops are cultivated in great extent (21%) of the total area of the Nima-Amaime subwetershed.

Table 118: Food exposure index expressed as the share of the crops area to the total pilot area, Nima pilot

Region	Share of main crops	
	Total area (ha)	% of total area
Nima-Amaime subwatershed	76970	21%

3.5.3 Vulnerability

In this section the results of the vulnerability assessment of Nima-Amaime subwetershed for the food system are presented.

Food system

In this sub-section the results of the assessment of the food vulnerability index related to agricultural income, are presented at regional level, i.e. for the Valle del cauca region where Nima-Amaime subwetershed is located.

Agricultural Income

The agricultural income of Valle del cauca region compared to the average national agricultural income of Colombia, is presented in Table 119. It is observed that the region of Valle del cauca, where Nima-Amaime subwetershed pilot is located, has 219% higher agricultural income compared to the national average. This indicates a high dependency of the country to the agricultural income of the region. Thus, the vulnerability related to this indicator is considered to be high.

Table 119: Food vulnerability index expressed as agriculture income, Nima-Amaime subwatershed

Region	Agricultural income	
	Billion Pesos	% of national average
National average	2120	100%
Valle del Cauca	4660	219%

3.5.4 Adaptive capacity

In this section, the results of the assessment of the adaptive capacity of the Nima subwaterbasin are presented. Specifically, the results refer to (i) the survey on the evaluation of the institutional readiness of the pilot as well as to (ii) the assessment of the GDP index for the pilot.

Institutional readiness

With respect to the institutional readiness survey, 9 stakeholders (SH) from the Nima subwatershed pilot took part, who had different backgrounds, as shown in Figure 60: Distribution of participants to the adaptive capacity survey by domain, Nima subwatershed. The half of the participants are engaged in the environment domain, while the rest of them are engaged in the water and food sectors.

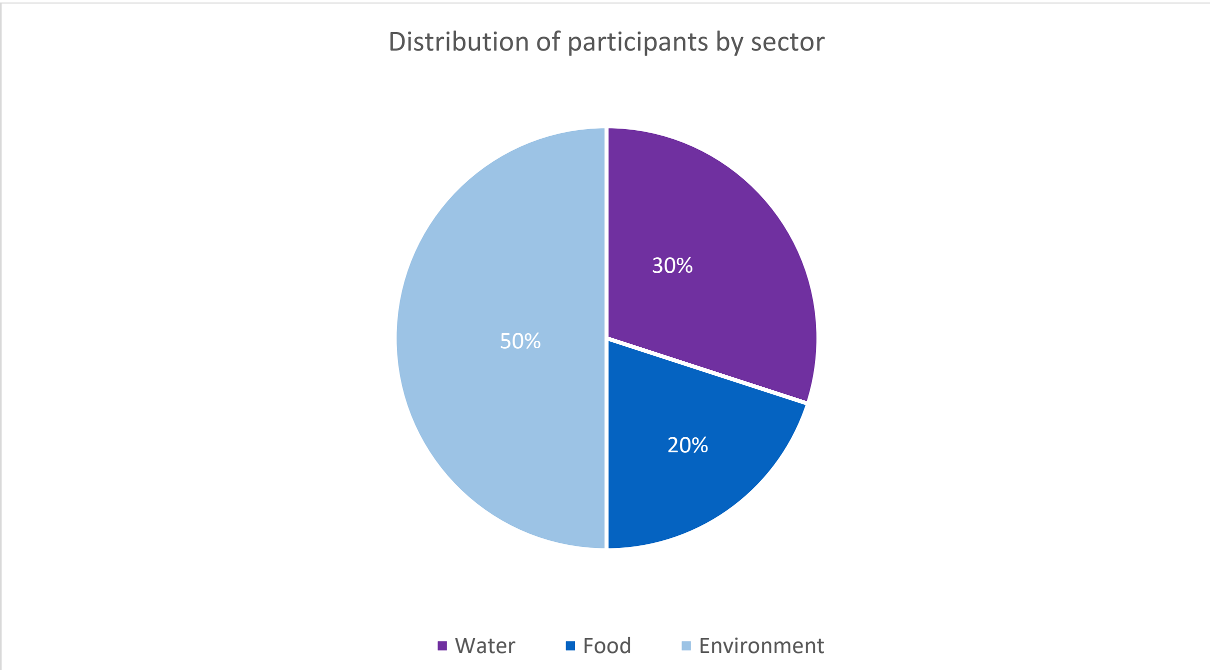

Figure 60: Distribution of participants to the adaptive capacity survey by domain, Nima subwatershed

The results of the survey are presented below.

Part A: Assessment of the adaptive capacity components

Political Leadership

The results of the evaluation the institutional organization component against the criteria are presented below. It may be concluded with respect to the criterion 1, that the majority of the respondents (67%) rated it as high. With respect to the evaluation of criterion 2, 44% of the respondents rated it either as limited or moderate, while regarding the criterion 3, 78% rated it as moderate.

	1. To what extent has the need for adaptation to climate change been recognized as a political priority?	*2. Evaluate the involvement of political leadership in designing strategies for adapting to climate change.*	*3. To what extent have policies and legislation related to climate change adaptation been adopted?*
None	0%	0%	0%
Limited	0%	0%	11%
Moderate	33%	44%	78%
High	67%	44%	11%
Don't know	0%	11%	0%

Institutional Organisation

The results of the evaluation of the Institutional Organisation component against three criteria, are presented below. With respect to the evaluation of criterion 1, 67% of the respondents replied that they are not aware of research programs or projects that study climate change in the pilot area. With respect to criterion 2, all of the respondents answered that there are institutions in the area that are engaged with adaptation to climate change. Finally, with respect to criterion 3, the majority of the respondents (78%) replied that there is a fragmentation of responsibilities between the involved stakeholders.

	1. Are there -beyond REXUS- other research programs or projects that study climate change in the pilot area?
None	11%
1-2	22%
More than 2	0%
Don't know	67%

	2. Are there institutions in the area that are engaged with adaptation to climate change?	*3. Do you think that there is a fragmentation of responsibilities between the involved stakeholders?*
Yes	100%	78%
No	0%	22%
Don't know	0%	0%

Decision Making

The results of the evaluation of the Decision-Making component against two criteria are presented below. With respect to the evaluation of criterion 1, most of the respondents (78%) replied that the extent to which stakeholders are involved in assessing the impact of climate change and policy making is moderate. With respect to criterion 2, the majority of them (44%) replied that they are not aware if there is a decision-making framework used to adapt to climate change, while 33% replied that there is.

	1. To what extent are stakeholders involved in assessing the impact of climate change and policy-making?
None	0%
Limited	22%
Moderate	78%
High	0%
Don't know	0%

	2. Is there a decision-making framework used to adapt to climate change?
Yes	33%
No	22%
Don't know	44%

Funding

The results of the evaluation of the Funding component against the criterion are presented below. It may be concluded that, the majority of the respondents (67%) rated the availability of funding as limited.

	How do you evaluate the availability of funding for adaptation to climate change?
None	0%
Limited	67%
Moderate	22%
High	0%
Don't know	11%

Public Awareness

The results of the evaluation of the Public Awareness component against two criteria are presented below. With respect to criterion 1, the majority of the respondents (78%) rated media coverage of climate change as limited. With respect to criterion 2, the majority of them (89%) answered that there is limited public awareness of the need for climate change adaptation.

	1. How do you rate media coverage of climate change?	2. How do you evaluate the public awareness of the need for climate change adaptation?
None	0%	0%
Limited	78%	89%
Moderate	22%	11%
High	0%	0%
Don't know	0%	0%

Economic capacity

The economic capacity of the Valle del cauca pilot expressed as the GDP of Colombia in relation to the Latin America average is presented in the table that follows. As can be seen, the GDP of Colombia is 314 billion US dollars which is almost the same as the Latin America average (101%).

Table 120: Economic capacity of Colombia

	GDP (billion US dollars)	in % of Latin America average
Latin America average	310	100%
Colombia	314	101%

3.5.5 Overall Risk

The results of the climate risk assessment, with respect to the food system, have been calculated on pilot level and they are depicted in Table 121.

As it may be seen in Table 121 a "Low" level risk is expected at the pilot of Nima at both scenarios. Additionally, the "Low" level risk is result of "Low" hazard, a "Medium-High" exposure and "High" vulnerability.

Table 121: Qualitative climate risk assessment per risk component for the food system (RCP4.5 and RCP8.5), Nima subwatershed

Sub-watershed	Hazard		Exposure	Vulnerability	Risk	
	4.5	8.5			4.5	8.5
Nima-Amaime	Low	Low	Medium-High	High	Low	Low

Furthermore, the results of the risk assessment for the period of 2031-2050 as well as the result of the adaptive capacity assessment is presented in parallel at Table 122, in order to examine the degree to which the overall risk can be influenced.

As it may be seen at Table 122, according to RCP4.5 and RCP8.5 the overall risk for the Food system is expected to be "Low", for both two scenarios.

Furthermore, the adaptive capacity is characterized as "Medium" for the pilot, which could theoretically offset the expected risk for the Food system.

Table 122: Overall risk of the WEF Nexus systems and adaptive capacity, Nima subwatershed

System	Overall risk		Adaptive Capacity
	RCP4.5	RCP8.5	
Food	(0.1) Low	(0.1) Low	(2.3) Medium

4 Conclusions

This deliverable intends to provide valuable information on the expected changes on the fit-for-nexus climate risk assessment for the five project pilot areas. The results of this analysis are presented below.

The results of the risk assessment for the period of 2031-2050 for the Pinios river basin show that, according to both future climate scenarios RCP4.5 and RCP8.5, the aggregated at pilot level overall risk for the Water system is expected to be “Medium-High”, for the Food system “Medium” and for the Energy system “Low”. Furthermore, when climate risk is considered at the administrative level, the expected risk reaches the "Medium-High" level on several municipalities for the Food systems.

The results of the risk assessment for the period of 2031-2050 for the lower Danube River basin show that, according to both climate scenarios RCP4.5 and RCP8.5 the aggregated at pilot level overall risk is expected to be “Medium” for the Water and Food systems and for the Energy system “Low”. According to RCP8.5 the overall risk in average is expected to be slightly higher for the Water and Food systems, but still in the same classification level. Furthermore, when climate risk is considered at the administrative level, the expected risk reaches the "Medium-High" level on several administrative units on RCP8.5 scenario for the Food systems.

The results of the risk assessment for the peninsular Spain pilot show that, according to both climate scenarios RCP4.5 and RCP8.5 the aggregated at pilot level overall risk is expected to be “Medium” for the Water and Food systems and for the Energy system “Low”. According to RCP8.5 the overall risk in average is expected to be slightly higher for the Water and Food systems, but still in the same classification level. Furthermore, when climate risk is considered at the administrative level, the expected risk reaches the "Medium-High" level in several provinces in both scenarios for water and food systems.

The results of the risk assessment for the Isonzo-Soča river basin pilot show that, according to RCP4.5 the aggregated at pilot level overall risk for the Water system is expected to be “Low-Medium”, for the Food system “Low-Medium” and for the Energy system “Low”. According to RCP8.5 the overall risk is expected to be slightly higher for the Water system estimated at “Medium” level. Furthermore, when climate risk is considered at the administrative level, the expected risk reaches higher levels in several administrative units in both scenarios for water and food systems.

The results of the risk assessment for the Nima-Amaime subwetershed pilot show that, according to RCP4.5 and RCP8.5 the overall risk for the Food system is expected to be “Low”, for both two scenarios.

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Annex

Pinios pilot

Hazard normalization tables

Frost *as the sum of the days when the minimum daily temperature is below 0°C*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	30	0	1
30	60	1	2
60	91	2	3

91	121	3	4
121	151	4	5

Heat stress 25 *as the sum of the days when the maximum daily temperature is above 25 °C*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	30	0	1
30	60	1	2
60	91	2	3
91	121	3	4
121	151	4	5

Heat stress 30 *as the sum of the days when the maximum daily temperature is above 30 °C*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	19	0	1
19	38	1	2
38	58	2	3
58	77	3	4
77	96	4	5

Aridity *as ratio between actual evapotranspiration and precipitation*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	1.00	0	1
1.00	1.53	1	2
1.53	2.00	2	3
2.00	5.00	3	4
5.00	20.00	4	5

Growing Degree Days *as cumulative temperature degrees °C*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	20	0	-1
20	40	-1	-2
40	60	-2	-3
60	80	-3	-4
80	100	-4	-5

Flood recurrence *as relative change (%) on the return value of annual maximum river discharge*

Original scale		Normalised scale	
Lower end	Higher end	Lower end	Higher end
-100	-40	-5	-3
-40	-10	-3	-1
-10	10	-1	1
10	40	1	3
40	100	3	5

Mean runoff *as relative change (%) on surface and subsurface runoff to streams*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
-100	-20	5	3
-20	-5	3	1
-5	5	1	-1
5	20	-1	-3
20	100	-3	-5

Hydropower generation *as relative change (%)*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
-100	-20	5	3
-20	-5	3	1
-5	5	1	-1
5	20	-1	-3
20	100	-3	-5

Solar photovoltaic power generation *as relative change (%)*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
-1.00	-0.40	5	3
-0.40	-0.10	3	1
-0.10	0.10	1	-1
0.10	0.40	-1	-3
0.40	1.00	-3	-5

Wind power generation *as relative change (%)*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**

-1.00	-0.40	5	3
-0.40	-0.10	3	1
-0.10	0.10	1	-1
0.10	0.40	-1	-3
0.40	1.00	-3	-5

Exposure normalization tables

Share of main crops *as percentage (%) of the area cultivated with the main crops to the total municipality area*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	0.05	0	1
0.05	0.10	1	2
0.10	0.20	2	3
0.20	0.40	3	4
0.40	1.00	4	5

Renewable energy intensity *As the ratio between renewable energy intensity of the pilot and the national*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	0.27	0	1
0.27	0.53	1	2
0.53	0.80	2	3
0.80	1.20	3	4
1.20	2.00	4	5

Energy crop cultivation intensity *As the ratio between energy crop cultivation intensity of the pilot and the national*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	0.27	0	1
0.27	0.53	1	2
0.53	0.80	2	3
0.80	1.20	3	4
1.20	2.00	4	5

Vulnerability normalization tables

Agricultural income *as percentage (%) of the region's agricultural income to the national average agricultural income*

Original scale		Normalised scale	
Lower end	Higher end	Lower end	Higher end
0	40	0	1
40	80	1	2
80	120	2	3
120	160	3	4
160	200	4	5

Water exploitation *as the ratio of water use to total water resources*			
Original scale		Normalised scale	
Lower end	Higher end	Lower end	Higher end
0	20	0	1
20	40	1	2
40	60	2	3
60	80	3	4
80	100	4	5

Agricultural water consumption *as the percentage (%) of water use in agriculture*			
Original scale		Normalised scale	
Lower end	Higher end	Lower end	Higher end
0	20	0	1
20	40	1	2
40	60	2	3
60	80	3	4
80	100	4	5

Energy import dependency *as the percentage (%) of net imports to gross inland energy consumption*			
Original scale		Normalised scale	
Lower end	Higher end	Lower end	Higher end
0	20	0	1
20	40	1	2
40	60	2	3
60	80	3	4
80	100	4	5

Renewable energy share *as the percentage (%) of renewable energy use in the gross final energy consumption*			
Original scale		Normalised scale	
Lower end	Higher end	Lower end	Higher end
0	20	0	1
20	40	1	2
40	60	2	3

60	80	3	4
80	100	4	5

Lower-Danube pilot

Hazard normalization tables

Frost *as the sum of the days when the minimum daily temperature is below 0°C*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	30	0	1
30	60	1	2
60	91	2	3
91	121	3	4
121	151	4	5

Heat stress 25 *as the sum of the days where the maximum daily temperature is above 25 °C*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	30	0	1
30	60	1	2
60	91	2	3
91	121	3	4
121	151	4	5

Heat stress 30 *as the sum of the days where the maximum daily temperature is above 30 °C*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	19	0	1
19	38	1	2
38	58	2	3
58	77	3	4
77	96	4	5

Aridity *as ratio between actual evapotranspiration and precipitation*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	1.00	0	1
1.00	1.53	1	2
1.53	2.00	2	3

2.00	5.00	3	4
5.00	20.00	4	5

Growing Degree Days *as cumulative temperature degrees °C*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	20	0	-1
20	40	-1	-2
40	60	-2	-3
60	80	-3	-4
80	100	-4	-5

Flood recurrence *as relative change (%) on the return value of annual maximum river discharge*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
-100	-40	-5	-3
-40	-10	-3	-1
-10	10	-1	1
10	40	1	3
40	100	3	5

Mean runoff *as relative change (%) on surface and subsurface runoff to streams*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
-100	-20	5	3
-20	-5	3	1
-5	5	1	-1
5	20	-1	-3
20	100	-3	-5

Hydropower generation *as relative change (%)*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
-100	-20	5	3
-20	-5	3	1
-5	5	1	-1
5	20	-1	-3
20	100	-3	-5

Solar photovoltaic power generation *as relative change (%)*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
-1.00	-0.40	5	3
-0.40	-0.10	3	1
-0.10	0.10	1	-1
0.10	0.40	-1	-3
0.40	1.00	-3	-5

Wind power generation *as relative change (%)*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
-1.00	-0.40	5	3
-0.40	-0.10	3	1
-0.10	0.10	1	-1
0.10	0.40	-1	-3
0.40	1.00	-3	-5

Exposure normalization tables

Share of main crops *as percentage (%) of the area cultivated with the main crops to the total municipality area*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	0.10	0	1
0.10	0.20	1	2
0.20	0.40	2	3
0.40	0.60	3	4
0.60	1.00	4	5

Renewable energy intensity *As the ratio between renewable energy intensity of the pilot and the national*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	0.27	0	1
0.27	0.53	1	2
0.53	0.80	2	3
0.80	1.20	3	4
1.20	2.00	4	5

Energy crop cultivation intensity

As the ratio between energy crop cultivation intensity of the pilot and the national			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	0.27	0	1
0.27	0.53	1	2
0.53	0.80	2	3
0.80	1.20	3	4
1.20	2.00	4	5

Vulnerability normalization tables

Agricultural income *as percentage (%) of the region's agricultural income to the national average agricultural income*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	0.40	0	1
0.40	0.80	1	2
0.80	1.20	2	3
1.20	1.60	3	4
1.60	2.00	4	5

Water exploitation *as the ratio of water use to total water resources*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	20	0	1
20	40	1	2
40	60	2	3
60	80	3	4
80	100	4	5

Agricultural water consumption *as the percentage (%) of water use in agriculture*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	20	0	1
20	40	1	2
40	60	2	3
60	80	3	4
80	100	4	5

Energy import dependency *as the percentage (%) of net imports to gross inland energy consumption*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**

0	20	0	1
20	40	1	2
40	60	2	3
60	80	3	4
80	100	4	5

Renewable energy share *as the percentage (%) of renewable energy use in the gross final energy consumption*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	20	0	1
20	40	1	2
40	60	2	3
60	80	3	4
80	100	4	5

Qualitative risk analysis table – Water system

Country	**Administrative units**	**Hazard**		**Vulnerability**	**Risk**	
		4.5	**8.5**		**4.5**	**8.5**
Romania-Counties	Teleorman	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Olt	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Dolj	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Mehedinti	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Caras-Severin	Low	Low-Medium	Medium	Low-Medium	Low-Medium
Serbia	Kladovo	Low-Medium	Low-Medium	Low-Medium	Low-Medium	Low-Medium
	Negotin	Low-Medium	Low	Low-Medium	Low-Medium	Low-Medium
Bulgaria	Летница	Low	Low	Low	Low	Low
	Бойчиновци	Low	Low	Low	Low	Low
	Брусарци	Low-Medium	Low-Medium	Low	Low	Low-Medium
	Вълчедръм	Low	Low-Medium	Low	Low	Low
	Лом	Low	Low-Medium	Low	Low	Low-Medium
	Медковец	Low	Low-Medium	Low	Low	Low-Medium
	Монтана	Low-Medium	Low-Medium	Low	Low	Low

	Якимово	Low	Low-Medium	Low	Low	Low-Medium
	Белене	Low-Medium	Low-Medium	Low	Low	Low
	Гулянци	Low-Medium	Low-Medium	Low	Low	Low-Medium
	Долна Митрополия	Low-Medium	Low-Medium	Low	Low	Low-Medium
	Долни Дъбник	Low	Low-Medium	Low	Low	Low
	Левски	Low	Low	Low	Low	Low
	Никопол	Low	Low-Medium	Low	Low	Low
	Искър	Low	Low-Medium	Low	Low	Low
	Плевен	Low	Low-Medium	Low	Low	Low
	Пордим	Low	Low	Low	Low	Low
	Червен бряг	Low	Low	Low	Low	Low
	Кнежа	Low	Low-Medium	Low	Low	Low
	Белоградчик	Low-Medium	Low-Medium	Low	Low	Low
	Брегово	Low-Medium	Low-Medium	Low	Low	Low
	Видин	Low-Medium	Low-Medium	Low	Low	Low
	Грамада	Low-Medium	Low-Medium	Low	Low	Low
	Димово	Low-Medium	Low-Medium	Low	Low	Low-Medium
	Макреш	Low-Medium	Low-Medium	Low	Low	Low
	Ново село	Low	Low-Medium	Low	Low	Low
	Ружинци	Low-Medium	Low-Medium	Low	Low	Low-Medium
	Чупрене	Low	Low-Medium	Low	Low	Low
	Бяла Слатина	Low	Low	Low	Low	Low
	Козлодуй	Low	Low-Medium	Low	Low	Low
	Мизия	Low	Low-Medium	Low	Low	Low
	Оряхово	Low-Medium	Low-Medium	Low	Low	Low-Medium
	Хайредин	Low	Low	Low	Low	Low
	Свищов	Low	Low	Low	Low	Low

Romania-Communes	Municipiul Caracal	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Drăghiceni	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Oraş Corabia	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Gârcov	Low	Low	Medium	Low	Low
	Oraş Drăgăneşti-Olt	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Băbiciu	Low	Low	Medium	Low	Low
	Municipiul Drobeta-Turnu Severin	Low	Low	Medium	Low	Low
	Şimian	Low	Low-Medium	Medium	Low	Low-Medium
	Municipiul Orşova	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Oraş Vânju Mare	Low-Medium	Low	Medium	Low-Medium	Low-Medium
	Balta	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Bălăciţa	Low-Medium	Low	Medium	Low-Medium	Low
	Brastavăţu	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Bucinişu	Low-Medium	Low	Medium	Low-Medium	Low-Medium
	Cezieni	Low	Low	Medium	Low	Low
	Cilieni	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Dăneasa	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Deveselu	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Dobrosloveni	Low	Low	Medium	Low	Low
	Bâcleş	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Bâlvăneşti	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Brezniţa-Ocol	Low	Low-Medium	Medium	Low	Low-Medium
	Broşteni	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Burila Mare	Low	Low	Medium	Low	Low
	Căzăneşti	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Cireşu	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium

	Corcova	Low-Medium	Low	Medium	Low-Medium	Low
	Corlăţel	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Cujmir	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Devesel	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Dârvari	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Dumbrava	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Floreşti	Low-Medium	Low	Medium	Low-Medium	Low
	Gârla Mare	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Godeanu	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Gogoşu	Low	Low	Medium	Low	Low
	Fărcaşele	Low	Low	Medium	Low	Low
	Giuvărăşti	Low-Medium	Low	Medium	Low-Medium	Low-Medium
	Gostavăţu	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Grojdibodu	Low	Low	Medium	Low-Medium	Low
	Ianca	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Izbiceni	Low-Medium	Low	Medium	Low-Medium	Low
	Mihăeşti	Low	Low	Medium	Low	Low
	Obârşia	Low	Low	Medium	Low-Medium	Low
	Greci	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Gruia	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Hinova	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Husnicioara	Low	Low	Medium	Low-Medium	Low
	Eşelniţa	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Ilovăţ	Low	Low	Medium	Low-Medium	Low
	Iloviţa	Low	Low	Medium	Low	Low
	Izvoru Bârzii	Low	Low	Medium	Low	Low

	Jiana	Low	Low	Medium	Low	Low-Medium
	Livezile	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Malovăţ	Low	Low-Medium	Medium	Low	Low-Medium
	Obârşia de Câmp	Low	Low	Medium	Low	Low-Medium
	Oprişor	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Pădina	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Pătulele	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Podeni	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Orlea	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Radomireşti	Low-Medium	Medium	Medium	Low-Medium	Medium
	Redea	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Rotunda	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Rusăneşti	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Scărişoara	Low	Low-Medium	Medium	Low	Low-Medium
	Poroina Mare	Low	Low-Medium	Medium	Low	Low-Medium
	Pristol	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Prunişor	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Punghina	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Rogova	Low	Low-Medium	Medium	Low	Low-Medium
	Salcia	Low	Low-Medium	Medium	Low	Low-Medium
	Şişeşti	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Şovarna	Low	Low-Medium	Medium	Low	Low-Medium
	Tâmna	Low-Medium	Medium	Medium	Low-Medium	Medium
	Vânători	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium

	Vânjuleţ	Low	Low-Medium	Medium	Low	Low-Medium
	Vlădaia	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Voloiac	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Braniştea	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Vrata	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Sprâncenata	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Stoeneşti	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Studina	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Ştefan cel Mare	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Tia Mare	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Traian	Low	Low-Medium	Medium	Low	Low-Medium
	Urzica	Low-Medium	Medium	Medium	Low-Medium	Medium
	Vădastra	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Vădăstriţa	Low-Medium	Medium	Medium	Low-Medium	Medium
	Vişina	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Vlădila	Low	Low-Medium	Medium	Low	Low-Medium
	Grădinile	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Gura Padinii	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Vişina Nouă	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Municipiul Craiova	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Bucovăţ	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Podari	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Municipiul Băileşti	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Municipiul Calafat	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium

	Oraş Şegarcea	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Afumaţi	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Amărăştii de Jos	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Amărăştii de Sus	Low	Low	Medium	Low	Low
	Apele Vii	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Oraş Bechet	Low	Low-Medium	Medium	Low	Low-Medium
	Bistret	Low	Low-Medium	Medium	Low	Low-Medium
	Bîrca	Low	Low	Medium	Low	Low-Medium
	Botoşeşti-Paia	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Brabova	Low	Low-Medium	Medium	Low	Low-Medium
	Bratovoeşti	Low	Low-Medium	Medium	Low	Low-Medium
	Breasta	Low	Low-Medium	Medium	Low	Low-Medium
	Calopăr	Low	Low-Medium	Medium	Low	Low-Medium
	Caraula	Low	Low-Medium	Medium	Low	Low-Medium
	Carpen	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Castranova	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Călăraşi	Low	Low	Medium	Low	Low
	Celaru	Low	Low	Medium	Low	Low-Medium
	Cerăt	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Cetate	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Cioroiaşi	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Ciupercenii Noi	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Coşoveni	Low	Low-Medium	Medium	Low	Low-Medium
	Daneţi	Low	Low	Medium	Low-Medium	Low-Medium
	Oraş Dăbuleni	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium

	Desa	Low	Low-Medium	Medium	Low	Low-Medium
	Dioşti	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Dobreşti	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Drănic	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Galicea Mare	Low	Low-Medium	Medium	Low	Low-Medium
	Gighera	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Giubega	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Giurgiţa	Low	Low-Medium	Medium	Low	Low-Medium
	Gângiova	Low	Low	Medium	Low	Low-Medium
	Gogoşu	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Goicea	Low	Low-Medium	Medium	Low	Low-Medium
	Greceşti	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Izvoare	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Leu	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Lipovu	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Măceşu de Jos	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Măceşu de Sus	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Maglavit	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Malu Mare	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Mârşani	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Moţăţei	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Negoi	Low	Low-Medium	Medium	Low	Low-Medium
	Orodel	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Ostroveni	Low	Low-Medium	Medium	Low-Medium	Low-Medium

	Perişor	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Piscu Vechi	Low	Low-Medium	Medium	Low	Low-Medium
	Pleniţa	Low	Low-Medium	Medium	Low	Low-Medium
	Poiana Mare	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Predeşti	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Radovan	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Rast	Low	Low-Medium	Medium	Low	Low-Medium
	Sadova	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Sălcuţa	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Seaca de Câmp	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Seaca de Pădure	Low	Low	Medium	Low-Medium	Low
	Siliştea Crucii	Low	Low-Medium	Medium	Low	Low-Medium
	Sopot	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Teasc	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Terpeziţa	Low	Low	Medium	Low	Low
	Teslui	Low	Low	Medium	Low	Low-Medium
	Ţuglui	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Unirea	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Urzicuţa	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Valea Stanciului	Low-Medium	Low	Medium	Low-Medium	Low-Medium
	Vela	Low	Low	Medium	Low	Low
	Verbiţa	Low	Low	Medium	Low-Medium	Low
	Vârtop	Low	Low-Medium	Medium	Low	Low-Medium
	Vârvoru de Jos	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Catane	Low	Low	Medium	Low	Low-Medium

	Cârcea	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Cârna	Low-Medium	Low	Medium	Low-Medium	Low
	Dobroteşti	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Galiciuica	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Ghidici	Low-Medium	Low	Medium	Low-Medium	Low-Medium
	Ghindeni	Low	Low-Medium	Medium	Low	Low-Medium
	Întorsura	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Plesoi	Low	Low	Medium	Low	Low
	Rojişte	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Mehadia	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Topleţ	Low-Medium	Low	Medium	Low-Medium	Low-Medium
	Municipiul Turnu Măgurele	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Ciuperceni	Low-Medium	Low	Medium	Low-Medium	Low
	Islaz	Low	Low	Medium	Low-Medium	Low-Medium
	Lita	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Municipiul Alexandria	Low	Low	Medium	Low	Low
	Nanov	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Poroschia	Low	Low	Medium	Low	Low
	Municipiul Roşiori de Vede	Low-Medium	Low	Medium	Low-Medium	Low
	Oraş Zimnicea	Low	Low	Medium	Low-Medium	Low
	Bogdana	Low	Low	Medium	Low-Medium	Low
	Bragadiru	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Brânceni	Low	Low-Medium	Medium	Low	Low-Medium
	Bujoru	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Buzescu	Low	Low-Medium	Medium	Low-Medium	Low-Medium

	Călmăţuiu	Low-Medium	Low	Medium	Low-Medium	Low-Medium
	Călmăţuiu de Sus	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Cervenia	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Conţeşti	Low	Low	Medium	Low	Low
	Crângeni	Low	Low-Medium	Medium	Low	Low-Medium
	Crângu	Low-Medium	Low	Medium	Low-Medium	Low
	Furculeşti	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Frumoasa	Low	Low	Medium	Low-Medium	Low-Medium
	Izvoarele	Low-Medium	Medium	Medium	Low-Medium	Medium
	Lisa	Low	Low-Medium	Medium	Low	Low-Medium
	Lunca	Low	Low	Medium	Low-Medium	Low
	Mavrodin	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Măldăeni	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Mârzăneşti	Low	Low	Medium	Low-Medium	Low
	Năsturelu	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Peretu	Low	Low	Medium	Low	Low
	Piatra	Low-Medium	Low	Medium	Low-Medium	Low
	Plosca	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Plopii-Slăviteşti	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Putineiu	Low	Low	Medium	Low-Medium	Low
	Salcia	Low	Low	Medium	Low	Low
	Seaca	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Segarcea-Vale	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Slobozia Mândra	Low-Medium	Low	Medium	Low-Medium	Low-Medium
	Smârdioasa	Low	Low-Medium	Medium	Low	Low-Medium
	Suhaia	Low	Low	Medium	Low	Low

	Ştorobăneasa	Low	Low	Medium	Low	Low
	Traian	Low	Low	Medium	Low-Medium	Low
	Troianul	Low	Low	Medium	Low	Low-Medium
	Ţigăneşti	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Vedea	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Viişoara	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Nenciulesti	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Beciu	Low-Medium	Low	Medium	Low-Medium	Low
	Dracea	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Fântânele	Low	Low-Medium	Medium	Low-Medium	Low-Medium
	Saelele	Low-Medium	Low	Medium	Low-Medium	Low
	Uda-Clocociov	Low	Low	Medium	Low-Medium	Low-Medium
	Oraş Băile Herculane	Low	Low-Medium	Medium	Low-Medium	Low-Medium

Qualitative risk analysis table – Food system

Country	**Administrative units**	**Hazard**		**Exposure**	**Vulnerability**	**Risk**	
		4.5	**8.5**			**4.5**	**8.5**
Romania-Counties	Teleorman	Low-Medium	Low-Medium	High	Medium-High	Low-Medium	Medium
	Olt	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Dolj	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Mehedinti	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Low-Medium
	Caras-Severin	Low-Medium	Low-Medium	Medium	Medium	Low	Low

Serbia	Kladovo	Low-Medium	Low-Medium	Low	Low-Medium	Low-Medium	Low-Medium
	Negotin	Low-Medium	Low	Low-Medium	Low-Medium	Low-Medium	Low-Medium
Bulgaria	Летница	Low	Low-Medium	Medium-High	Low-Medium	Low-Medium	Low-Medium
	Бойчиновци	Low-Medium	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
	Брусарци	Low-Medium	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
	Вълчедръм	Low-Medium	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
	Лом	Low-Medium	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
	Медковец	Low-Medium	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
	Монтана	Low-Medium	Low-Medium	Medium-High	Low-Medium	Low-Medium	Low-Medium
	Якимово	Low-Medium	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
	Белене	Low-Medium	Low-Medium	Medium-High	Low-Medium	Low-Medium	Low-Medium
	Гулянци	Low-Medium	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
	Долна Митрополия	Low-Medium	Low-Medium	High	Low-Medium	Low-Medium	Medium
	Долни Дъбник	Low-Medium	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
	Левски	Low-Medium	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
	Никопол	Low-Medium	Low-Medium	Medium-High	Low-Medium	Low-Medium	Low-Medium

	Искър	Low-Medium	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
	Плевен	Low-Medium	Low-Medium	Medium-High	Low-Medium	Low-Medium	Low-Medium
	Пордим	Low	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
	Червен бряг	Low	Low-Medium	Medium-High	Low-Medium	Low-Medium	Low-Medium
	Кнежа	Low-Medium	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
	Белоградчик	Low-Medium	Low-Medium	Low-Medium	Low-Medium	Low-Medium	Low-Medium
	Брегово	Low-Medium	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
	Видин	Low-Medium	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
	Грамада	Low-Medium	Low-Medium	Medium-High	Low-Medium	Low-Medium	Low-Medium
	Димово	Low-Medium	Low-Medium	Medium-High	Low-Medium	Low-Medium	Low-Medium
	Макреш	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium	Low-Medium
	Ново село	Low-Medium	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
	Ружинци	Low-Medium	Low-Medium	Medium-High	Low-Medium	Low-Medium	Low-Medium
	Чупрене	Low-Medium	Low-Medium	Low-Medium	Low-Medium	Low-Medium	Low-Medium
	Бяла Слатина	Low	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
	Козлодуй	Low-Medium	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium

	Мизия	Low-Medium	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
	Оряхово	Low-Medium	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
	Хайредин	Low	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
	Свищов	Low-Medium	Low-Medium	High	Low-Medium	Low-Medium	Low-Medium
Romania-Communes	Municipiul Caracal	Low-Medium	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Drăghiceni	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Low-Medium
	Oraş Corabia	Low-Medium	Low-Medium	Low	Medium	Low	Low
	Gârcov	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Oraş Drăgăneşti-Olt	Low-Medium	Low-Medium	Low	Medium	Low	Low
	Băbiciu	Low	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Municipiul Drobeta-Turnu Severin	Low	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Şimian	Low-Medium	Low-Medium	Low	Medium	Low	Low
	Municipiul Orşova	Low-Medium	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Oraş Vânju Mare	Low-Medium	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Balta	Low-Medium	Low-Medium	Medium-High	Medium	Medium	Medium
	Bălăciţa	Low-Medium	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Brastavăţu	Low-Medium	Low-Medium	Low	Medium	Low	Low
	Bucinişu	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Low-Medium
	Cezieni	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium

	Cilieni	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Dăneasa	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Deveselu	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Dobrosloveni	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Bâcleş	Low-Medium	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Bâlvăneşti	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Brezniţa-Ocol	Low-Medium	Low-Medium	Low	Medium	Low	Low
	Broşteni	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Burila Mare	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Low-Medium
	Căzăneşti	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Cireşu	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Low-Medium
	Corcova	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Low-Medium
	Corlăţel	Low-Medium	Low-Medium	Low	Medium	Low	Low
	Cujmir	Low-Medium	Low-Medium	Low	Medium	Low-Medium	Low-Medium
	Devesel	Low-Medium	Low-Medium	Low	Medium	Low	Low
	Dârvari	Low-Medium	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Dumbrava	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Floreşti	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium

	Gârla Mare	Low-Medium	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Godeanu	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Gogoşu	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Fărcaşele	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Giuvărăşti	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Gostavăţu	Low-Medium	Low-Medium	Low	Medium	Low	Low
	Grojdibodu	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Ianca	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Izbiceni	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Low-Medium
	Mihăeşti	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Obârşia	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Greci	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Gruia	Low-Medium	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Hinova	Low-Medium	Low-Medium	Low	Medium	Low-Medium	Low-Medium
	Husnicioara	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Low-Medium
	Eşelniţa	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium

	Ilovăţ	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Iloviţa	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Izvoru Bârzii	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Low-Medium
	Jiana	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Livezile	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Malovăţ	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Obârşia de Câmp	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Oprişor	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Pădina	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Medium
	Pătulele	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Medium
	Podeni	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Orlea	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Radomireşti	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Redea	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Rotunda	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Rusăneşti	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Medium
	Scărişoara	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium

	Poroina Mare	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Pristol	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Medium
	Prunişor	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Medium
	Punghina	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Rogova	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Salcia	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Şişeşti	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Medium
	Şovarna	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Tâmna	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Vânători	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Vânjuleţ	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Vlădaia	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Voloiac	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Braniştea	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Vrata	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Sprâncenata	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Stoeneşti	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium

	Studina	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Ştefan cel Mare	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Tia Mare	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Traian	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Urzica	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Vădastra	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Vădăstriţa	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Vişina	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Vlădila	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Grădinile	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Gura Padinii	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Vişina Nouă	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Municipiul Craiova	Low-Medium	Low-Medium	Medium-High	Medium-High	Medium	Medium
	Bucovăţ	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Podari	Low-Medium	Low-Medium	Medium-High	Medium-High	Low-Medium	Medium
	Municipiul Băileşti	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Municipiul Calafat	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Oraş Şegarcea	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Afumaţi	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Amărăştii de Jos	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium

	Amărăştii de Sus	Low-Medium	Low-Medium	High	Medium-High	Low-Medium	Medium
	Apele Vii	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Oraş Bechet	Low-Medium	Low-Medium	High	Medium-High	Low-Medium	Medium
	Bistret	Low-Medium	Low-Medium	High	Medium-High	Low-Medium	Medium
	Bîrca	Low-Medium	Low-Medium	High	Medium-High	Low-Medium	Medium
	Botoşeşti-Paia	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Brabova	Low-Medium	Low-Medium	High	Medium-High	Low-Medium	Medium
	Bratovoeşti	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Breasta	Low-Medium	Low-Medium	Medium-High	Medium-High	Low-Medium	Medium
	Calopăr	Low-Medium	Low-Medium	High	Medium-High	Low-Medium	Medium
	Caraula	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Carpen	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Castranova	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Călăraşi	Low-Medium	Low-Medium	High	Medium-High	Low-Medium	Medium
	Celaru	Low-Medium	Low-Medium	Medium-High	Medium-High	Low-Medium	Medium
	Cerăt	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Cetate	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Cioroiaşi	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Ciupercenii Noi	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium

	Coşoveni	Low-Medium	Low-Medium	High	Medium-High	Low-Medium	Medium
	Daneţi	Low-Medium	Low-Medium	High	Medium-High	Low-Medium	Medium
	Oraş Dăbuleni	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Desa	Low-Medium	Low-Medium	High	Medium-High	Low-Medium	Medium
	Dioşti	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Dobreşti	Low-Medium	Low-Medium	Medium-High	Medium-High	Low-Medium	Medium
	Drănic	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Galicea Mare	Low-Medium	Low-Medium	High	Medium-High	Low-Medium	Medium
	Gighera	Low-Medium	Low-Medium	High	Medium-High	Low-Medium	Medium
	Giubega	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Giurgiţa	Low-Medium	Low-Medium	High	Medium-High	Low-Medium	Medium
	Gângiova	Low-Medium	Low-Medium	High	Medium-High	Low-Medium	Medium
	Gogoşu	Low-Medium	Low-Medium	Medium-High	Medium-High	Low-Medium	Medium
	Goicea	Low-Medium	Low-Medium	High	Medium-High	Low-Medium	Medium
	Greceşti	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Izvoare	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Leu	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Lipovu	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium

	Măceşu de Jos	Low-Medium	Low-Medium	High	Medium-High	Low-Medium	Medium
	Măceşu de Sus	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Maglavit	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Malu Mare	Low-Medium	Low-Medium	High	Medium-High	Medium	Medium
	Mârşani	Low-Medium	Low-Medium	Medium-High	Medium-High	Low-Medium	Medium
	Moţăţei	Low-Medium	Low-Medium	High	Medium-High	Low-Medium	Medium
	Negoi	Low-Medium	Low-Medium	High	Medium-High	Low-Medium	Medium
	Orodel	Low-Medium	Low-Medium	Low	Medium	Low	Low
	Ostroveni	Low-Medium	Low-Medium	Low	Medium	Low	Low
	Perişor	Low-Medium	Low-Medium	Low	Medium	Low-Medium	Low-Medium
	Piscu Vechi	Low-Medium	Low-Medium	Low-Medium	Medium	Low-Medium	Low-Medium
	Pleniţa	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Low-Medium
	Poiana Mare	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Medium
	Predeşti	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Radovan	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Medium
	Rast	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Sadova	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Sălcuţa	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Seaca de Câmp	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium

	Seaca de Pădure	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Siliştea Crucii	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Sopot	Low-Medium	Low-Medium	Medium-High	Medium	Medium	Low-Medium
	Teasc	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Terpeziţa	Low	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Teslui	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Ţuglui	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Unirea	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Medium
	Urzicuţa	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Medium
	Valea Stanciului	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Vela	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Verbiţa	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Vârtop	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Vârvoru de Jos	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Catane	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Cârcea	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium

	Cârna	Low-Medium	Low-Medium	High	Medium	Medium	Low-Medium
	Dobroteşti	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Galiciuica	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Ghidici	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Ghindeni	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Întorsura	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Low-Medium
	Plesoi	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Rojişte	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Medium
	Mehadia	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Topleţ	Low-Medium	Low-Medium	High	Medium	Medium	Low-Medium
	Municipiul Turnu Măgurele	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Ciuperceni	Low-Medium	Low-Medium	High	Medium	Medium	Low-Medium
	Islaz	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Lita	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Municipiul Alexandria	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Nanov	Low-Medium	Low-Medium	High	Medium	Medium	Medium

	Poroschia	Low	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Municipiul Roşiori de Vede	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Oraş Zimnicea	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Bogdana	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Bragadiru	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Brânceni	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Bujoru	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Buzescu	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Medium
	Călmăţuiu	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Călmăţuiu de Sus	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Cervenia	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Conţeşti	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Crângeni	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Crângu	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Furculeşti	Low-Medium	Low-Medium	Medium	Medium	Low-Medium	Low-Medium
	Frumoasa	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium

	Izvoarele	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Medium
	Lisa	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Lunca	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Mavrodin	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Măldăeni	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Mârzăneşti	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Năsturelu	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Peretu	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Piatra	Low-Medium	Low-Medium	High	Medium	Medium	Low-Medium
	Plosca	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Plopii-Slăviteşti	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Putineiu	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Salcia	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Seaca	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Segarcea-Vale	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Slobozia Mândra	Low-Medium	Low-Medium	High	Medium	Medium	Medium
	Smârdioasa	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium

	Suhaia	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Ştorobăneasa	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Traian	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Troianul	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Low-Medium
	Ţigăneşti	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Vedea	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Viişoara	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Medium
	Nenciulesti	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Beciu	Low-Medium	Low-Medium	High	Medium	Medium	Low-Medium
	Dracea	Low-Medium	Low-Medium	Medium-High	Medium	Low-Medium	Medium
	Fântânele	Low-Medium	Low-Medium	High	Medium	Low-Medium	Medium
	Saelele	Low-Medium	Low-Medium	High	Medium	Medium	Low-Medium
	Uda-Clocociov	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium
	Oraş Băile Herculane	Low-Medium	Low-Medium	High	Medium	Low-Medium	Low-Medium

Spain peninsular pilot

Hazard normalization tables

Frost *as the sum of the days when the minimum daily temperature is below 0°C*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	30	0	1
30	60	1	2
60	91	2	3
91	121	3	4
121	151	4	5

Heat stress 25 *as the sum of the days where the maximum daily temperature is above 25 °C*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	30	0	1
30	60	1	2
60	91	2	3
91	121	3	4
121	151	4	5

Heat stress 32 *as the sum of the days where the maximum daily temperature is above 32 °C*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	18	0	1
18	36	1	2
36	54	2	3
54	72	3	4
72	90	4	5

Aridity *as ratio between actual evapotranspiration and precipitation*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	1.00	0	1
1.00	1.53	1	2
1.53	2.00	2	3
2.00	5.00	3	4
5.00	20.00	4	5

Growing Degree Days *as cumulative temperature degrees °C*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	20	0	-1
20	40	-1	-2
40	60	-2	-3
60	80	-3	-4
80	100	-4	-5

Flood recurrence *as relative change (%) on the return value of annual maximum river discharge*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
-100	-40	-5	-3
-40	-10	-3	-1
-10	10	-1	1
10	40	1	3
40	100	3	5

Mean runoff *as relative change (%) on surface and subsurface runoff to streams*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
-100	-20	5	3
-20	-5	3	1
-5	5	1	-1
5	20	-1	-3
20	100	-3	-5

Hydropower generation *as relative change (%)*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
-100	-20	5	3
-20	-5	3	1
-5	5	1	-1
5	20	-1	-3
20	100	-3	-5

Solar photovoltaic power generation *as relative change (%)*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
-1.00	-0.40	5	3

-0.40	-0.10	3	1
-0.10	0.10	1	-1
0.10	0.40	-1	-3
0.40	1.00	-3	-5

Wind power generation *as relative change (%)*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
-1.00	-0.40	5	3
-0.40	-0.10	3	1
-0.10	0.10	1	-1
0.10	0.40	-1	-3
0.40	1.00	-3	-5

Exposure normalization tables

Share of main crops *as percentage (%) of the area cultivated with the main crops to the total municipality area*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	0.10	0	1
0.10	0.20	1	2
0.20	0.40	2	3
0.40	0.60	3	4
0.60	1.00	4	5

Renewable energy intensity *As the ratio between renewable energy intensity of the pilot and the national*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	0.27	0	1
0.27	0.53	1	2
0.53	0.80	2	3
0.80	1.20	3	4
1.20	2.00	4	5

Energy crop cultivation intensity *As the ratio between energy crop cultivation intensity of the pilot and the national*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	0.27	0	1
0.27	0.53	1	2
0.53	0.80	2	3
0.80	1.20	3	4

1.20	2.00	4	5

Vulnerability normalization tables

Agricultural income *as percentage (%) of the region's agricultural income to the national average agricultural income*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	0.40	0	1
0.40	0.80	1	2
0.80	1.20	2	3
1.20	1.60	3	4
1.60	2.00	4	5

Water exploitation *as the ratio of water use to total water resources*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	20	0	1
20	40	1	2
40	60	2	3
60	80	3	4
80	100	4	5

Agricultural water consumption *as the percentage (%) of water use in agriculture*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	20	0	1
20	40	1	2
40	60	2	3
60	80	3	4
80	100	4	5

Energy import dependency *as the percentage (%) of net imports to gross inland energy consumption*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	20	0	1
20	40	1	2
40	60	2	3
60	80	3	4
80	100	4	5

Renewable energy share *as the percentage (%) of renewable energy use in the gross final energy consumption*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	20	0	1
20	40	1	2
40	60	2	3
60	80	3	4
80	100	4	5

Isonzo-Soča pilot

Hazard normalization tables

Frost *as the sum of the days when the minimum daily temperature is below 0°C*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	30	0	1
30	60	1	2
60	91	2	3
91	121	3	4
121	151	4	5

Heat stress 30 *as the sum of the days where the maximum daily temperature is above 30 °C*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	19	0	1
19	38	1	2
38	58	2	3
58	77	3	4
77	96	4	5

Heat stress 33 *as the sum of the days where the maximum daily temperature is above 33 °C*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	4	0	1
4	9	1	2
9	13	2	3
13	18	3	4
18	22	4	5

Growing Degree Days *as cumulative temperature degrees °C*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	20	0	-1
20	40	-1	-2
40	60	-2	-3
60	80	-3	-4
80	100	-4	-5

Aridity *as ratio between actual evapotranspiration and precipitation*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	1.00	0	1
1.00	1.53	1	2
1.53	2.00	2	3
2.00	5.00	3	4
5.00	20.00	4	5

Heavy precipitation *as the sum of days when the total daily precipitation is above 30mm*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.0	0.6	0	-1
0.6	1.2	-1	-2
1.2	1.7	-2	-3
1.7	2.3	-3	-4
2.3	2.9	-4	-5

Hydropower generation *as relative change (%)*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
-100	-20	5	3
-20	-5	3	1
-5	5	1	-1
5	20	-1	-3
20	100	-3	-5

Solar photovoltaic power generation *as relative change (%)*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**

-1.00	-0.40	5	3
-0.40	-0.10	3	1
-0.10	0.10	1	-1
0.10	0.40	-1	-3
0.40	1.00	-3	-5

Wind power generation *as relative change (%)*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
-1.00	-0.40	5	3
-0.40	-0.10	3	1
-0.10	0.10	1	-1
0.10	0.40	-1	-3
0.40	1.00	-3	-5

Exposure normalization tables

Share of main crops *as percentage (%) of the area cultivated with the main crops to the total municipality area*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	0.10	0	1
0.10	0.20	1	2
0.20	0.40	2	3
0.40	0.60	3	4
0.60	1.00	4	5

Renewable energy intensity *As the ratio between renewable energy intensity of the pilot and the national*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	0.27	0	1
0.27	0.53	1	2
0.53	0.80	2	3
0.80	1.20	3	4
1.20	2.00	4	5

Energy crop cultivation intensity *As the ratio between energy crop cultivation intensity of the pilot and the national*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	0.27	0	1
0.27	0.53	1	2
0.53	0.80	2	3

0.80	1.20	3	4
1.20	2.00	4	5

Vulnerability normalization tables

Agricultural income *as percentage (%) of the region's agricultural income to the national average agricultural income*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	0.40	0	1
0.40	0.80	1	2
0.80	1.20	2	3
1.20	1.60	3	4
1.60	2.00	4	5

Water exploitation *as the ratio of water use to total water resources*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	20	0	1
20	40	1	2
40	60	2	3
60	80	3	4
80	100	4	5

Agricultural water consumption *as the percentage (%) of water use in agriculture*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	20	0	1
20	40	1	2
40	60	2	3
60	80	3	4
80	100	4	5

Energy import dependency *as the percentage (%) of net imports to gross inland energy consumption*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	20	0	1
20	40	1	2
40	60	2	3
60	80	3	4
80	100	4	5

Renewable energy share *as the percentage (%) of renewable energy use in the gross final energy consumption*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	20	0	1
20	40	1	2
40	60	2	3
60	80	3	4
80	100	4	5

Nima pilot

Hazard normalization tables

Heavy precipitation *as the sum of days when the total daily precipitation is above 30mm*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.0	0.6	0	-1
0.6	1.2	-1	-2
1.2	1.7	-2	-3
1.7	2.3	-3	-4
2.3	2.9	-4	-5

Growing Degree Days *as cumulative temperature degrees °C*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0	20	0	-1
20	40	-1	-2
40	60	-2	-3
60	80	-3	-4
80	100	-4	-5

Exposure normalization tables

Share of main crops *as percentage (%) of the area cultivated with the main crops to the total municipality area*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	0.10	0	1
0.10	0.20	1	2
0.20	0.40	2	3
0.40	0.60	3	4
0.60	1.00	4	5

Vulnerability normalization tables

Agricultural income *as percentage (%) of the region's agricultural income to the national average agricultural income*			
Original scale		**Normalised scale**	
Lower end	**Higher end**	**Lower end**	**Higher end**
0.00	0.40	0	1
0.40	0.80	1	2
0.80	1.20	2	3
1.20	1.60	3	4
1.60	2.00	4	5