Ref. Ares(2023)5935923 - 31/08/2023

D1.2- Map and report of key climate-change hazards

DATE OF DELIVERY - 31/08/2022

AUTHOR(S):
Emilio Laíño Rebollido (UCC)
Gregorio Iglesias (UCC)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003534

DOCUMENT TRACKS DETAILS

Project acronym	SCORE
Project title	Smart Control of the Climate Resilience in European Coastal Cities
Starting date	01.07.2021
Duration	48 months
Call identifier	H2020-LC-CLA-2020-2
Grant Agreement No	101003534

Deliverable Information	
Deliverable number	D1.2
Work package number	WP1
Deliverable title	Map and report of key climate-change hazards
Lead beneficiary	UCC
Author(s)	Emilio Laíño Rebollido (UCC), Gregorio Iglesias (UCC)
Contributing partners	ITS, UCD, RED, TERO, TUKE, UA, NAIDER, UG, OAR, OEIRAS, SAMU, ZRS, ENT, PGC and ISTID
Due date	31/08/2022
Actual submission date	31/08/2022
Type of deliverable	Report
Dissemination level	Public

VERSION MANAGEMENT

Revision table			
Version	Name	Date	Description
V 0.1	Emilio Laíño Rebollido (UCC)	06/05/2022	First draft
V 0.2	Gregorio Iglesias (UCC)	12/05/2022	Updated draft internally reviewed
V 0.3	Emilio Laíño Rebollido (UCC)	17/05/2022	Second draft after internal contributions
V 0.4	Emilio Laíño Rebollido (UCC)	29/06/2023	Third draft

V 0.5	Emilio Laíño Rebollido (UCC)	04/07/2022	Updated draft after partners contribution
V 0.6	Emilio Laíño Rebollido (UCC)	15/08/2022	Updated draft after peer-review from Gianbattista Bussi (RED), Roberta Paranunzio (CNR) and Luis Angel Espinosa (IST-ID)
V 1.0	Iulia Anton, Salem Gharbia (ITSligo)	23/08/2022	Final version
V 1.1	Emilio Laíño Rebollido (UCC)	29/06/2023	Updated draft after suggestions/commentaries from first review period
V 1.2	Emilio Laíño Rebollido (UCC) Gregorio Iglesias (UCC)	30/06/2023	Updated draft after internal contributions
V1.3	Iulia Anton, Salem Gharbia (ATU Sligo)	31/08/2022	Final version

LIST OF ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Meaning / Full text
CCLL	Coastal City Living Lab
CSI	Coastal Sensitivity Index
EBA	Ecosystem-Based Approach
GIS	Geographic Information System
MHW	Mean High Water
NBS	Nature-Based Solution
WP	Work Package

BACKGROUND: ABOUT THE SCORE PROJECT

SCORE is a four-year EU-funded project aiming to increase climate resilience in European coastal cities.

The intensification of extreme weather events, coastal erosion and sea-level rise are major challenges to be urgently addressed by European coastal cities. The science behind these disruptive phenomena is complex, and advancing climate resilience requires progress in data acquisition, forecasting, and understanding of the potential risks and impacts for real-scenario interventions. The Ecosystem-Based Approach (EBA) supported by smart technologies has potential to increase climate resilience of European coastal cities; however, it is not yet adequately understood and coordinated at European level.

SCORE outlines a co-creation strategy, developed via a network of 10 coastal city ‘living labs’ (CCLLs), to rapidly, equitably and sustainably enhance coastal city climate resilience through EBAs and sophisticated digital technologies.

The 10 coastal city living labs involved in the project are: Sligo and Dublin (Ireland), Barcelona/Vilanova i la Geltrú, Benidorm and Oarsoaldea (Spain), Oeiras (Portugal), Massa (Italy), Piran (Slovenia), Gdańsk (Poland) and Samsun (Turkey).

SCORE will establish an integrated coastal zone management framework for strengthening EBA and smart coastal city policies, creating European leadership in coastal city climate change adaptation in line with The Paris Agreement. It will provide innovative platforms to empower stakeholders’ deployment of EBAs to increase climate resilience, business opportunities and financial sustainability of coastal cities.

The SCORE interdisciplinary team consists of 28 world-leading organizations from academia, local authorities, RPOs, and SMEs encompassing a wide range of skills including environmental science and policy, climate modelling, citizen and social science, data management, coastal management and engineering, security and technological aspects of smart sensing research.

EXECUTIVE SUMMARY

This document is a deliverable of the SCORE project, funded under the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003534.

This document primarily describes the methodology and summarises the results and conclusions of Task 1.2 – Mapping of past extreme events and identification of key hazards in the coastal cities. It is part of the work included in WP1, whose final objective is to produce a high-level baseline risk map of extreme climate impacts and sea-level rise based on a semi-quantitative assessment of exposure and vulnerability for the ten CCLLs

This report is based on the literature review carried out in Task 1.1 and on a participatory process involving the CCLLs, in conjunction with WP2.

Past extreme climate events in the CCLLs (including all frontrunners and followers) have been mapped, and the key climate-related hazards identified and categorised under existing climatic conditions. Moreover, the past event database is a very valuable output of this report, as it can be exploited by other project participants and external users.

For this purpose, the following indicative hazard categories have been considered: heavy precipitation, coastal flooding, coastal erosion, pluvial flooding, river flooding, landslides, droughts, heat waves, cold spells, storms, heavy snowfall, strong winds, forest fires, and other hazards.

The latter category has been designed to include impacts relating to multi-hazard risk and cascading effects, such as coastal ecosystem issues, seawater intrusion, water scarcity, harmful algal blooms, and pollution.

Within these categories, different hazards have been identified and mapped using the ArcGIS Pro software.

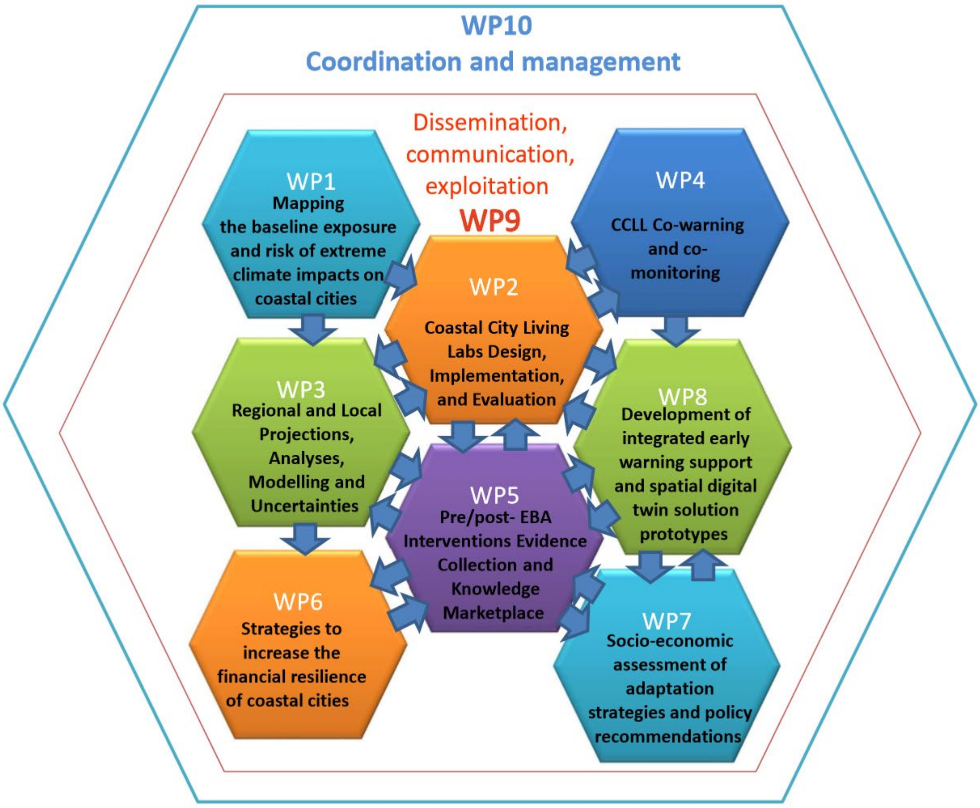
Finally, the most relevant hazards for each city have been selected for further investigation in Tasks 1.3, 1.4 and in WP6.

LINKS WITH OTHER PROJECT ACTIVITIES

A number of work packages are being prepared under the umbrella project *Smart Control of the Climate Resilience in European Coastal Cities* (acronym: SCORE) between 2021 and 2025:

- Work Package 1 – Mapping the baseline exposure and risk of extreme climate impacts on coastal cities
- Work Package 2 – Coastal City Living Labs Design, Implementation, and Evaluation
- Work Package 3 – Regional and Local Projections, Analyses, Modelling and Uncertainties
- Work Package 4 – CCLL co-warning and comonitoring
- Work Package 5 – Pre/post-EBA Interventions Evidence Collection and Knowledge Marketplace
- Work Package 6 – Strategies to increase the financial resilience of coastal cities
- Work Package 7 – Socio-economic assessment of adaptation strategies and policy recommendations
- Work Package 8 – Development of integrated early warning support and spatial digital twin solution prototypes
- Work Package 9 – Dissemination, communication, exploitation
- Work Package 10 – Coordination and management

Figure 1: SCORE work packages structure.



In this vein, this report has been prepared as the second of four deliverables of Work Package 1 – Mapping the baseline exposure and risk of extreme climate impacts on coastal cities:

- Deliverable 1.1 – Literature review report
- Deliverable 1.2 – Map and report of key climate-change hazards
- Deliverable 1.3 – Map and report of baseline exposure and vulnerability
- Deliverable 1.4 – Report of baseline risk analysis

The main goal of WP1 is to produce a high-level baseline risk map of extreme climate impacts and sea-level rise based on a semi-quantitative assessment of exposure and vulnerability for the ten CCLLs. The *Literature review report* was completed in December 2021; this task ends in June 2022, the 12th month of the SCORE project. The maps produced in this task are required as an intermediate step, but exposure and vulnerability studies are also required. Therefore, the exposure and vulnerability studies at a high level performed in the *Map and report of baseline exposure and vulnerability* will be the next steps forward.

In addition, this document is complemented by the data collected from the CCLLs in WP2. The report outcomes will directly feed the next WP1 tasks and contribute to the development of certain tasks in WP3, WP5, WP6, WP7 and WP8.

TABLE OF CONTENT

INDEX OF FIGURES

INDEX OF TABLES

1. INTRODUCTION

The generalised sea level and temperature rise are poised to exacerbate a variety of hazards: coastal flooding and erosion events, heavy rains and pluvial/river floods, heat waves and cold spells, and landslides, among others. Moreover, the hazards can trigger a number of impacts: destruction of land as it is permanent submerged or eroded; economic and social losses due to the impacts on infrastructure, buildings, facilities, services, industry and agriculture; and potential loss of coastal ecosystems when the environmental conditions are altered. Overall, these changes will affect coastal landforms and ecosystems including oceans, beaches, estuaries, lagoons and rivers.

In the framework of SCORE, the impacts of sea level rise and increases in precipitation extremes (either heavy rainfall events or droughts) due to climate change on European coastal cities will be mitigated by co-design, and co-development with citizens and stakeholders, and by deploying, testing, and demonstrating innovative EBAs, smart technologies and hybrid Nature Based Solutions (NBSs) while facilitating financial sustainability. For this purpose, extensive information on past extreme climate events is needed. As there is a range of information sources that provide data and information about extreme climate events for large different levels, the collaboration between SCORE partners has been crucial to collect the largest dataset possible.

This document will provide information on how the past extreme climate events collected have been used to produce significant outputs for the SCORE project. In the next sections, a summary of the methodology utilised for the identification of the key climate-related hazards affecting each CCLL for baseline characterisation, as well as a set of maps representing the main past extreme climate events occurred in the CCLLs using GIS software are given. The most relevant hazards for each city will be consequently further investigated in Task 1.3, Task 1.4 and WP6.

2. METHODOLOGY

2.1. Overview

The main purpose of Task 1.2 is the production of a set of maps representing the main past extreme climate events occurred in the CCLLs using GIS software (e.g., footprints of past events, hazard maps, symbols representing the past events), and the identification and categorisation of the key climate-related hazards under the existing climatic conditions for each CCLL.

2.2. Information sources

Data for this task have been mainly collected from the responses to WP2 questionnaires, and from the previous task, the literature review. The information sources utilised include, *inter alia:* CCLL's existing datasets, repositories at national, regional and local levels, scientific publications, risk assessments and other technical documents containing relevant information.

A summary of the information sources utilised in this report is provided in Table 1. Due their extension, the information sources are described specifically for each city throughout the Results section. Besides, in the literature review (D1.1), scientific sources including conference proceedings, scientific-technical reports and peer-reviewed scientific journal articles were reviewed through the Scopus and Web of Science scientific databases for each city. The outputs of this review also complements the results provided in this report.

Table 1: Information sources by CCLL.

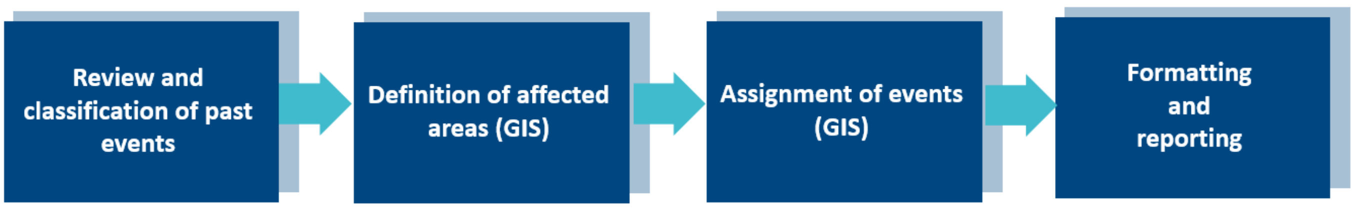
CCLL	Information sources and spatiotemporal resolution
Sligo	• CCLL geographical extent: shapefile from Ordnance Survey Ireland on Ireland's Open Data Portal (administrative boundary of County Sligo) • Past events: CCLL partners (county level, 1973-2021)
Dublin	• CCLL geographical extent: shapefile from Ordnance Survey Ireland on Ireland's Open Data Portal (administrative boundaries of Kildare, Meath, Dublin and Wicklow counties) • Information on historical flood events: web-viewer (floodinfo.ie) from OPW (Ireland, first known event-Autumn 2014)
Vilanova i la Geltrú	• CCLL geographical extent: shapefile from National Institute of Geography of Spain (IGN) (administrative boundary of Vilanova i la Geltrú municipality) • Past climate-related events: CCLL partners (affected areas, 1988-2021) • Briefs on extreme weather events: Meteorology Service of Catalunya (Catalonia region, last 3 centuries) • Tropical nights and hot days: Vilanova i la Geltrú Climate Change Adaptation Plan (Sant Pere de Ribes weather station, 2004-2013) • Shoreline evolution: Cartography and Geology Institute of Catalunya online tool (2016-present)
Benidorm	• CCLL geographical extent and areas affected by past climate-related events: shapefiles from Official Cartography of Valencian Community by Institute of Cartography of Valencia (administrative boundary of Benidorm municipality), CCLL partners (Levante, Poniente and Finestrat beaches) and self-production from satellite imagery (footprints of IES Pere Maria Orts high school, CV-70 road and Terra Mitica theme park) • Past climate-related events: CCLL partners (affected areas, 1980-2020) • Related scientific sources: (Cramer et al., 2018; Fernández Montes & Sánchez Rodrigo, 2014; Gonzalez-Hidalgo et al., 2007; Imeson et al., 1998)
Oarsoaldea	• CCLL geographical extent: shapefile from geoEuskadi (administrative boundaries of Errenteria, Lezo, Pasaia and Oiartzun municipalities) • Past climate-related events: CCLL partners (municipality-level, 1900-2022)
Oeiras	• CCLL geographical extent: shapefile from Portuguese Public Administration's open data portal (administrative boundary of Oeiras municipality, including parishes of Algés, Linda-a-Velha and Cruz Quebrada-Dafundo, Carnaxide and Queijas, Barcarena, Portosalvo and Oeiras e São Julião da Barra, Paço de Arcos and Caxias) • Past climate-related events: DISASTER database (Zêzere et al., 2014) (parish-level, 1865-2021) • Climate-related occurrences (landslides, coastal flooding and land flooding): Civil Protection occurrences database (municipality-level, 2006-2022) • Hazard and susceptibility maps: Civil Protection Plan (municipality-level, 2018)
Massa	• CCLL geographical extent: shapefile from Tuscany Region (administrative boundary of Massa municipality) • Past climate-related events: CCLL partners (municipality-level, 1994-2021) • Hazard maps on coastal flooding, river flooding and landslides: adapted from maps from District Basin Authority of the Northern Apennines (Massa municipality) • Reports on past climate events: Regional Functional Centre of the Tuscany Region (Tuscany region, 2009-present)
Piran	• CCLL geographical extent: shapefile from CCLL partners (administrative boundary of Piran municipality) • Past climate-related events: CCLL partners (municipality-level, 2005-2021) • Flood maps: Ministry of the Environment and Spatial Planning – Directorate of the Republic of Slovenia for Water and Flood Cadastre Warning Maps (Slovenia)

	• Landslides: Analysis of landslide occurrence in Slovenia and preparation of landslide probability map (Slovenia) • Climate-related occurrences (coastal flooding, land flooding, strong winds, cold spells, droughts and landslides): Administration of the Republic of Slovenia for Civil Protection and Disaster Relief (municipality-level, 2005-2021) • Related sources: (Brečko Grubar et al., 2019; Kovačič et al., 2016)
Gdańsk	• CCLL geographical extent: shapefile from European Environment Agency (administrative boundary of Gdańsk city) • Past climate-related events: Regional Water Management Board Gdańsk (Gdańsk city, 1829-1992 and 2010-2017) • Information on changes in mean annual sea levels (1955-2015), storm surge values (1955-2015), and urban floods (1992-2016): Plan of adaptation to climate change in the city of Gdańsk until 2030 (Gdańsk city) • Climate-related occurrences (floods): Regional Water Management Board Gdańsk (Gdańsk city, 2010-2017)
Samsun	• CCLL geographical extent: shapefile from European Environment Agency (administrative boundary of Samsun province) • Past climate-related events: CCLL partners (province-level, 1963-2012) • Scientific sources: (Ozturk et al., 2015; Ozturk & Sesli, 2015; Tătui et al., 2019)

2.3. Mapping of past climate events

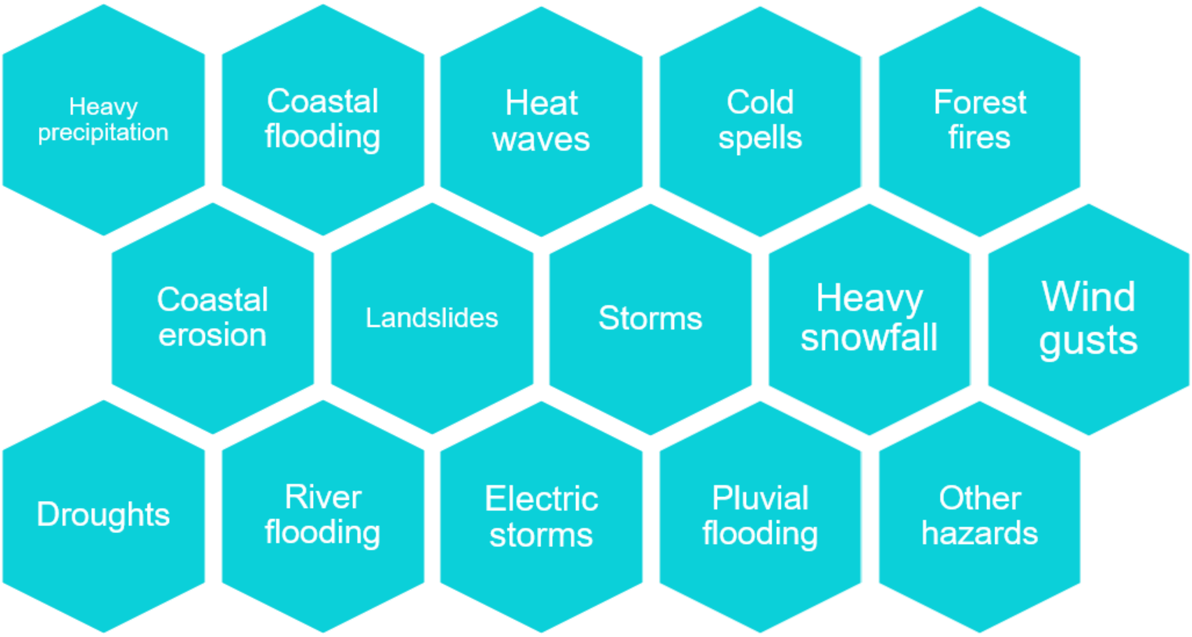
To produce the maps, the basic idea is to combine the data on past climate events and geographical information. The steps involving this process are illustrated in Figure 2. After collecting the past events from the responses, the information is processed, and a GIS model of the study area is built. In this model, the areas affected by the past events are identified and mapped, and the past events are accordingly assigned. The final step involves the formatting and reporting of the final outputs, which are presented in this document.

Figure 2: Workflow of the methodology to produce the maps.



Regarding the extreme climate events, they have been collected and summarised with the help of the Task 1.2 partners. The past events have been classified under a wide variety of categories, mainly based in the Sixth Assessment Report from the IPCC. Thus, the categories considered include heavy precipitation, coastal flooding, coastal erosion, pluvial flooding, river flooding, landslides, droughts, heat waves, cold spells, storms, heavy snowfall, electric storms, strong winds, forest fires, and other hazards as shown in Figure 3. The previous list is not exhaustive and additional categories could be included in the study in the case that they are detected to be of particular concern to a CCLL.

Figure 3: Overview of the climate-related events identified in Task 1.2.



For the sake of mapping, the individualisation of each event has been very important. Complementary data clearly defining the affected area, date, duration, category of the event (as explained in previous lines) and a short description have been of great help in the production of maps. The full lists including all the past events collected and the complementary data are presented in the Appendix II – Past events datasets in the form of tables. A short example is provided in Table 2, where an extract of three rows represents how the past events have been individualised.

Table 2: Extract of the past extreme climate events collected in Oarsoaldea CCLL.

Extreme event ID	Extreme event type	Short description	Date	Area affected	Duration
RF8	River flooding	Floods close to the mouth of Oiartzun River.	01/01/1981	Errenteria and Oiartzun	1 day
CF1	Coastal flooding	The sea high tide coincided with sea storm. 20 cm height of water in the streets of Pasaia (San Juan district).	01/02/2014	Pasaia (San Juan District)	1 day
PF1	Pluvial flooding	Ground floors and streets flooded, business and vehicles damaged, street and roadblocks.	01/06/1992	Central areas of Errenteria, Pasaia and Oiartzun.	1 day

2.4. Identification of key climate-related hazards

Finally, the most relevant hazards for each city have been identified and will be further investigated in Tasks 1.3, 1.4 and in WP6. The key climate-related hazards have been identified considering the existing information, the local expertise from the CCLLs, SCORE partners, and stakeholders through workshops, questionnaires, and internal meetings.

2.5. Limitations of the methodology

The level of detail of the results for each CCLL depends on the Frontrunner/Fellow status. The level of detail of the results is greater for the Frontrunner cities, whereas the Fellow cities will develop the methodology gradually in the future. The status (see Table 3) is in alignment with the SCORE project through the analysis performed in WP2 for the deliverable D2.1, and the development of future tasks, especially those in WP1, WP3 and WP6. Furthermore, the level of detail for each CCLL depends on the available information.

Table 3: Frontrunner/Fellow status of the CCLLs in the SCORE project.

CCLL	WP1	WP2	WP3	WP4	WP6	WP7	WP8
Benidorm	Frontrunner	Fellow	Frontrunner	Fellow	Fellow	Fellow	Fellow
Vilanova i la Geltrú	Frontrunner	Frontrunner	Frontrunner	Fellow	Frontrunner	Frontrunner	Frontrunner
Dublin	Fellow	Fellow	Fellow	Frontrunner	Fellow	Fellow	Fellow
Gdańsk	Fellow	Fellow	Fellow	Fellow	Fellow	Fellow	Fellow
Piran	Frontrunner	Frontrunner	Fellow	Fellow	Fellow	Frontrunner	Fellow
Massa	Frontrunner	Fellow	Frontrunner	Frontrunner	Frontrunner	Fellow	Frontrunner
Oarsoaldea	Frontrunner	Frontrunner	Frontrunner	Frontrunner	Frontrunner	Frontrunner	Frontrunner
Oeiras	Frontrunner	Fellow	Fellow	Frontrunner	Fellow	Fellow	Fellow
Samsun	Fellow	Fellow	Frontrunner	Fellow	Fellow	Fellow	Fellow
Sligo	Frontrunner	Frontrunner	Fellow	Frontrunner	Fellow	Frontrunner	Fellow

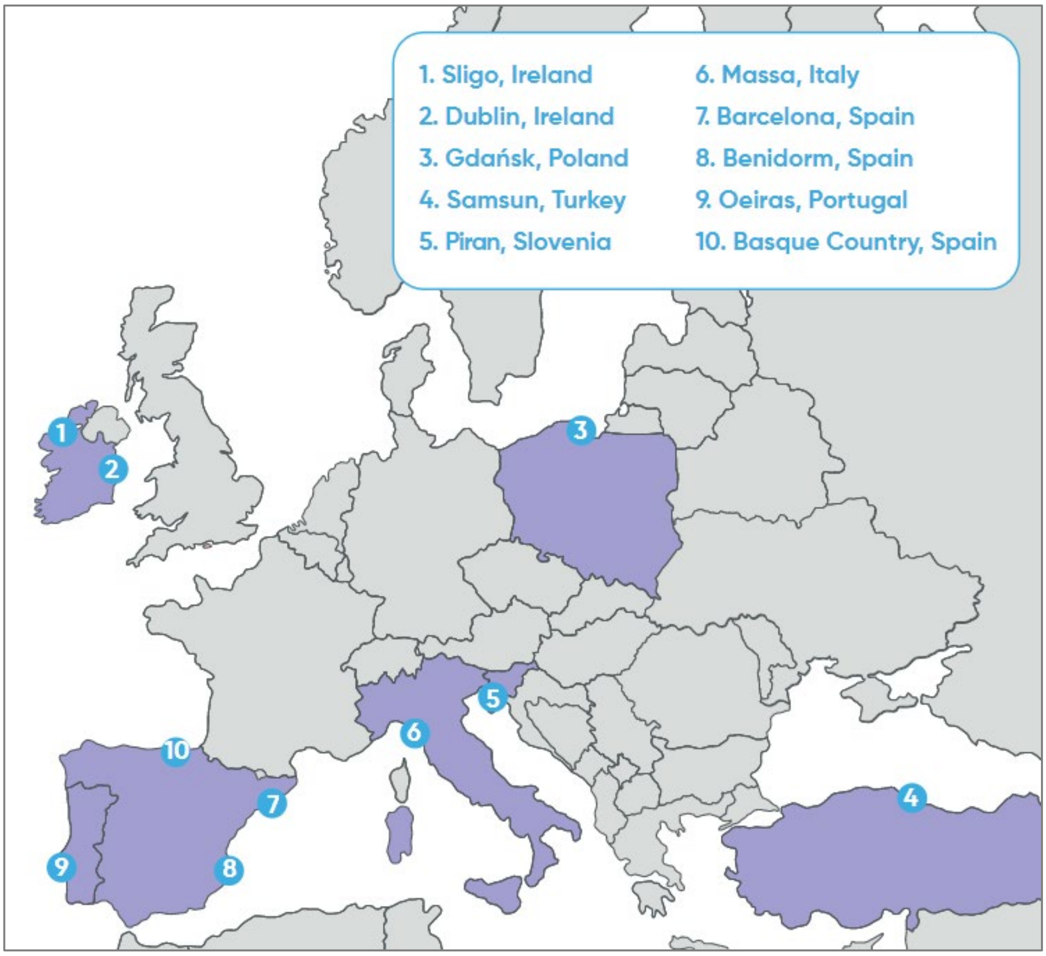
The CCLLs of Benidorm, Vilanova, Piran, Massa, Oarsoaldea, Oeiras and Sligo have the status of Frontrunners for this task, whereas Dublin, Gdańsk, and Samsun have been selected as Fellows. Notwithstanding, in Task 1.3 and Task 1.4, the imbalance between the two roles is substantially reduced. In Task 1.3, indicators of exposure and vulnerability are developed, regardless of the CCLL status. Moreover, the characterisation of baseline risk and identification of risk hot spots developed in Task 1.4 considers all CCLLs equally, including the maps produced. For this purpose, these tasks also include complementary and extended data on the key climate-related hazards identified in this report.

3. RESULTS

3.1. Overview

This section reports the information sources regarding the key climate-related hazards and past extreme climate events identified for each CCLL. Moreover, the complete versions of all the maps produced and complementary datasets are provided in the appendixes (Appendix I – maps and Appendix II – Past events datasets, respectively).

Figure 4: Location of the CCLLs.



3.2. Sligo

The main natural or climatic-related hazards identified are storms, coastal and land flooding, and coastal erosion. The increased frequency and intensity of winter storms are the main hazards identified as these had the most significant impact in recent years. Coastal flooding and erosion have a high potential of causing significant and irreparable damage. Particularly, the impact on municipal infrastructure and chronic, short term transport disruption are especially relevant.

The study area is County Sligo, as CCLL Sligo is interested in whether a given hazard spread across a large geographical area may impact the CCLL. The geographic data have been derived from the publication of Ordnance Survey Ireland on Ireland's Open Data Portal[1], which includes a dataset of the Irish Administrative Areas generated from the 2019 OSi National Statutory Boundary dataset, summarised in Table 4.

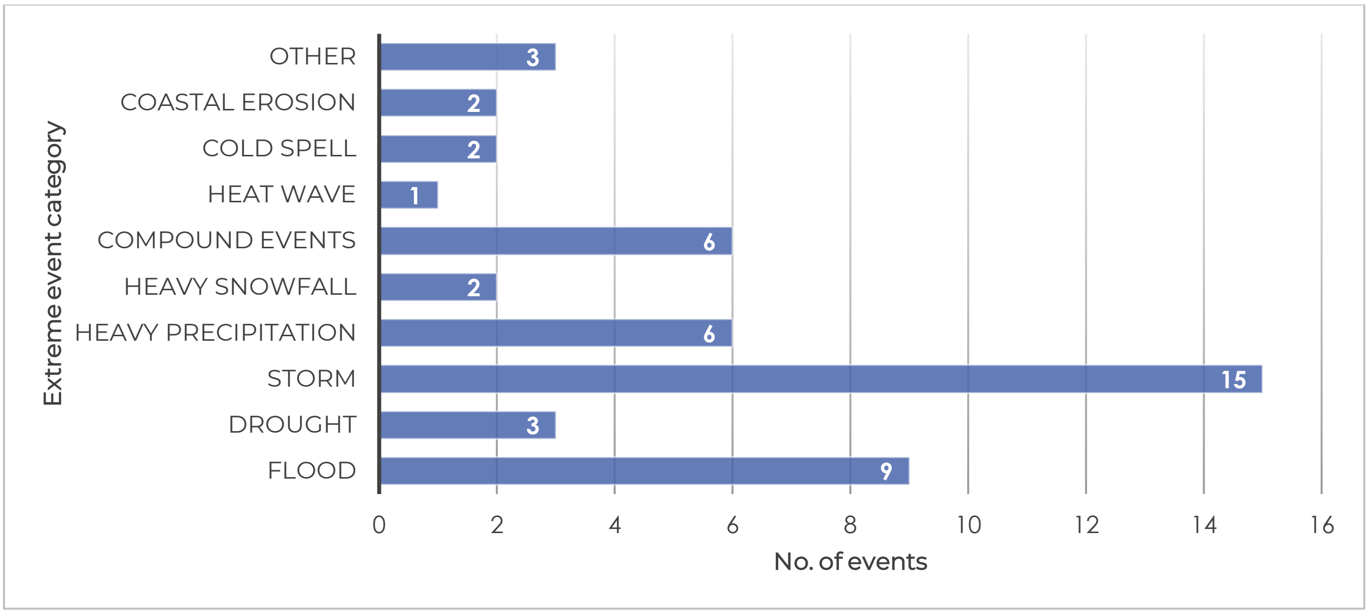
Table 4: Summary of the geographical files utilised in CCLL Sligo's past events mapping

Area	Description	Shapefile source
County Sligo	Shapefile representing County Sligo generalised to 20 m from 2019 OSi National Statutory Boundary dataset. Coordinate Reference System: Irish Transverse Mercator.	Ireland's Open Data Portal.

[1] https://data.gov.ie/dataset/counties-osi-national-statutory-boundaries-generalised-20m1/resource/366a5e7f-7bc5-470f-a820-34a2a5469d73?inner_span=True

In total, forty-nine (49) extreme climate events have been registered for this CCLL, summarised in the Appendix (see Sligo). Their distribution by event category is represented in Figure 5.

Figure 5: Number of past events recorded in Sligo by event category.



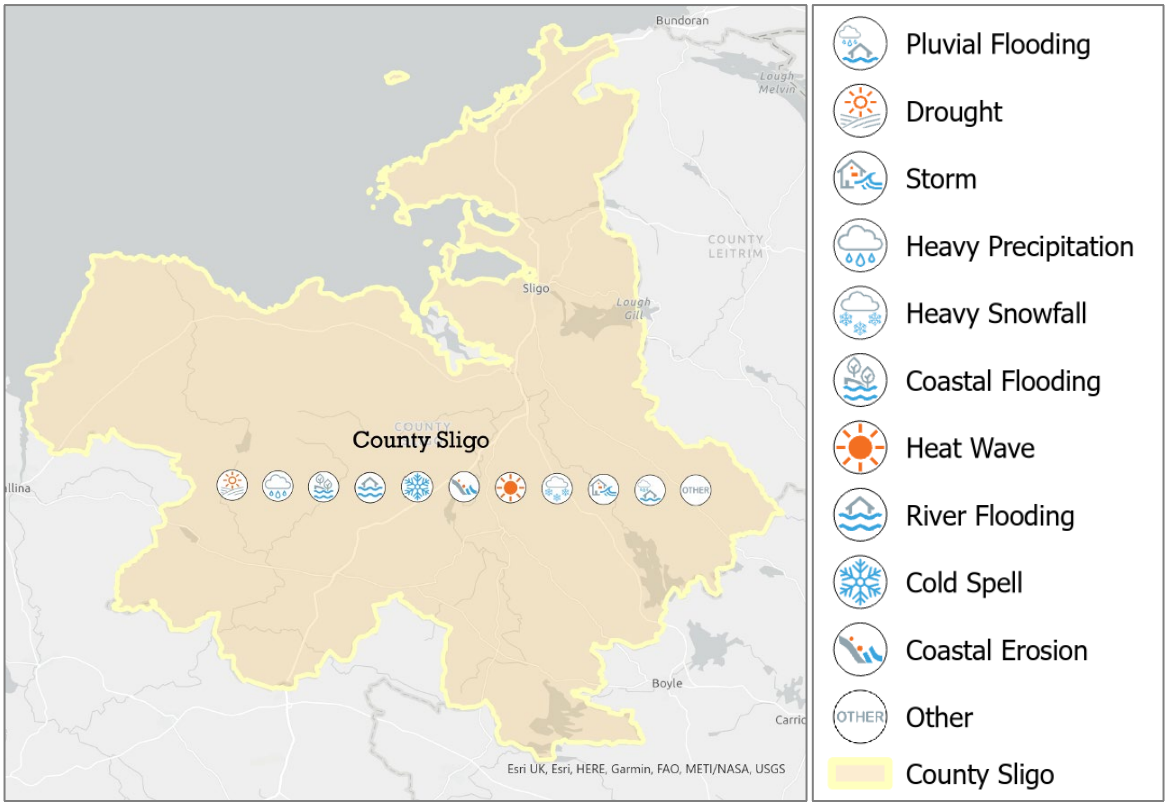
Storms are the most frequent extreme events, with fifteen (15) occurrences, followed by nine (9) flooding events. The less frequent extreme events are coastal erosion episodes, cold spells and heavy snowfalls, with two (2) occurrences each one, and heat waves, recorded only one (1) time. Moreover, three (3) events have been categorised under the "Other" label, and six (6) events have been also reported under the "Compound Event" category (see Table 5).

Table 5: Past extreme climate events under "Compound Event" and "Other" categories recorded for CCLL Sligo.

Extreme Event ID	Extreme event type	Short description	Date
C1	Compound Event	Storm and Heavy precipitation	February 1990
C2	Compound Event	Storm surge and Coastal flooding	February 2002
C3	Compound Event	Flooding and Landslide	September 2003
C4	Compound Event	Heavy rain and flooding	Summer 2008
C5	Compound Event	Winter storms and storm surges	Winter 2013/14
C6	Compound Event	Heatwave and drought	Summer 2018
O1	Other	Storm force winds	February 1988
O2	Other	Hurricane force winds	December 1998
O3	Other	Driest winter in 25 years	Winter 2016/17

The climate events categories described previously have been represented in a GIS model. The full map can be found in the Appendix of this document (Sligo). A snapshot is represented in Figure 6.

Figure 6: Schematic representation of key climate-related hazards identified in Sligo CCLL.



3.3. Dublin

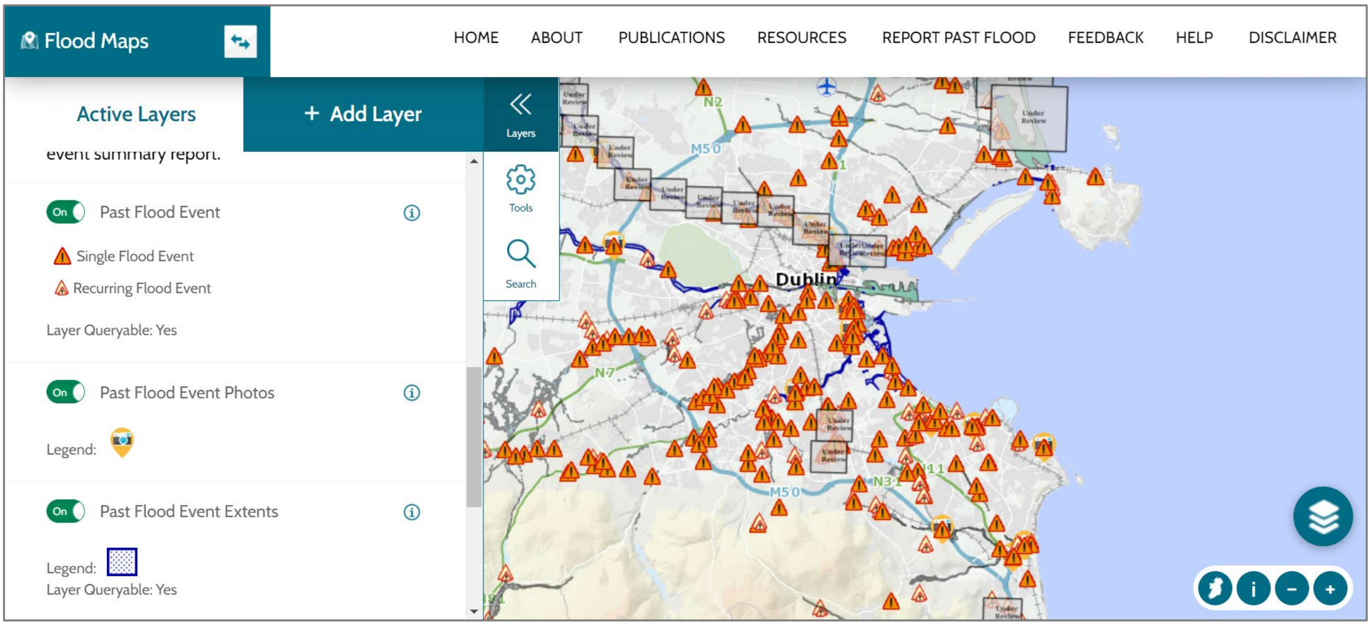
Coastal flooding and erosion have caused some of the most severe impacts recorded in recent years. For instance, coastal flooding regularly impacts the commuter rail system as well as primary roadways and busy tourist areas in the city, disrupting the public and private transport in Dublin.

The National Flood Data Archive, which provides information on past flood event records, is continually being updated by the Office of Public Works. The past flood events information is currently accessible for events which occurred pre-Autumn 2014 in a web map[2]. This map data provides information about the location of known flood events in Ireland and shows supporting information in the form of reports, photos and press articles. Data are available on the website and can be viewed by turning on the "Past Flood Events" layer, that enables this past flood event data to be viewed simultaneously with predictive flood mapping layers, as shown in Figure 7.

Past flood events are represented on the map in three different ways. Where the boundary of a flood has been mapped, the flood is shown as a shaded area with a blue border defining the extent of the flood. Floods without extent information are represented with a point symbol at the approximate location of the flood. Where more than one flood has occurred in the same location, and to denote a location with recurring flooding, a multiple flood point symbol is used.

[2] https://www.floodinfo.ie/map/floodmaps/?X=7061815.17613&Y=-880434.69084&Z=7

Figure 7: Snapshot of Flood Maps online map showing past flood events in Dublin, as identified by the Office of Public Works.

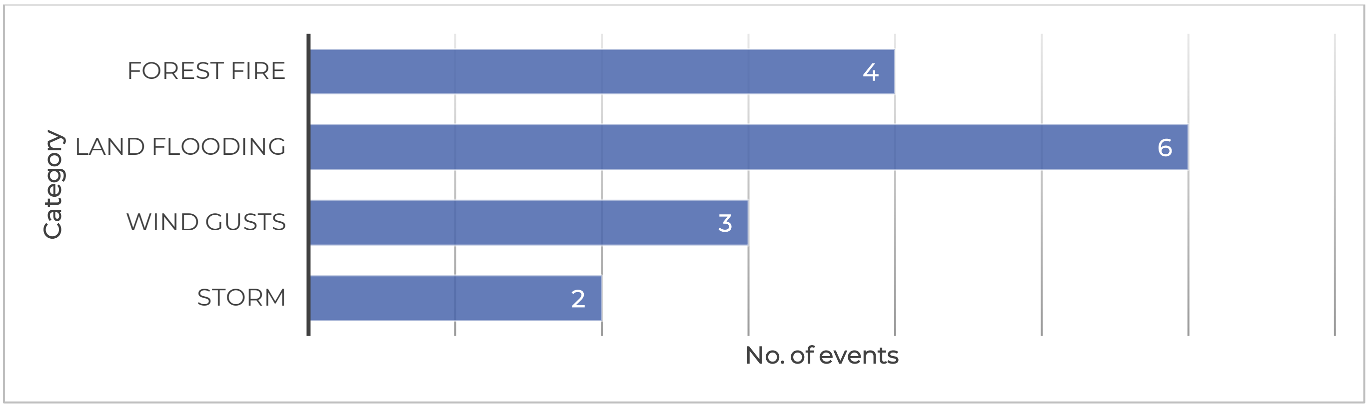


3.4. Vilanova i la Geltrú

Land flooding, coastal flooding, coastal erosion, strong winds and forest fires have been identified as the main hazards affecting the area, leading to impacts on tourism and local economy, damage to residential and commercial buildings and coastal infrastructure; loss of cultural heritage, ecosystems and biodiversity (wetlands, sandy and subaquatic habitats); and population safety.

In this context, Vilanova i la Geltrú CCLL has produced a list summarising the past extreme climate events occurred in the municipality, which can be found in the Appendix (see Vilanova i la Geltrú). In addition, Vilanova i la Geltrú CCLL has provided data on past forest fires occurred in Catalunya since 1986. The forest fires that affected Vilanova i la Geltrú have been extracted and included in the past events list and mapped. In summary, the total number of events identified is fifteen (15), including episodes of land flooding, storms, strong winds, and forest fires. The number of events by category is represented in Figure 8.

Figure 8: Number of past events recorded in Vilanova i la Geltrú by category.

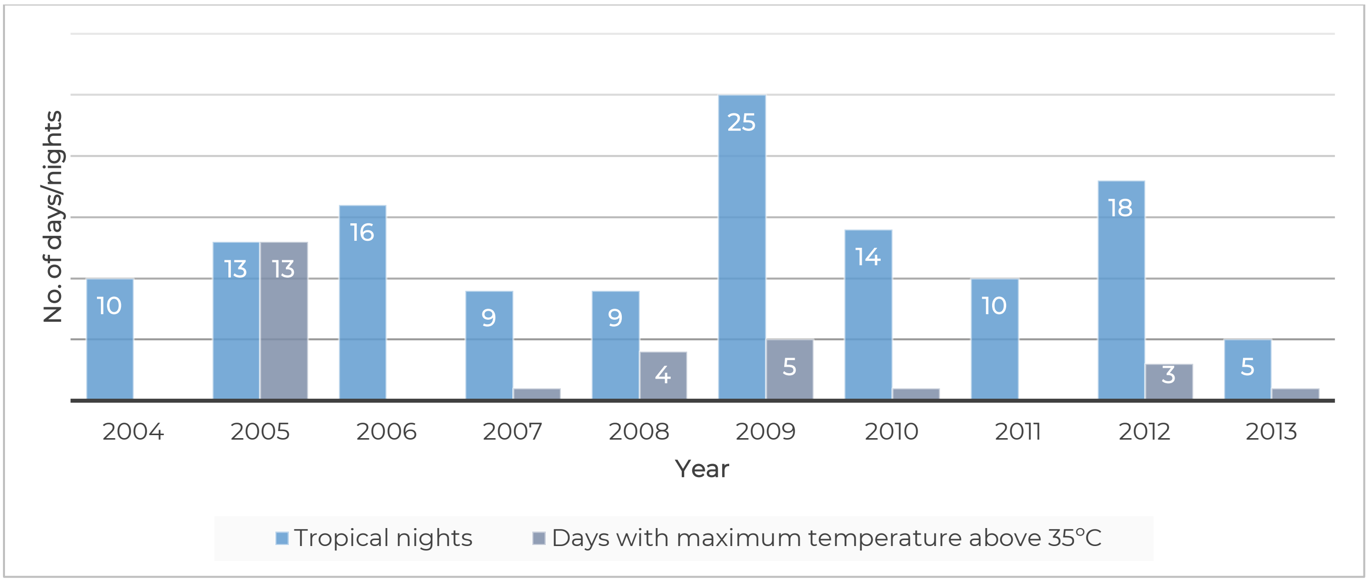


The main data sources regarding past extreme climate events are the Meteorology Service of Catalunya, Vilanova i la Geltrú Climate Change Adaptation Plan and Cartography and Geology Institute of Catalunya.

The Meteorology Service of Catalunya[3] (Servei Meteorològic de Catalunya) holds a series of brief explanatory summaries of the main extreme weather events that have occurred in Catalonia over the last 300 years, especially since the mid-nineteenth century. The affected area of a relevant flood event[4] in 1987 has been included in the past events map.

Vilanova i la Geltrú Climate Change Adaptation Plan[5] holds information on extreme temperatures. The number of tropical nights (in which the minimum temperature does not fall below 20.0°C) and days with maximum temperatures above 35.0°C in the period 2004-2013 is significant (Figure 9). Tropical nights stand out especially in 2009 and 2012, with twenty-five (25) and eighteen (18) episodes respectively, followed by 2006 and 2010, with sixteen (16) and fourteen (14) episodes. Moreover, the days with temperatures above 35.0°C were highest in 2005 and 2009, with thirteen (13) and five (5) episodes. In 2017, the absolute maximum temperature reached 37.0°C in August.

Figure 9: Evolution of the number of tropical nights and hot days at the Sant Pere de Ribes weather station (2004-2013). From: Vilanova i la Geltrú Climate Change Adaptation Plan.

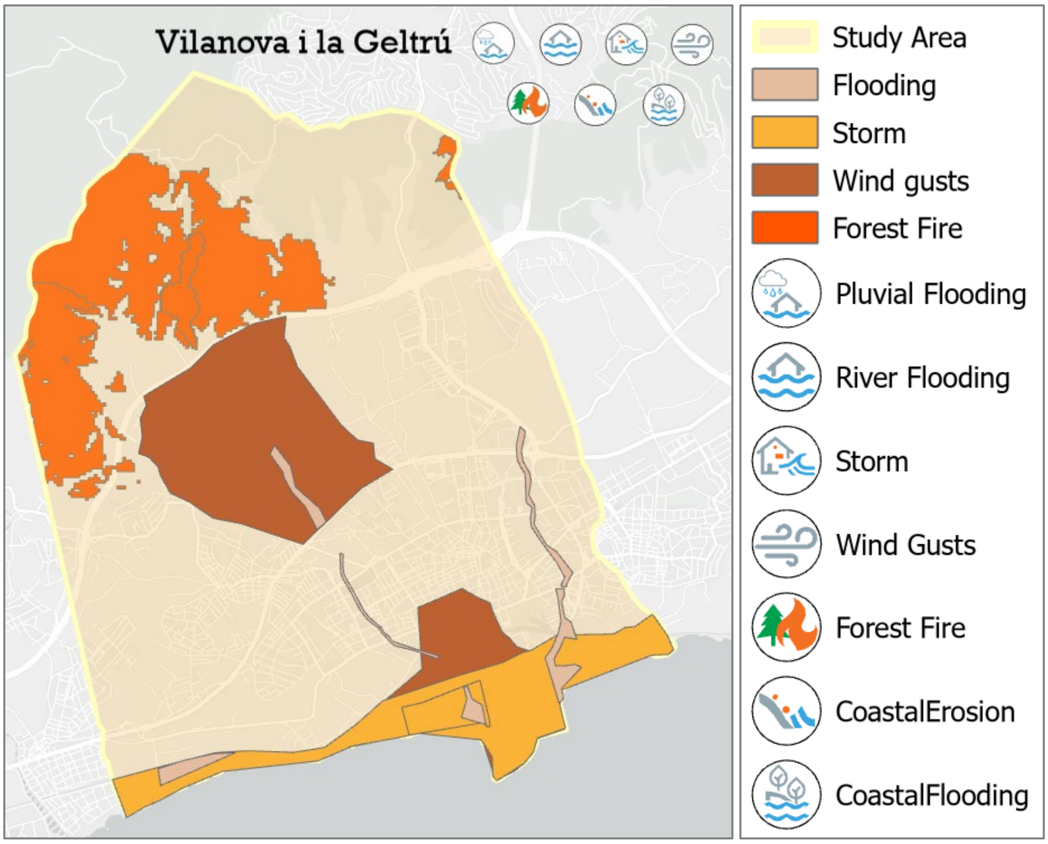


[3] https://www.meteo.cat/wpweb/divulgacio/publicacions/efemerides/
[4] https://www.meteo.cat/wpweb/divulgacio/publicacions/efemerides/1987-10-03_30-anys-dels-catastrofics-aiguats-doctubre-de-1987/
[5] doc_51397699.pdf (vilanova.cat)

Furthermore, the Cartography and Geology Institute of Catalunya (Institut Cartogràfic i Geològic de Catalunya) provides a web-viewer[6] where the evolution of the Catalonian coastline since 2016 can be derived through orthoimagery comparison.

Finally, the information on past events described previously has been represented in the map included in the Appendix (see Vilanova i la Geltrú) and Figure 10.

Figure 10: Key climate-related hazards identified in Vilanova i la Geltrú CCLL.



3.5. Benidorm

Data for this task have been mainly collected from the responses to WP2 questionnaires and from the previous task, the literature review. During the literature review, it was found that the main sources regarding climate change extreme impacts in Benidorm were scientific publications.

According to the CCLL's responses, the main concerns of climate change in this area are the increase in the frequency and intensity of torrential storms, coastal flooding and coastal erosion. They have the potential to decrease the beach width and consequently its recreational space, impact on the infrastructures attached to the beach (promenades, businesses, etc.), damage the exposed low areas and affect the tourism.

In this context, a review of the daily soil erosion in Western Mediterranean areas can be found in Gonzalez-Hidalgo et al. (2007). The main conclusions reached are that, although soil erosion varies from site to site, and from year to year, the annual amount of soil eroded depends on a few daily extreme coastal erosion events, mainly due to heavy rainfall. Furthermore, the Benidorm Surface soil has the highest erodibility in Alicante province (Imeson et al., 1998).

Moreover, an increase in the frequency and intensity of droughts in the Mediterranean basin has been observed since 1950, posing additional challenges to existing environmental problems (Cramer et al., 2018). Particularly, in

[6] https://visors.icgc.cat/costa/#12/40.5391/0.5812

Alicante, a steady rise in the minimum temperatures has been detected, whereas the precipitation shows high variability in the interannual and interdecadal trends across the last decades (Fernández Montes & Sánchez Rodrigo, 2014).

Figure 11 illustrates the impacts of storms on the Benidorm coastline, which have also been recorded in video by the newspapers *El Mundo*[7] (07/09/2015), *ABC*[8] (21/01/2020 and 10/10/2020) and *Información*[9] (20/01/2020).

Figure 11: Storm causing coastal flooding over Benidorm on 05/10/2014. From METEORED*[10]*.

In summary, thirty-seven past events have been recorded in Benidorm for the period 1950-2020, including episodes of coastal flooding, coastal erosion, pluvial flooding, strong winds, landslides and heavy precipitation (Table 6). Five of them affected the whole area of Benidorm (heavy precipitation and pluvial flooding events). The remaining thirty-two, affected smaller areas, which have been defined in the GIS model. Levante Beach is the most affected area with seventeen occurrences of coastal flooding and coastal erosion. Poniente Beach has been affected ten times by either coastal flooding or coastal erosion. The data indicate that Cala Finestrat has been flooded twice by pluvial flooding. Two events of strong winds have been recorded in Terra Mitica theme park and IES Pere Maria Orts Institute. And, finally, one landslide occurred over the CV-70 road.

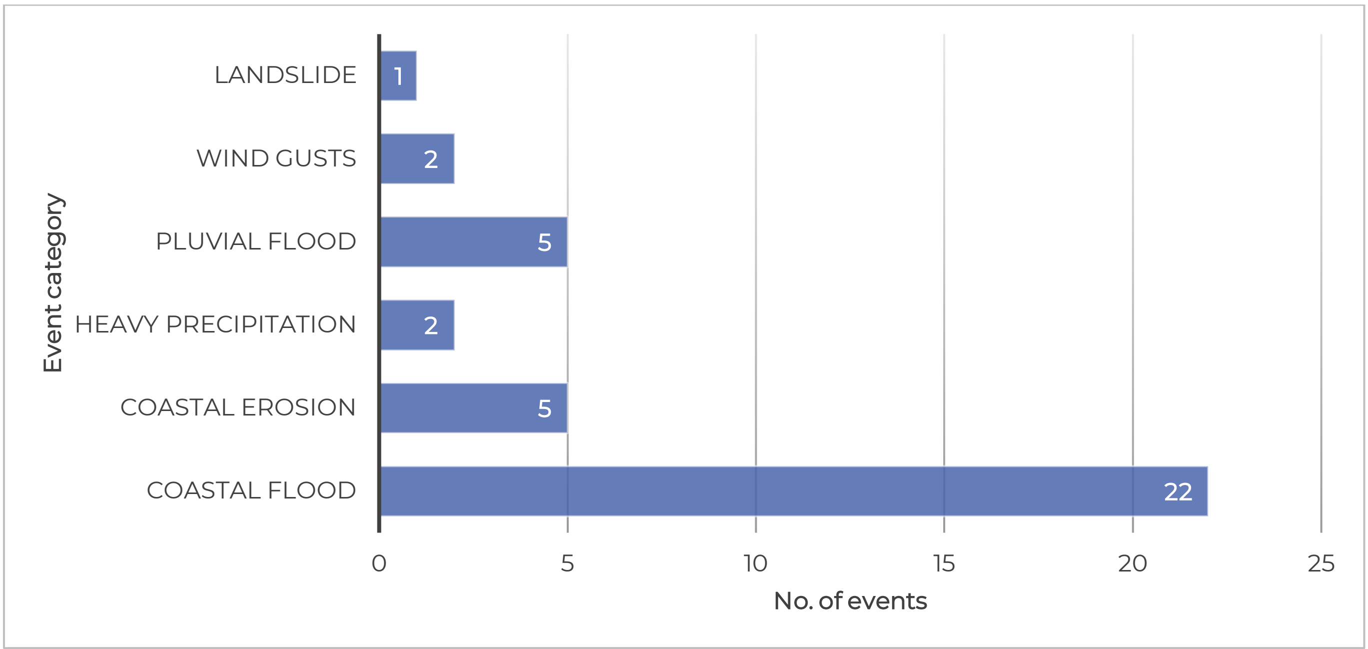
[7] https://www.elmundo.es/comunidad-valenciana/2015/09/07/55eda524e2704e49268b459b.html
[8] https://www.abc.es/espana/comunidad-valenciana/abci-atipica-imagen-playa-benidorm-inundada-lluvia-puente-pilar-202110091701_video.html
https://www.abc.es/local-alicante/20141006/abci-lluvias-benidorm-201410061558.html
[9] https://www.informacion.es/benidorm/2020/01/21/temporal-traga-arena-playa-levante-4958955.html
[10] https://www.tiempo.com/

Table 6: Geographic distribution of the past events recorded in Benidorm CCLL.

Area	No. of past events recorded	Past events categories
Poniente beach	10	Coastal flooding, coastal erosion
Levante beach	17	Coastal flooding, coastal erosion
Cala Finestrat	2	Pluvial flooding
Terra Mitica	1	Strong winds
IES Pere Maria Orts	1	Strong winds
CV-70	1	Landslide
Benidorm	5	Pluvial flooding, heavy precipitation
Total	37	All above: coastal flooding, coastal erosion, pluvial flooding, strong winds, landslide, heavy precipitation

The number of events by category are represented in Figure 12. Coastal flooding is the most recurrent event, accumulating up to twenty-two (22) occurrences. The following categories which accumulate more events are coastal erosion and pluvial flooding, with five (5) occurrences each one. Finally, the less recurrent events are strong winds, landslides and heavy precipitation. Note here that some events can include others, for example pluvial flooding events are usually led by heavy precipitation events.

Figure 12: Number of past events recorded in Benidorm CCLL by category.



The affected areas have been represented in the GIS model. A summary of the geographical files produced can be found in Table 7. The study area (Benidorm municipality) has been derived from the Official Cartography of Valencian Community resources. The shapefiles representing the three beaches (Levante, Poniente and Cala Finestrat) were provided by Benidorm CCLL. The shapefiles representing the remaining areas (Terra Mitica theme park, IES Pere Maria Orts institute and CV-70 road) have been self-produced from satellite imagery.

Table 7: Summary of the geographical files utilised in Benidorm's past events mapping.

Area	Description	Shapefile source
Benidorm municipality	Shapefile containing Benidorm municipality area at 1:5000 scale from photogrammetric restitution from digital flights between the years 2005-2018	Institut Cartogràfic Valenciàn[11]. Official Cartography of Valencian Community
Levante beach	Shapefile representing Levante beach footprint	Provided by Benidorm CCLL
Poniente beach	Shapefile representing Poniente beach footprint	Provided by Benidorm CCLL
Cala Finestrat beach	Shapefile representing Cala Finestrat beach footprint	Provided by Benidorm CCLL
Terra Mítica theme park	Shapefile representing Terra Mítica theme park footprint	Self-produced from satellite imagery
IES Pere María Orts institute	Shapefile representing IES Pere María Orts institute footprint	Self-produced from satellite imagery
CV-70 road	Shapefile representing CV-70 road throughout Benidorm municipality	Self-produced from satellite imagery

The information previously described is summarised in the map included in the Appendix (see Benidorm), which is also illustrated in Figure 13.

Figure 13: Schematic representation of key climate-related hazards identified in Benidorm CCLL

[11] https://icv.gva.es/va/

3.6. Oarsoaldea

The main climate change-related hazards and extreme impacts identified in the CCLL are flooding, coastal erosion, landslides and storm surge and tourism, cultural heritage, commercial and residential buildings and energy and transport networks, respectively.

Above all, flooding of residential and tourist areas near the sea is especially relevant, as many Guipúzcoa municipalities are settled in old marshes.

In light of Oarsoaldea's responses, the study area has been divided in the four municipalities which are part of Oarsoaldea, namely: Errenteria, Lezo, Oiartzun and Pasaia. A summary of the geographical files utilised in the GIS model is included in Table 8. The geographical data have been mainly collected from *geoEuskadi*[12] website and consist of five 1:5000 scale shapefiles.

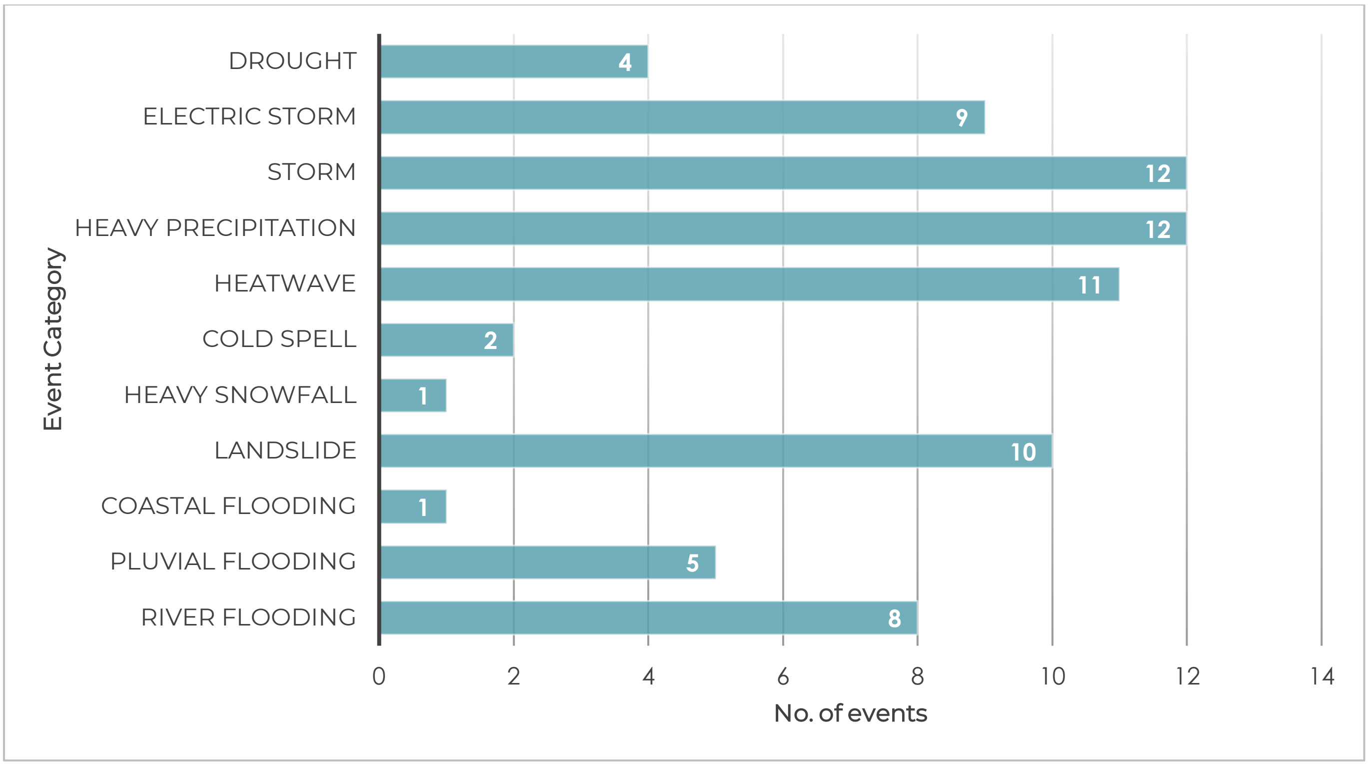
Table 8: Summary of the geographical files utilised in Oarsoaldea's past events mapping.

Area	Description	Shapefile source
Study Area	Shapefile representing Oarsoaldea shire/county at 1:5000 scale.	Self-produced from geoEuskadi data
Errenteria	Shapefile representing Errenteria municipality at 1:5000 scale.	geoEuskadi
Oiartzun	Shapefile representing Oiartzun municipality at 1:5000 scale.	geoEuskadi
Pasaia	Shapefile representing Pasaia municipality at 1:5000 scale.	geoEuskadi
Lezo	Shapefile representing Lezo municipality at 1:5000 scale.	geoEuskadi

With the help of the partners, the past extreme climate change events in Oarsoaldea have been collected and summarised (see Oarsoaldea). The number of events by category are represented in Figure 14. Storms and heavy precipitation events are the most recurrent events. Of especial relevance are also heat waves, landslides, electric storms and river flooding episodes. Finally, the less recurrent events are cold spells, heavy snowfall and coastal flooding episodes.

[12] https://www.geo.euskadi.eus/webgeo00-inicio/es/

Figure 14: Number of past events recorded in Oarsoaldea CCLL by category (1900-2022).



In summary, seventy-five (75) past events have been collected in Oarsoaldea, including episodes of river flooding, pluvial flooding, coastal flooding, landslide, heavy snowfall, cold spell, heatwave, heavy precipitation, storm, electric storm, and drought (Table 9). Fifty (50) of them affected the whole area of Oarsoaldea, including heavy snowfall, cold spell, heatwave, heavy precipitation, storm, electric storm, and drought events. The remaining twenty-five (25), affected one or more of the municipalities included in Oarsoaldea, but not all the four. Each municipality has been analysed individually, so it has been counted how many times each municipality was affected by one of these last twenty-five (25) events. In this way, Errenteria has been affected eleven (11) times by either river or pluvial flooding; Oiartzun six (6) times by river or pluvial flooding again; Pasaia has been the most affected municipality registering eighteen (18) events including river flooding, pluvial flooding, coastal flooding and landslides; and Lezo has been the less affected municipality only registering three (3) events of pluvial flooding or landslides.

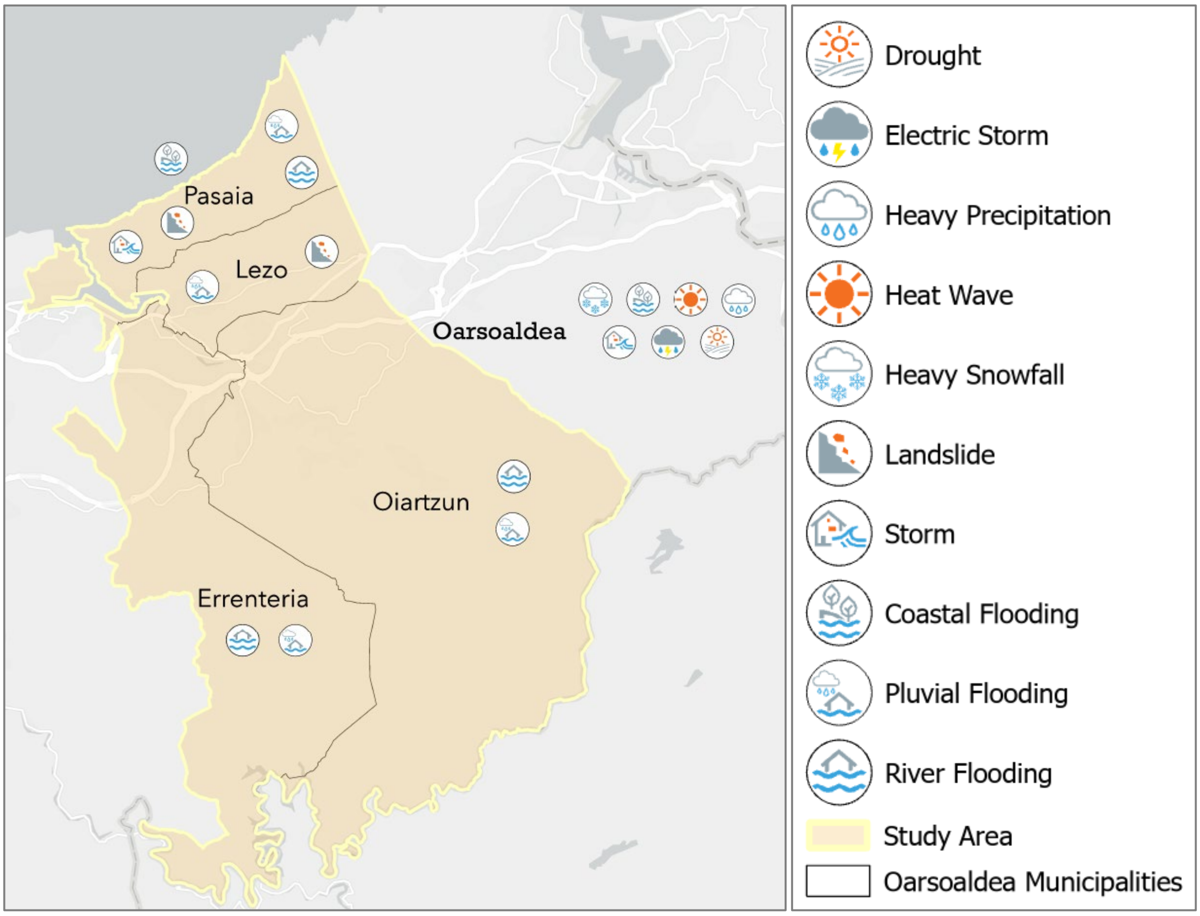
Table 9: Distribution per geographic area of the past events recorded in Oarsoaldea CCLL.

Area	No. of past events recorded	Past events categories
Errenteria	11*	River flooding and pluvial flooding.
Oiartzun	6*	River flooding and pluvial flooding.
Pasaia	18*	River flooding, pluvial flooding, coastal flooding, storm and landslide.
Lezo	3*	Pluvial flooding and landslide.
Oarsoaldea	50	Heavy snowfall, cold spell, heatwave, heavy precipitation, storm, electric storm and drought.
Total	75	All above.

** Twenty-five (25) events in total, affecting Oarsoaldea's municipalities partially.*

Consequently, the events have been assigned to the affected areas in the GIS model (see Oarsoaldea). In Figure 15, different symbols represent the events occurred in each area of study.

Figure 15: Schematic representation of key climate-related hazards identified in Oarsoaldea CCLL.



Photography for the coastal flooding affecting Pasaia in Winter 2014 and the river flooding occurred in Errenteria December 2021 have been provided by Oarsoaldea CCLL. These pictures are presented in Figure 16.

Figure 16: Coastal flood in Winter 2014 in Pasaia (left) and river flood in December 2021 in Errenteria (right).

3.7. Oeiras

Flooding, coastal erosion, landslides, droughts and heat waves are the main climate change hazards identified in Oeiras. Although Oeiras Municipality is connected to many climatic-related hazards, flooding is seen as the most relevant. Hazards associated to floods can directly affect several assets (e.g., public facilities and infrastructures), as well have societal impacts on health and public services.

The main information sources on past climate events for Oeiras are described in the following lines.

- **Civil Protection occurrences database**[13]. The National Authority for Emergency and Civil Protection have classified, in a national database, occurrences by type since 2006.
- **DISASTER database**[14]. This database, from Instituto of Geography and Spatial Planning – University of Lisbon (IGOT-UL), is based on newspapers sources and contains information on landslides and floods that caused casualties; injuries; and missing, evacuated or homeless people; for the period 1865-2010. More information can be found in Zêzere et al. (2014) and the project web page.
- **Civil Protection Municipality plan**[15]. The document "Plano Municipal De Emergência De Proteção Civil Municipio De Oeiras – 2018" reports and provides susceptibility maps of the climate related risks in Oeiras Municipality (e.g., extreme coastal floods, heatwaves, cold spells, landslides, and river and pluvial floods).

The study area (Oeiras municipality) has been geographically divided at parochial level (Table 10), including the parishes of Oeiras e S. Julião da Barra, Paço de Arcos e Caxias; Algés, Linda-a-Velha e Cruz Quebrada-Dafundo; Carnaxide e Queijas; Barcarena; and Porto Salvo. The geographical data have been obtained and derived from the Portuguese Public Administration's open data portal[16, 17] (Dados.gov).

Table 10: Summary of the geographical files utilised in Oeiras's past events mapping.

Area	Description	Shapefile source
Study Area	Shapefile representing Oeiras municipality.	Self-produced from Portuguese Public Administration's open data portal.
União das freguesias de Algés, Linda-a-Velha e Cruz Quebrada-Dafundo	Shapefile representing the parishes of Algés, Linda-a-Velha and Cruz Quebrada-Dafundo.	Self-produced from Portuguese Public Administration's open data portal.
União das freguesias de Carnaxide e Queijas	Shapefile representing the parishes of Carnaxide and Queijas.	Self-produced from Portuguese Public Administration's open data portal.
Barcarena	Shapefile representing Barcarena parish.	Self-produced from Portuguese Public Administration's open data portal.
Porto Salvo	Shapefile representing Porto Salvo parish.	Self-produced from Portuguese Public Administration's open data portal.

[13] https://dados.gov.pt/en/reuses/ocorrencias-em-aberto/
[14] http://riskam.ul.pt/disaster/en
[15] http://planos.prociv.pt/Documents/132131286457737300.pdf
[16] https://dados.gov.pt/es/datasets/freguesias-de-portugal/
[17] https://dados.gov.pt/es/datasets/concelhos-de-portugal/

União das freguesias de Oeiras e São Julião da Barra, Paço de Arcos e Caxias	Shapefile representing the parishes of Oeiras e São Julião da Barra, Paço de Arcos and Caxias.	Self-produced from Portuguese Public Administration’s open data portal.

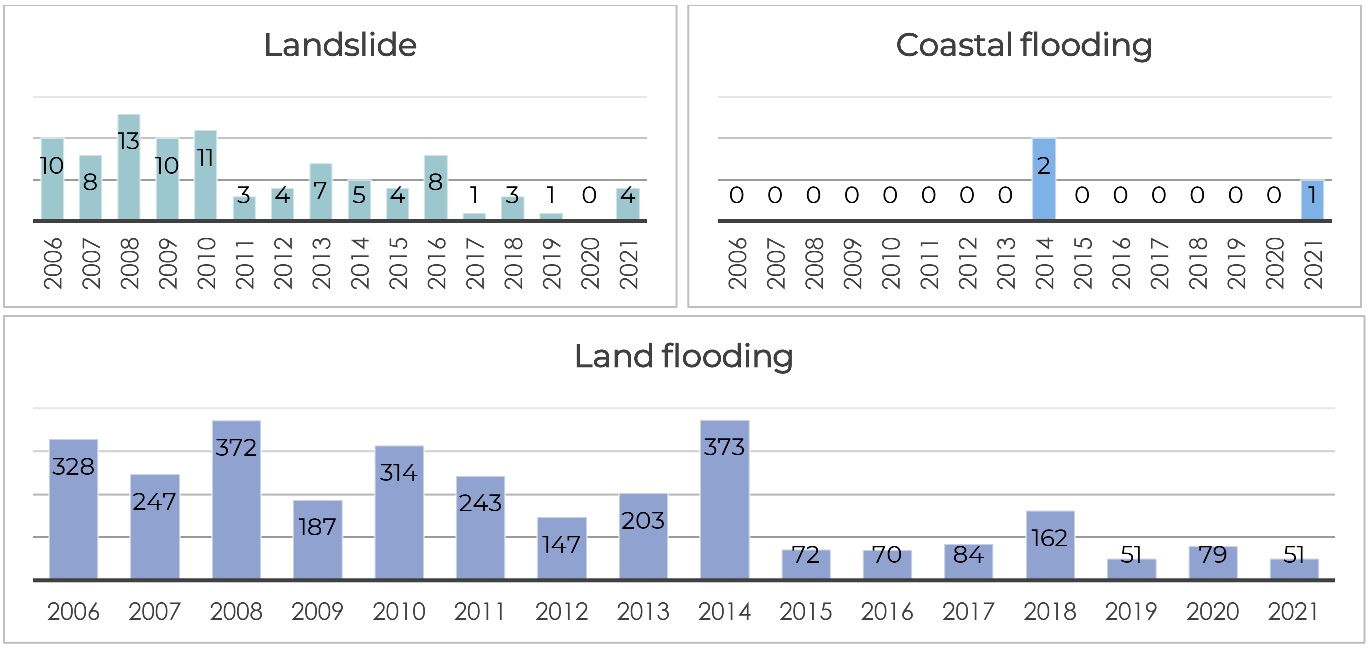
The Civil Protection occurrences database holds a record of a wide variety of natural and technological related hazards that have occurred in Portugal since 2006. In particular, the past events obtained from this dataset for Oeiras municipality are summarised in Table 11. The most frequent events are the episodes of flooding due the heavy rainfall, with over three thousand (~3000) occurrences. Moreover, ninety-two (92) landslides and three (3) coastal flooding episodes have been recorded. There have been not found events of strong winds, heavy snowfall, heat waves, cold spells, droughts or coastal erosion in this database for Oeiras. In addition, the number of occurrences by type and year for the entire municipality have been represented in Figure 17.

Table 11: Geographic distribution of the climate-related occurrences recorded in Oeiras CCLL at parochial level from the Civil Protection occurrences database for the years 2006-2021.

Area (parishes)	Landslide	Pluvial Flooding*	Coastal Flooding	Total
Algés, Linda-a-Velha e Cruz Quebrada-Dafundo	22	790	1	813
Carnaxide e Queijas	35	842	0	877
Barcarena	20	336	0	356
Porto Salvo	2	115	0	117
Oeiras e São Julião da Barra, Paço de Arcos e Caxias	13	900	2	915
Total (Oeiras municipality)	92	2983	3	3078

** Specifically, flooding of built spaces or surfaces, including roads or streets, by the combination of heavy precipitation and partially or totally impeded drainage.*

Figure 17: Number of occurrences by category recorded in the Civil Protection occurrences database in Oeiras CCLL for the period 2006-2021.



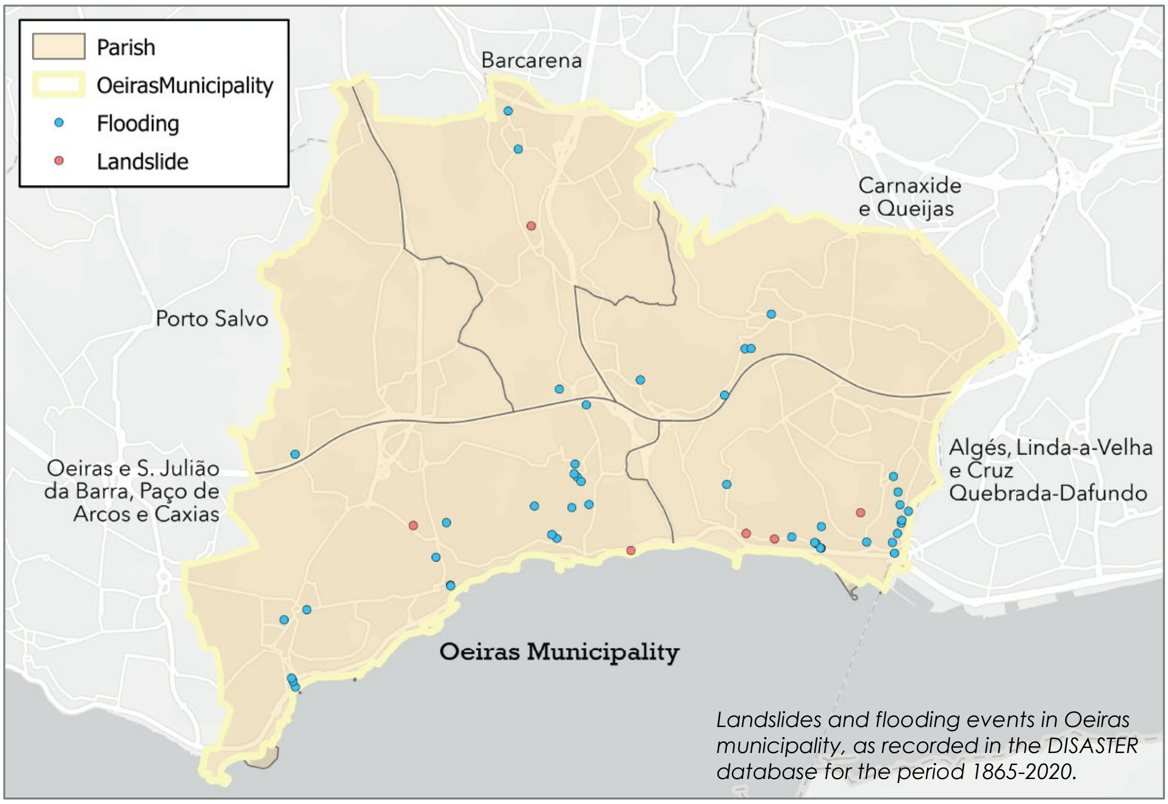
The DISASTER database contains information on landslides and flooding episodes exclusively. The number of events by study and category area are summarised in Table 12. In total, forty-five (45) flooding events and six (6) landslides occurrences have been identified during 1865-2020.

Table 12: Geographical distribution of past events recorded in Oeiras CCLL at parochial level from the DISASTER database for the years 1865-2020.

Area (parishes)	Landslide	Flooding	Total
Algés, Linda-a-Velha e Cruz Quebrada-Dafundo	3	17	20
Carnaxide e Queijas	0	5	5
Barcarena	1	3	4
Porto Salvo	0	1	1
Oeiras e São Julião da Barra, Paço de Arcos e Caxias	2	19	21
Total (Oeiras municipality)	6	45	51

The previous events from the DISASTER database have been represented in a map (Figure 18). Most of the events are concentrated along the coastline, in the perishes of Oeiras e São Julião da Barra, Paço de Arcos, Caxias, Algés, Linda-a-Velha and Cruz Quebrada-Dafundo; whereas only one (1) event has been recorded in Porto Salvo.

Figure 18: Map representing the landslides (red points) and flooding events (blue points) in Oeiras municipality recorded in the DISASTER database for the period 1865-2020.



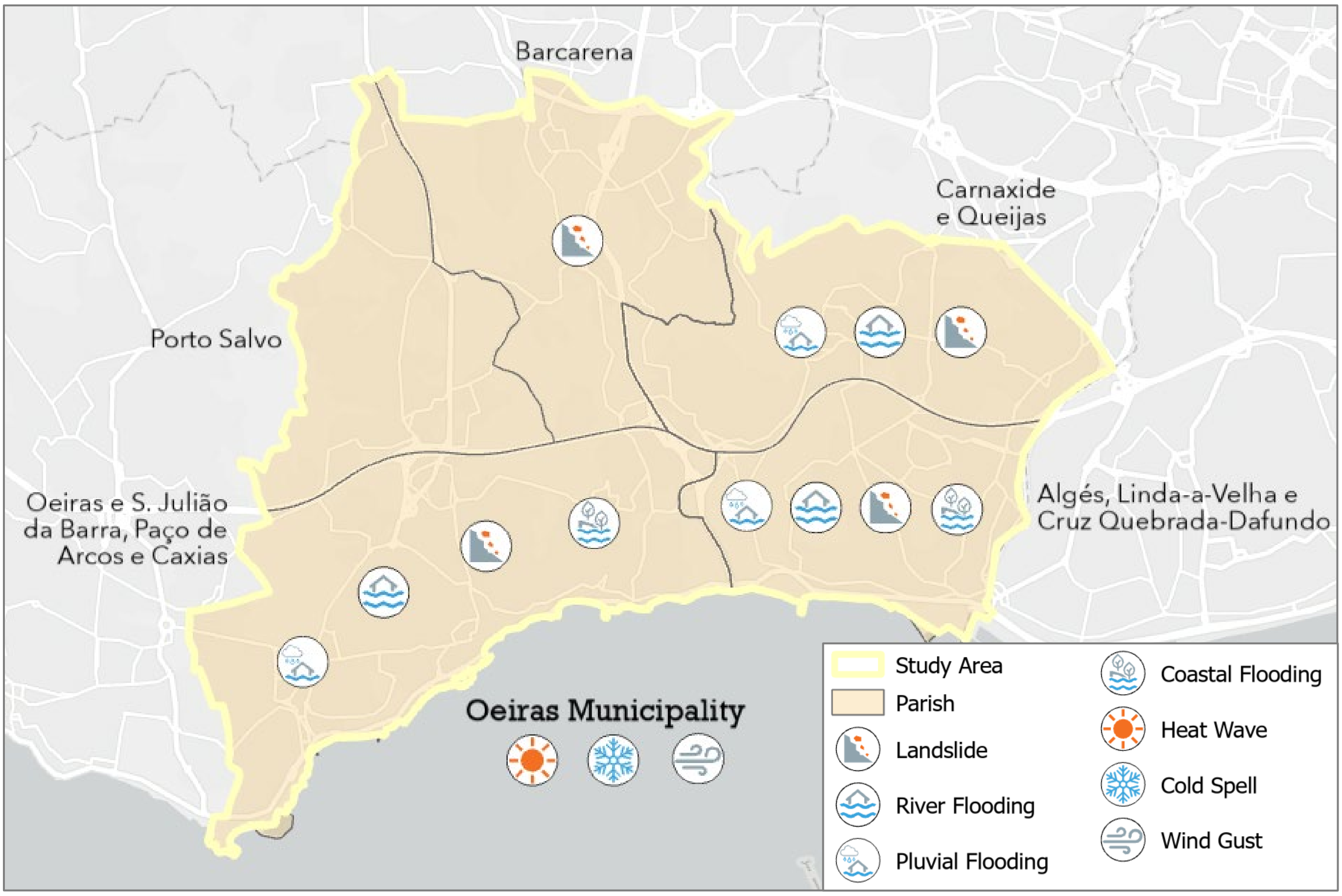
The document *Plano Municipal De Emergência De Proteção Civil Municipio De Oeiras – 2018* contains a series of susceptibility maps, including, among other natural hazards, heat waves, cold spells, strong winds, river and pluvial flooding events, coastal flooding and landslides. A more detailed description of the information available on this document is provided in Table 13.

Table 13: Summary of the maps contained in the document Plano Municipal De Emergência De Proteção Civil Municipio De Oeiras – 2018 related to WP1.

Map title	Climate event category	Short description
Suscetibilidade de ocorrência de ondas de calor no concelho de Oeiras	Heat wave	The map represents the susceptibility of occurrence of a heat wave in Oeiras municipality in a colour scale ranging between very low, low and moderate.
Suscetibilidade de ocorrência de ondas de frio no concelho de Oeiras	Cold spell	The map represents the susceptibility of occurrence of a cold spell in Oeiras municipality in a colour scale ranging between low and moderate.
Suscetibilidade de ocorrência vento forte no concelho de Oeiras	Strong wind	The map represents the susceptibility of occurrence of a strong wind in Oeiras municipality in a colour scale ranging between low, moderate and high.
Ocorrências de inundações entre 2006 e 2007	River and pluvial flooding	The map represents the past river and pluvial flooding events in Oeiras municipality occurred during 2006-2007.
Delimitação das Áreas Inundáveis para um período de retorno de 100 anos	River and pluvial flooding	The map represents the flood-prone areas in Oeiras municipality for the 100-year period return.
Carta de Risco de Inundação (Alínea a) e b) do Artigo 8.º do DL 115/2010).	River and pluvial flooding	Flood risk map in Oeiras municipality
Inundações e Galgamentos Costeiros	Coastal flooding	The map represents the coastal areas susceptible of coastal flooding in Oeiras municipality.
Inventário de Movimentos de Massa em Vertentes no Município de Oeiras	Landslide	The map represents the landslides in Oeiras municipality occurred during 2006-2007.
Suscetibilidade aos Movimentos de Massa em Vertentes no Município de Oeiras	Landslide	The map represents the susceptibility of occurrence of a landslide in Oeiras municipality in a colour scale ranging between very low, low, moderate and high.

According to the three information sources described before, a map representing the main hazards affecting each parish and the entire municipality of Oeiras has been produced in ArcGIS Pro (see Oeiras). As it can be observed in the map, which is partly shown in Figure 19, the main climate-change-related hazards affecting the study area are landslides, river flooding, pluvial flooding, coastal flooding, heat waves, cold spells and strong winds. The three first affect mainly the parishes of Carnaxide e Queijas; Oeiras e São Julião da Barra, Paço de Arcos e Caxias; and Algés, Linda-a-Velha e Cruz Quebrada-Dafundo; although landslides also affect Barcarena. Coastal flooding events are of concern for practically the entire Oeiras coastline. Finally, heat waves, cold spells and strong winds affect the whole municipality.

Figure 19: Schematic representation of key climate-related hazards identified in Oeiras CCLL.



3.8. Massa

In Tuscany, as in many other regions, there is an increasing trend in intense precipitation episodes, which have led to significant negative impacts on this CCLL in recent decades. Following on the results from the literature review, the most dangerous climate-related hazards are represented by the floods in lowland areas and landslides in the hilly area, from the point of view of the safety of people, and the coastal erosion, from the point of view of economic consequences. The reduction of the beach area by the erosion is one of the main economic problems arisen due to the impact on the tourist offer.

The main information source regarding extreme climate events is the alert system provided by the Regional Functional Centre of the Tuscany Region. Reports on past climate events since 2009 are available on its website [18].

The information on past climate events provided by Massa CCLL is summarised in the Appendix (see Massa). The past events list includes the categories of heavy precipitation, coastal storm, river flooding, landslides and pluvial flooding, although episodes of coastal erosion and strong winds can also be identified within the short descriptions. The events mainly affect the areas of the city centre, the hilly and the mountain areas, and the coast, as specified in Table 14.

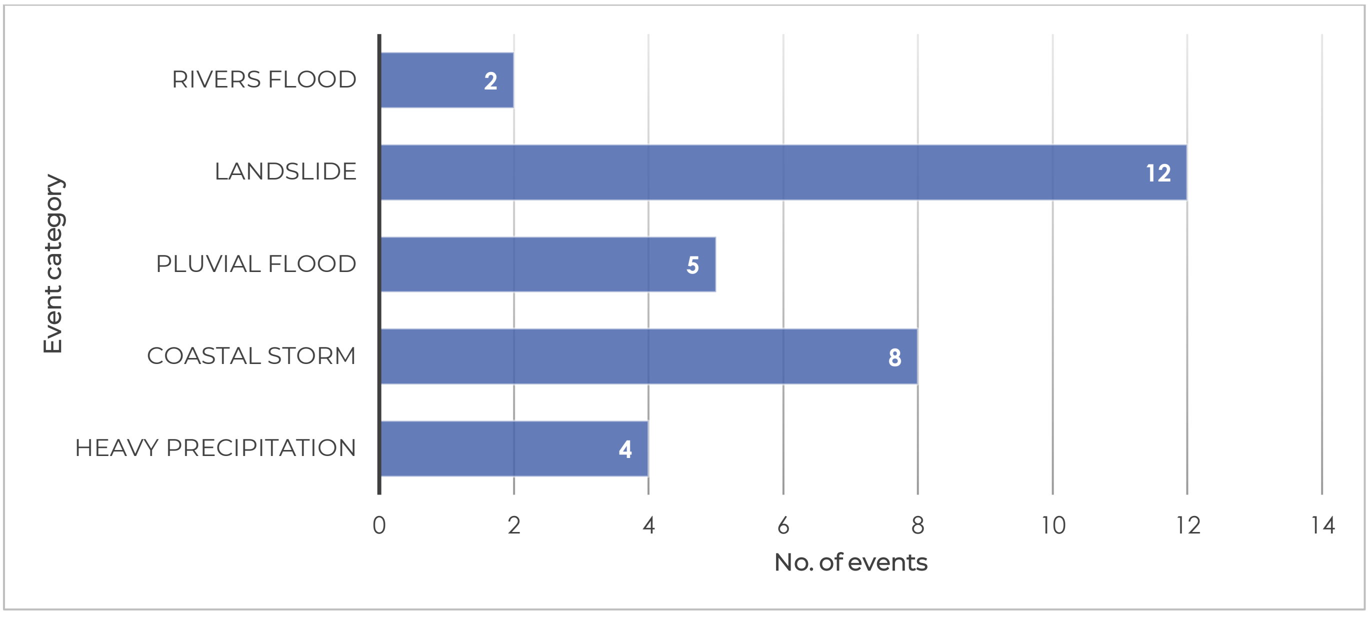
[18] https://www.cfr.toscana.it/index.php?IDS=23&IDSS=191

Table 14: Geographical distribution of the past events identified in Massa CCLL.

Event category	Areas affected
Heavy precipitation	Hilly and coastal area
Coastal Storm	Coastal area and city centre
Pluvial Flood	Coastal area, city centre, hilly area and mountain area
Landslide	Hilly and mountain areas
Rivers Flood	Coastal area
Strong wind	City centre and coastal area
Coastal Erosion	Coastal area

In total, thirty-one (31) events have been identified since 1994 (Figure 20). Most of them are landslides, with twelve (12) occurrences, followed by eight (8) coastal storm episodes. Seven (7) land flooding events, which five (5) have been catalogued as pluvial flooding and two (2) as river flooding, and four (4) heavy precipitation events complete the table.

Figure 20: Number of past events recorded in Massa CCLL by category (1994-2021).

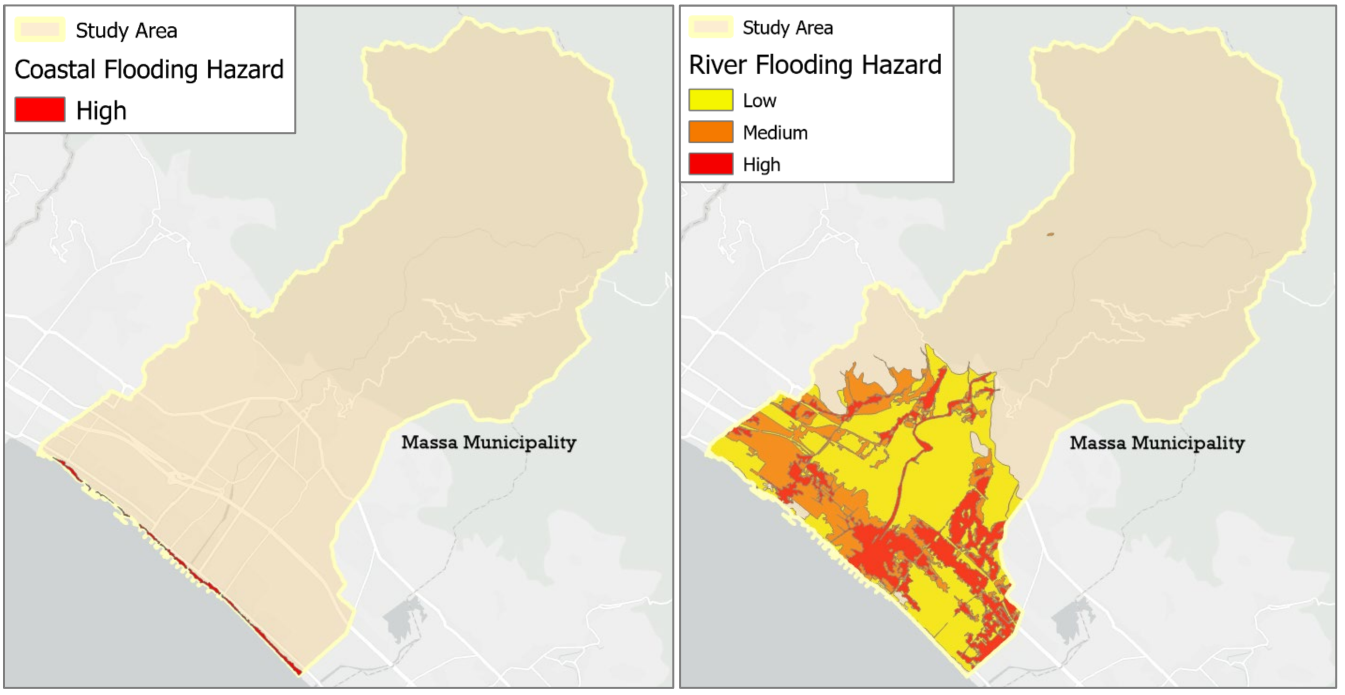


Furthermore, the District Basin Authority of the Northern Apennines (Autorità di bacino distrettuale dell'Appennino Settentrionale) have produced hazard maps on coastal flooding, river flooding and landslides, which are publicly available on a web-viewer [19, 20].

[19]https://geodataserver.appenninosettentrionale.it/portal/apps/webappviewer/index.html?id=bc700cea326441a49c0bb6d4a4b24c5b
[20]https://geodataserver.appenninosettentrionale.it/portal/apps/webappviewer/index.html?id=5df4e2dc9f79431ea89eef064912c45a

The data on coastal flooding[21] and river flooding[22] hazards for Massa municipality shown in Figure 21, have been retrieved from the map "PGRA - Mappa della Pericolosità da alluvione fluviale e costiera", for the Northern Apennine District, pursuant to EC "Directive 2007/60" and the Italian "Legislative Decree 49/2010".

Figure 21: Coastal flooding (left) and river flooding (right) hazard in Massa municipality, according to the probability scenarios of low (yellow), medium (orange) and high (red) hazard. Data from: Autorità di bacino distrettuale dell'Appennino Settentrionale – "Mappa della Pericolosità da alluvione fluviale e costiera" (PGRA).



Moreover, the landslide hazard information[23] displayed in Figure 22 has been downloaded from the "Plan on landslide and geomorphological risk" (PAI) at 1/10,000 scale, and the spatial reference system utilised is the ROMA40/OVEST.

Finally, the map representing the extreme climate events affecting Massa CCLL is included in the Appendix (see Massa) and Figure 23.

[21] http://www.adbarno.it/pagine_sito_opendata/gds_md_scheda_ridotta.php?id_ds=2840
[22] http://www.adbarno.it/pagine_sito_opendata/gds_md_scheda_ridotta.php?id_ds=2839
[23] http://www.adbarno.it/pagine_sito_opendata/gds_md_scheda_completa.php?id_ds=2841#blocco09

Figure 22: Landslide hazard map in Massa municipality, according to the probability scenarios of high (orange) and very high (red) hazard. Data from: Autorità di bacino distrettuale dell'Appennino Settentrionale – "Pericolosita' geomorfologica del PAI bacini regionali toscani".

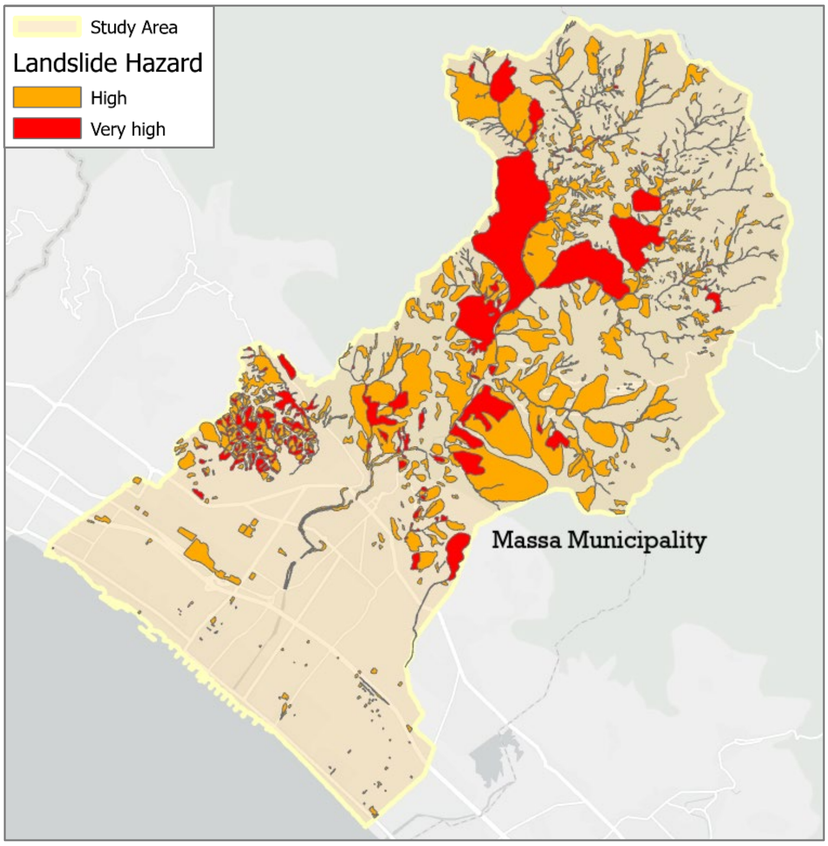
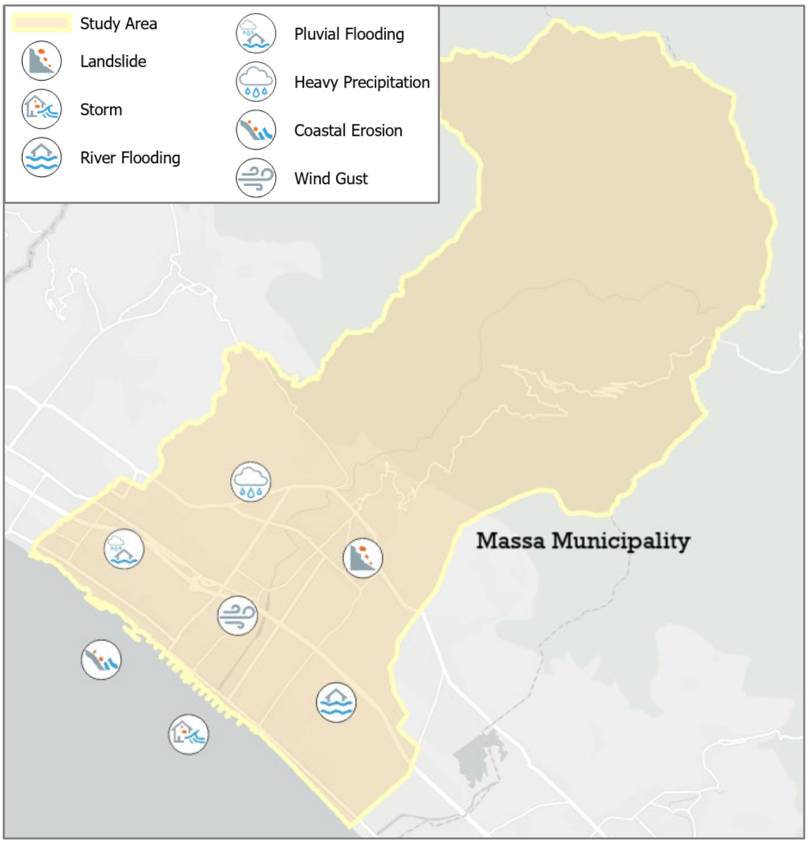


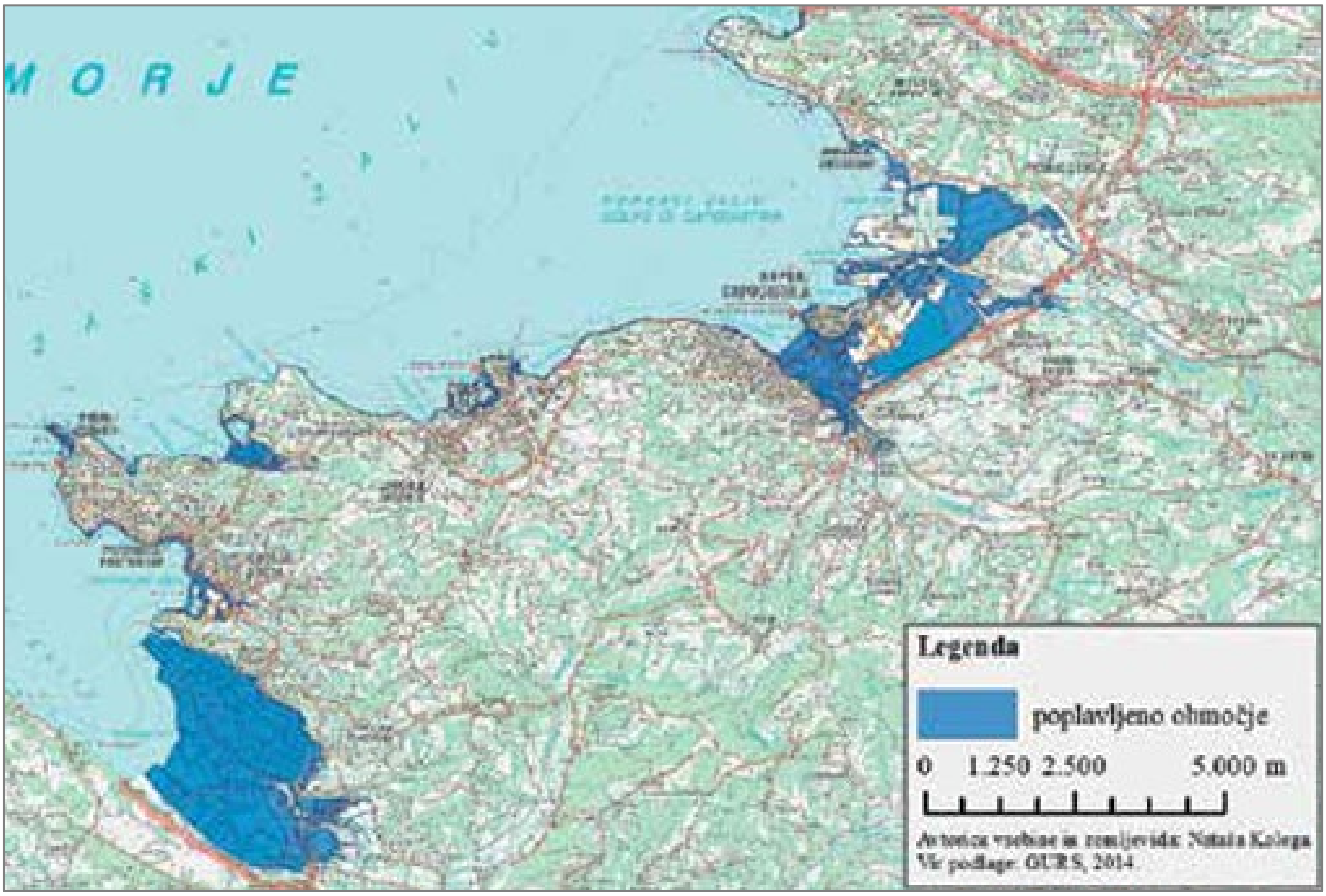
Figure 23: Schematic representation of key climate-related hazards identified in Massa CCLL.



3.9. Piran

The main concerns for this CCLL are storms, coastal flooding, droughts and heat waves. Coastal flooding produces damage to life and property and water infrastructure, access to fresh water, and adverse effects on aquacultures receiving the storm runoff. It leads to road cut-offs and the isolation of the citizens and threats buildings and heritage sites. In this sense, a review of coastal flooding events along the Slovenian coast with emphasis on their formation, extent and impacts can be found in Kovačič et al. (2016). A similar study is carried out in Grubar et al. (2019), where land exposure to flooding) is determined for sea level rises of 50 and 100 cm along the Slovenian coast. For the worst scenario, great urban areas would be submerged (see Figure 24), including the old city centre of Piran. In fact, as a recent example, an episode of coastal flooding affected the Tartini Square (Piran) in November 2019. Moreover, the increasing frequency of heatwaves and droughts may exacerbate the water scarcity in the Slovenian coastal area, especially during the summer tourist season. Conversely to coastal flooding, droughts and water scarcity are identified as long-term challenges.

Figure 24: Flooded areas (blue) in case of rising mean sea level by 100 cm and high tide. From: Grubar et al. (2019).



The CCLL of Piran has provided a dataset containing occurrences (Civil Protection interventions) related to climate events in Piran since 2005. The list of occurrences has been extracted from the platform managed by the Administration of the RS for Civil Protection and Disaster Relief[24] in Piran. The total amount of occurrences recorded in the database is 1713, including episodes of coastal flooding, land flooding, strong winds, cold spells, droughts and

[24] https://spin3.sos112.si/javno/zemljevid

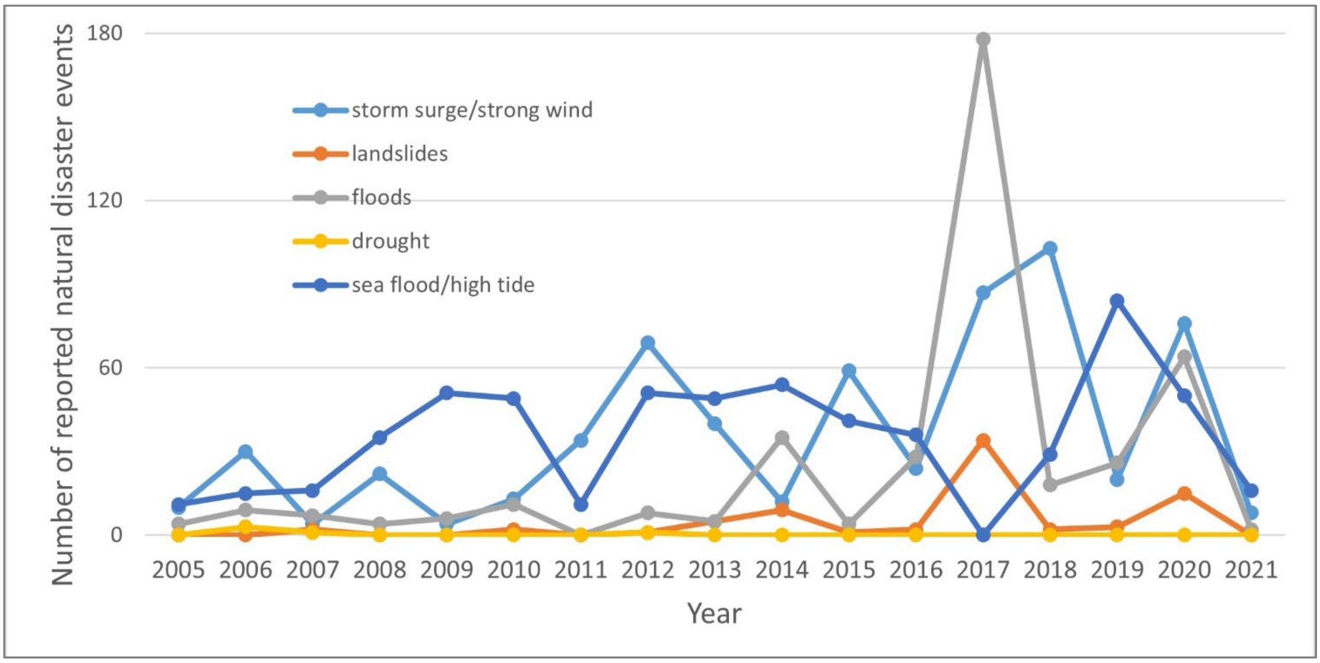
landslides. The distribution of the number of occurrences are described in Table 15 and Figure 25, where the floods are subcategorised into coastal flooding, pluvial flooding, river flooding, and groundwater flooding.

Table 15: Number of climate-related occurrences recorded in Piran CCLL by category since 2005, as provided by the Administration of the RS for Civil Protection and Disaster Relief.

Event category	Number of events
Coastal flooding	598
Pluvial flooding	362
River flooding	39
Groundwater flooding	7
Strong winds	616
Cold spell	10
Drought	5
Landslide	76
Total	1713

The most frequent event are coastal flooding, pluvial flooding, and strong winds, with 598, 362, and 616 episodes, respectively, whereas the other flooding categories, landslides, cold spells and droughts show a reduced number of occurrences in the city.

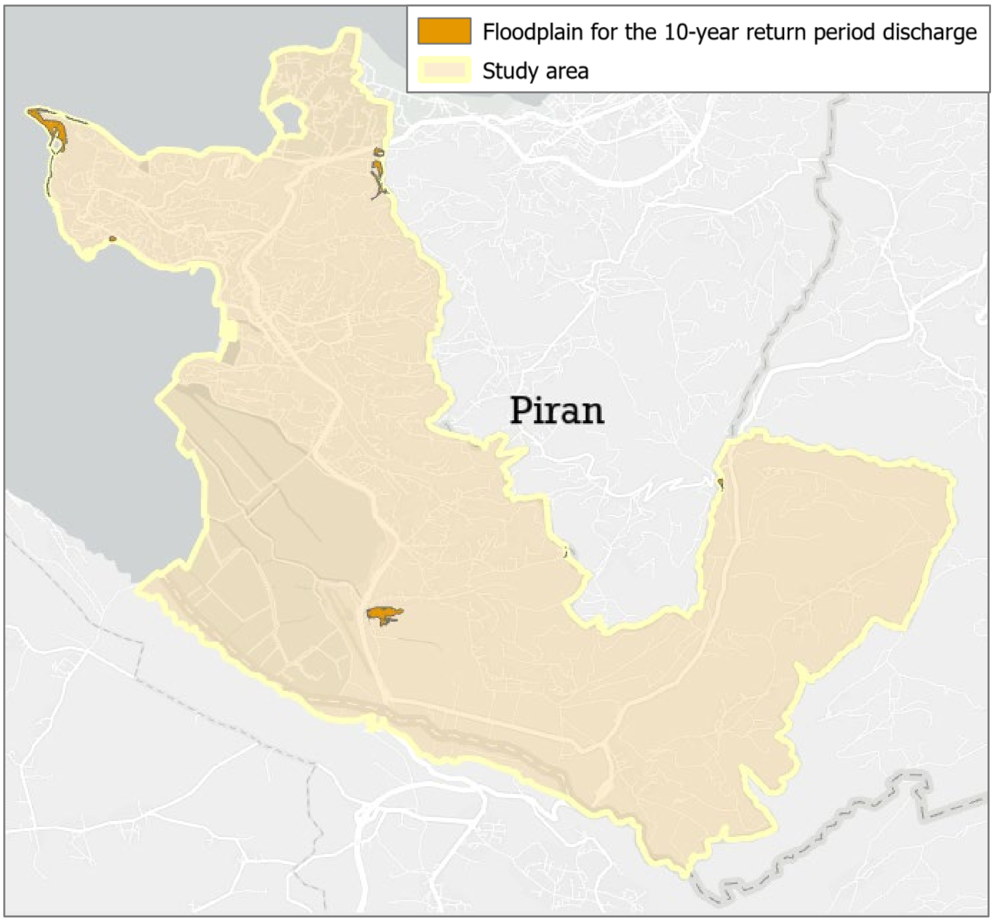
Figure 25: Yearly reported number of occurrences related to natural disaster events over the period 2005-2021 in the town of Piran, Slovenia.



Furthermore, Piran CCLL has provided extensive information on flood and landslides hazard maps for this task. The information sources and related data are presented in the following lines. The complete datasets are included in the Appendix (see Piran).

Firstly, the Ministry of the Environment and Spatial Planning – Directorate of the Republic of Slovenia for Water, has produced a series of integrated flood hazard maps, representing the floodplains for the 500-year[25], 100-year[26] and 10-year[27] return periods discharge value. Unfortunately, only the map associated to the 10-year return period discharge value was available during the writing of this report, and therefore, it is the only map of the series which has been included in the Appendix (see Piran) (Figure 26). Flood hazard areas for this map are determined primarily based on a flood warning map, according to the document *Official Gazette of the Republic of Slovenia, No. 60/07 (Article 5)*. The determination of areas is carried out using modelling and analysis methods, which correspond to the recognised state of science based on hydrological, geological, geomorphological and geodetic data, as well as data on land use and cover.

Figure 26: Floodplains for the 10-year return period discharge value. From: Ministry of the Environment and Spatial Planning – Directorate of the Republic of Slovenia for Water.



Similarly, Piran CCLL also provided a series of maps (Flood Cadastre Warning Map[28]) containing data on:

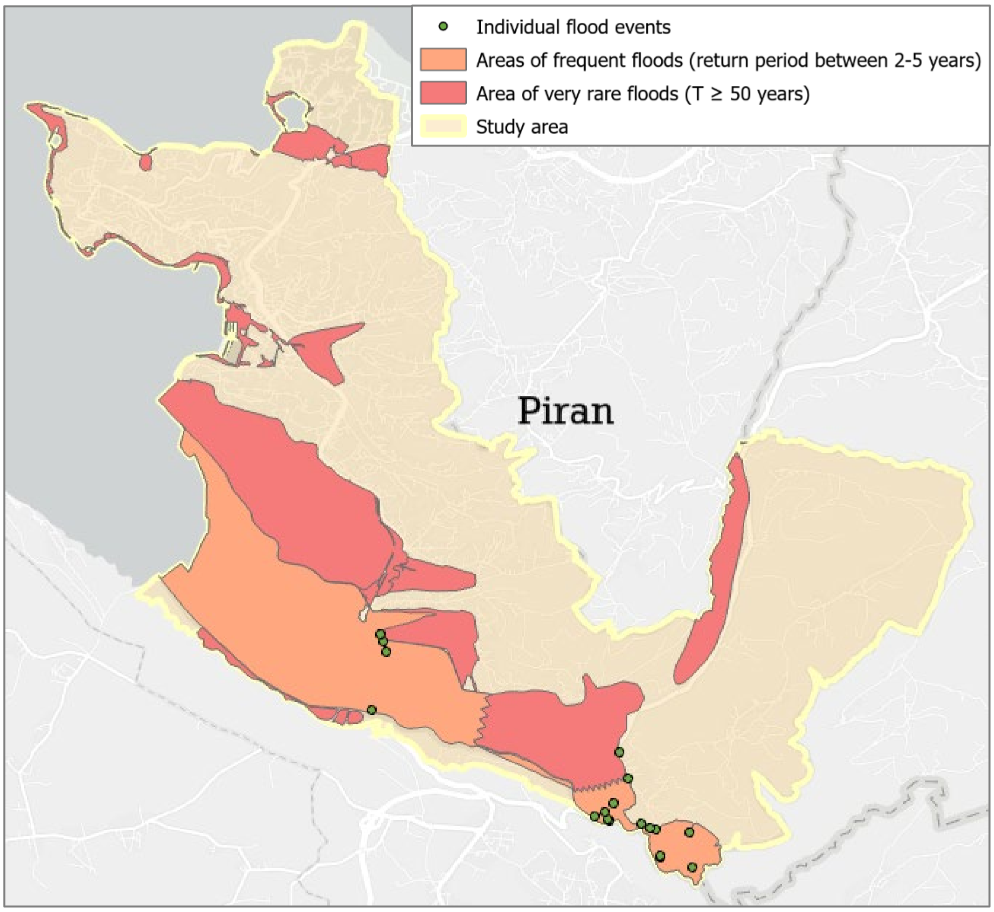
- Areas of very rare floods involving floods with a return period of 50 years or more,
- Areas of frequent floods, which include floods with a return period of 2 to 5 years.

[25] https://podatki.gov.si/dataset/integralna-karta-poplavne-nevarnosti-ikpn/resource/be96647a-9881-425b-aa72-11d97d5fd2c1
[26] https://podatki.gov.si/dataset/integralna-karta-poplavne-nevarnosti-ikpn/resource/da7f4e13-c165-4fb5-af89-3f62a802f6e9
[27] https://podatki.gov.si/dataset/integralna-karta-poplavne-nevarnosti-ikpn/resource/ea4df3e3-6da3-4f19-b353-b2f4fe6308e1
[28] https://podatki.gov.si/dataset/opozorilna-karta-poplav/resource/cb0a034c-a534-4fb2-89ff-01db9ff07358

- Locations of individual flood events with point markings.

The floodplains describe areas of possible occurrences of fluvial and pluvial flooding, according to the associated return period, and determined according to the *Official Gazette of the Republic of Slovenia, No. 60/07 (Article 5)* (Figure 27).

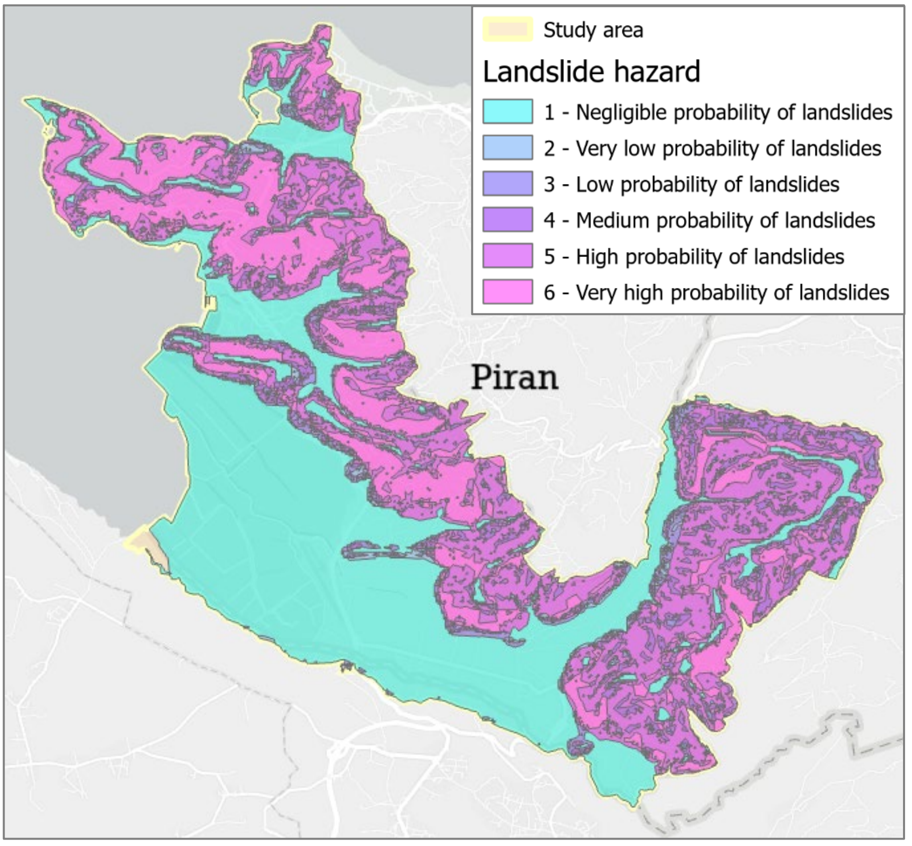
Figure 27: Area of frequent floods, areas of very rare floods, and past individual flood events. Data from: Ministry of the Environment and Spatial Planning – Directorate of the Republic of Slovenia for Water.



Besides, a landslide hazard map has been produced based on the information provided by Piran CCLL, according to the document *Analysis of landslide occurrence in Slovenia and preparation of landslide probability map*[29] *(Analiza Pojavljanja Plazov V Sloveniji In Izdelava Karte Verjetnosti Plazenj)* (Figure 28). The probability scenarios include negligible, very low, low, medium, high and very high probability of landslides. The areas where a landslide is more likely to occur are in the mountains, whereas the probability of landslides is lower in the plains. More details about the probablity levels can be found in the reference document.

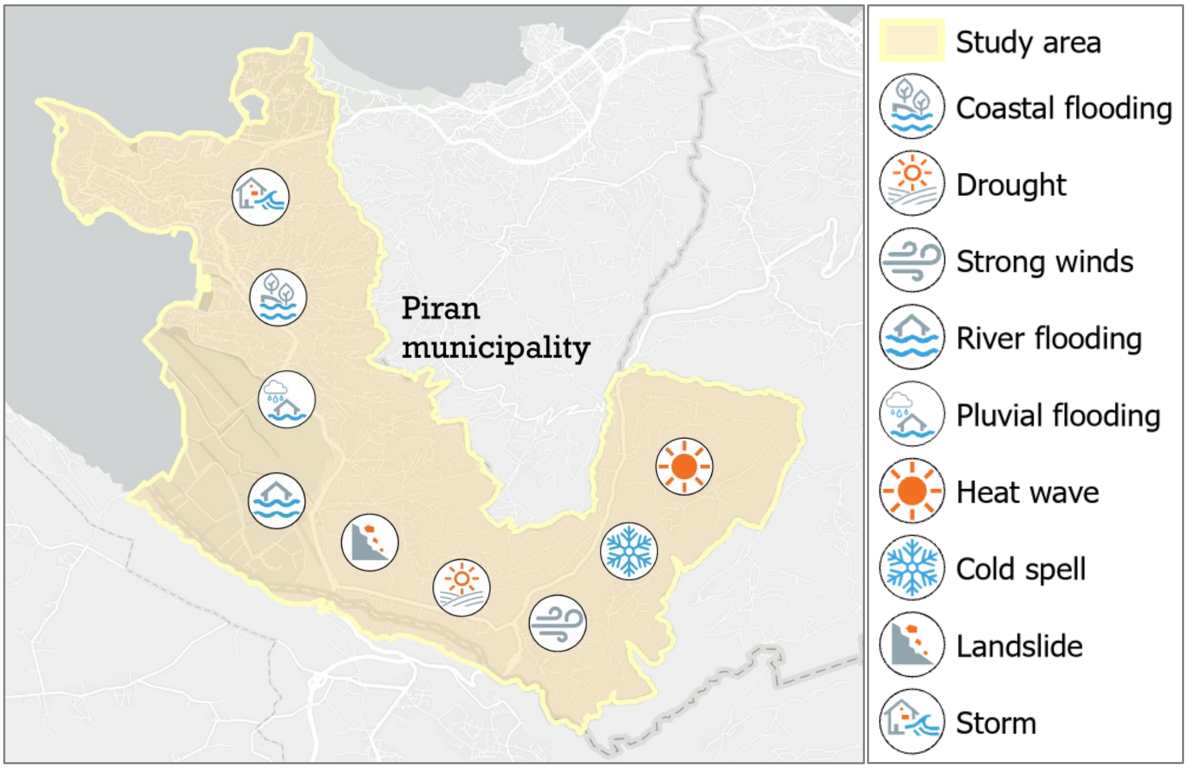
29 http://www.sos112.si/slo/tdocs/plazenja.pdf

Figure 28: Landslide hazard map in Piran. Data from: Analiza Pojavljanja Plazov V Sloveniji In Izdelava Karte Verjetnosti Plazenj.



Finally, the map summarising the key climate-related hazards identified in Piran can be found in Appendix I – maps, whereas an extract is shown in Figure 29.

Figure 29: Schematic representation of key climate-related hazards identified in Piran CCLL.



3.10. Gdańsk

Due to its location, Gdańsk is threatened by many types of floods, both in terms of sources and the scale of possible phenomena. There have been many studies on the historical floods in Gdańsk, caused by both intense rainfall, thaws and ice jams on the Vistula, storm surges from the sea and anthropogenic-related causes (damage to flood protection or anti-storm protection facilities, breakage of embankments, etc.).

According to Gdańsk CCLL, two are the main information sources on past extreme climate events in Gdańsk: the Regional Water Management Board Gdańsk (Regionalny Zarząd Gospodarki Wodnej Gdańsk[30]) and the document "Plan of adaptation to climate change in the city of Gdańsk until 2030" (Plan adaptacji do zmian klimatu miasta Gdańsk do roku 2030[31]).

Data for more than five hundred (500+) pluvial flooding notifications in Gdańsk for the years 2010-2017 and historical floods during 1829-1992 have been made available by the Regional Water Management Board Gdańsk. However, the data on flooding events since 2018 were not available during the writing of this report. The available dataset includes information on the fields descripted in Table 16. The complete dataset is presented in the Appendix (see Gdańsk).

Table 16: Legend of the floods database provided by the Regional Water Management Board Gdańsk.

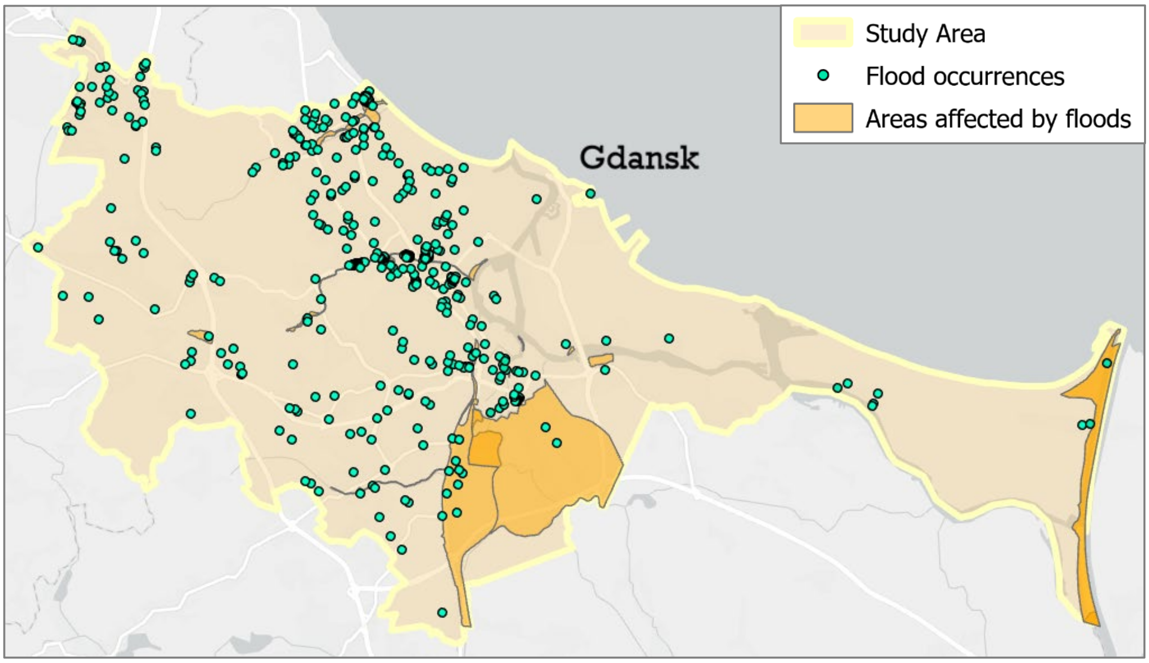
Name	Description
Flood location	Name of the river basin, sub-basin and/or coastal area or other areas associated with each area of potential significant flood risk.
Event category	Information on the specific sources of flooding. • A11 – Fluvial (River) • A12 – Pluvial • A14 – Sea Water
Mechanism of flooding	For each flood event, the mechanism(s) of flooding is indicated. • A21 – Natural Exceedance. • A22 – Defence Exceedance. • A23 – Defence Infrastructural Failure. • A24 – Blockage/Restriction. • A25 – Other. • A26 – No data available on the mechanism of flood. • A27 – Mechanism uncertain.
Short description	Additional information describing the flooding event.
Impacts (human health)	Relevant impacts on human health. • B11 – Human health: adverse consequences for human health, whether immediate or secondary, such as may arise from pollution or interruptions in the provision of water supply and treatment services. Include fatalities. • B12 – Community: adverse community implications such as detrimental impacts on local governance and public administration, emergency response, education, healthcare and social work (e.g., hospitals). • B13 – Other. • B14 – Not applicable.
Impacts (environment)	Relevant impacts on the environment.

[30] http://www.rzgw.gda.pl/
[31] http://44mpa.pl/gdansk/

	• B21 – Status of bodies of water: adverse impacts on the ecological or chemical status of surface water bodies or chemical status of groundwater bodies. Such consequences can arise from pollution from different sources (point and diffuse) or due to the hydromorphological effects of floods. • B22 – Protected areas: adverse consequences for protected areas or water courses such as those designated under the Birds and Habitats Directives, bathing waters or drinking water extraction points. • B23 – Pollution sources: sources of potential contamination in the event of a flood. • B24 – Other potential adverse environmental effects such as soil, biodiversity, flora or fauna. • B25 – Not applicable.
Impacts (cultural heritage)	Relevant impacts on cultural heritage. • B31 – Cultural assets: adverse consequences for cultural heritage that may include archaeological sites / monuments, architectural sites, museums, spiritual sites and buildings. • B32 – Landscape: adverse permanent or long-term consequences for cultural landscapes, that is, cultural properties that represent the combined works of nature and man, such as relics of traditional landscapes. • B33 – Others. • B34 – Not applicable.
Impacts (economy)	Relevant impacts on the economy. • B41 – Real estate (such as homes and businesses). • B42 – Infrastructure (assets such as utilities, power generation, transportation, storage and communications). • B43 – Land use in rural areas (e.g., agriculture, forestry, mineral extraction and fishing). • B44 – Economic activities (e.g., production, construction, retail, services and other employment). • B45 – Other. • B46 – Not applicable.
Date	Date of the flood occurrence (date of the flood's peak).
Size of flooding	The size that characterises the maximum size of the flood. • Lokalne – Local. • Małe – Small. • Średnie – Medium. • Duże – Large.
Return period (years)	The statistical prediction of years between certain flood magnitude events (frequency). It has been reported as a return period (e.g., once in every 100 years).
LAT	Latitude
LON	Longitude

The mechanism of flooding for each pluvial flooding event has been described as “natural exceedance”, as opposed to other possible mechanisms, such as defence exceedance, defence infrastructural failure, and blockage or restriction. Similarly, most of the pluvial flooding events have been categorised as “other rapid onset”, instead of, e.g., flash flood, snow melt flood, medium onset flood, slow onset flood, debris flow, high velocity flow or deep flood. The locations of the flood notifications are mapped in Figure 30.

Figure 30: Geographical distribution of the flood notifications (1829-2017) in Gdańsk. Data from: Regional Water Management Board Gdańsk (Regionalny Zarząd Gospodarki Wodnej Gdańsk).

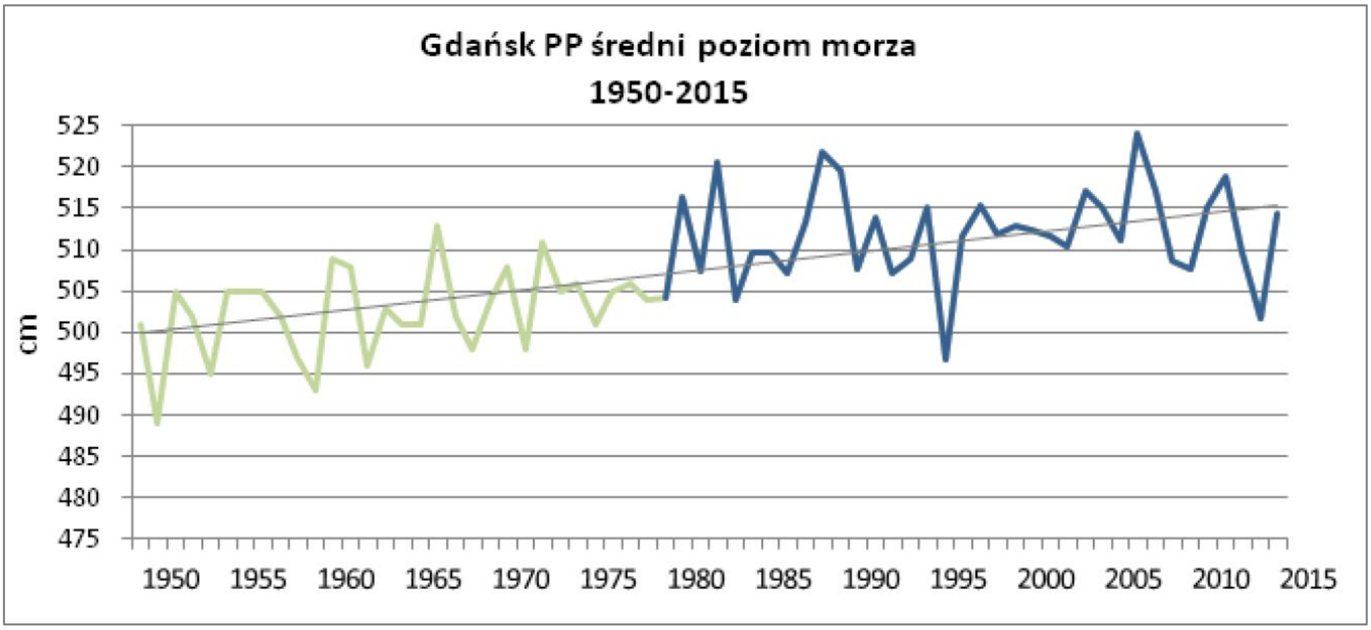


The document *Plan of adaptation to climate change in the city of Gdańsk until 2030* analyses, *inter alia*, the pluvial, river and coastal flooding events; the sea level rise; and the storm surge in Gdańsk. The main results of this study are summarised in the following lines.

Only in the multi-year period 1992-2016, as many as twenty-three (23) cases of urban (sudden, flash) floods were recorded around the city of Gdańsk (see Appendix – Gdańsk). The distribution of urban floods in the city of Gdańsk is characterised by an upward trend for an ordered time series. For instance, as a result of the flood that took place on July 9, 2001, significant areas of the city were affected, including the Orunia-Św. Wojciech Lipce and Śródmieście, as well as the areas of the Wrzeszcz Górny and Wrzeszcz Dolny districts located by the Strzyża stream. Roads and houses next to them collapsed, the railway line Gdańsk - Tczew was seriously endangered. As a result of the flood, 304 people needed immediate evacuation, and the flood stress resulted in the death of 4 people. Moreover, during a downpour on July 9, 2001, within eight hours, 127.7 mm of water per square meter dropped. Finally, the flood in Gdańsk in 2001 caused losses in the city's infrastructure, estimated at about PLN 200 million - not including the losses incurred by the inhabitants.

The document also analyses changes in mean annual sea levels. In Gdańsk Northern Port, in the analysed period 1981-2015 and in the multi-year period 1955-2015, and in both cases, slight increasing trends were noted, as shown in Figure 31.

Figure 31: Mean sea level in the Northern Port of Gdańsk for the multi-year period 1955-2015 (Plan adaptacji do zmian klimatu miasta Gdańsk do roku 2030).



Finally, storm rises in the South Baltic Sea pose a significant flood risk to cities located in the Polish coastal zone. For all the indicators of storm surge analysed (number of storm surges in a given year, number of hours above the Mean High Water Level (MHW) in a given year, maximum level in a given year) in Gdańsk, a growing trend is visible for the ordered time series. In the study, any excess of the characteristic MHW level by the sea mirror was considered to be a storm surge. For the tide gauge located in Gdańsk (Northern Port), this value was 594 cm (which corresponds to an ordinate of 0.86 m above sea level) and was calculated for the multi-year period 1955-2015. The data analysis showed that fifty-nine (59) storm surges occurred in Gdańsk in this multi-year period. In the last analysed 15-year period (2000-2015), nineteen (19) storm surges were recorded, and during four (4) of them the level equal to or higher than 620 cm was recorded. The largest number of storm surges, as many as five (5) cases, occurred in 2007. The total time of exceeding the MHW level in 2007 was 70 hours. In the 15-year period (2000-2015), the total time of exceeding the MHW level was 210 hours (the entire analysis period, 454 hours). The absolute maximum sea level occurred during a storm surge in 2004. The level of 644 cm was recorded then, corresponding to an ordinate of 1.36 m above sea level and to a maximum storm surge of 50 cm according to this methodology.

All the conducted analysis and the recorded effects of natural hazards show that the most serious threat in Gdańsk, due to the location and topography of the city, is mainly the occurrence of sudden urban floods (flash floods) and floods from the side of rivers and floods from the sea (stormy floods). The main cause of which is the wind and the constantly observed rise in sea level.

Another important threat that affects the quality of Gdańsk's functioning is the occurrence of strong gusts of wind and torrential rains due to intense storms, which can cause serious losses in many areas of the economy, hinder transport and pose a threat to human life. In addition, studies have shown that landslides may be a problem in Gdańsk, although most of them are located in undeveloped areas, covered with forests, thickets or wastelands (only about one third of the designated landslides pose a threat to buildings and communication or transmission infrastructure). Despite the currently minor problem in Gdańsk, in the future, attention should be paid to the increasing frequency of heat waves and hot days, which have a negative impact on the human and nature systems as well as economic and communication infrastructure. A quite significant stressor affecting many sectors in the city may be the presence of snow cover, which is characterised by large spatial diversification in the area of Gdańsk. It should be noted, however, that due to the observed climate warming, a further reduction in the number of days with snow cover is expected. Due to the local conditions and the coastal location, the urban heat island and air pollution pose a lesser threat in Gdańsk.

3.11. Samsun

As a result from the *Literature Review Report* (SCORE – D1.1), it was found that coastal erosion is the most important concern for the Samsun CCLL and Kızılırmak Delta. Coastal and land floods are other important hazards for the region. In this context, the Samsun CCLL has outlined three scientific articles providing information regarding coastal erosion and shoreline change, which are summarised in the following lines, and produced a table summarising the historical pluvial flooding events (see Appendix – Samsun).

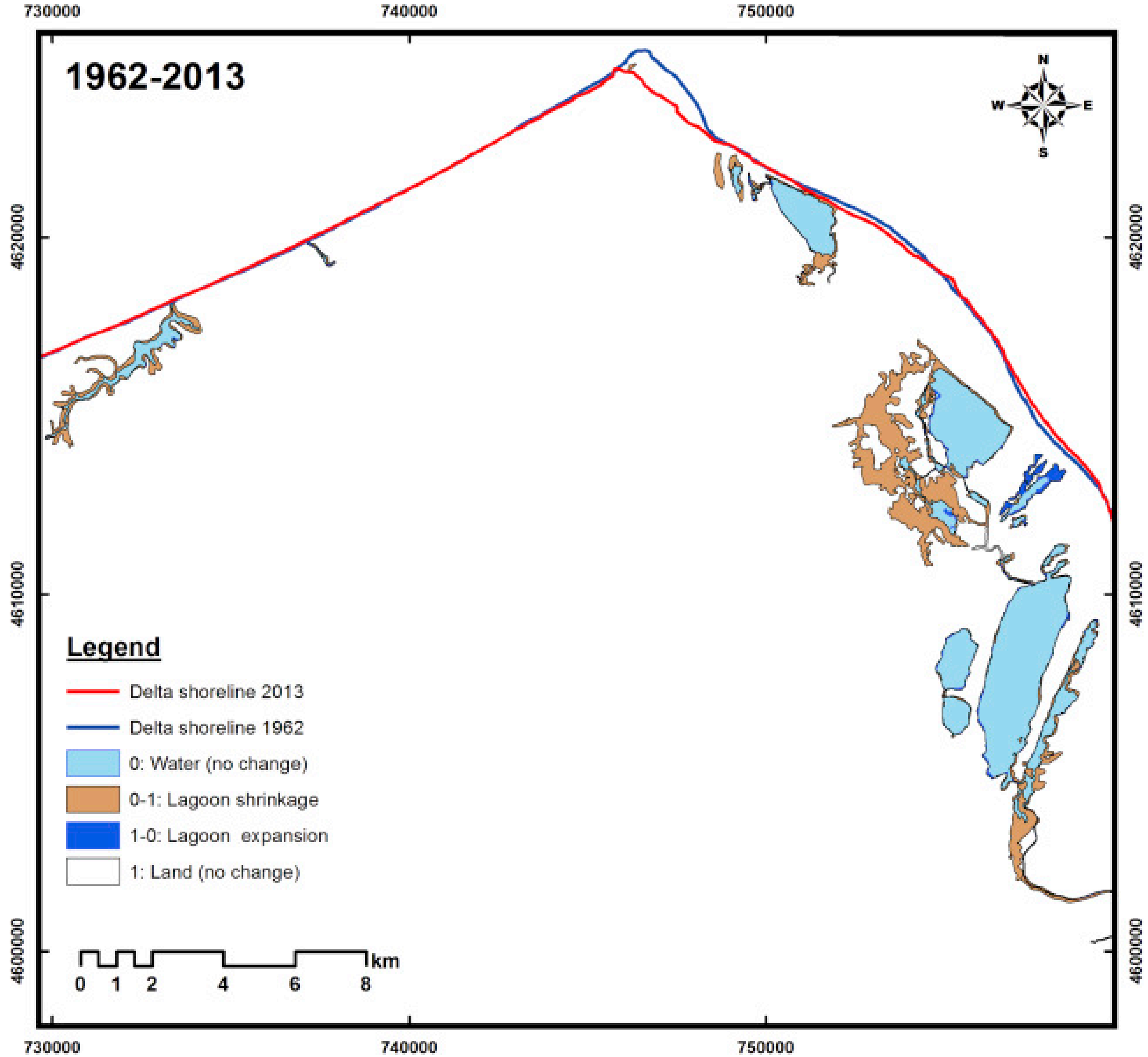
In addition, within the scope of the Turkish Disaster Data Bank project carried out by the Planning and Mitigation Department, the Turkish Disaster Data Bank System[32] has been launched for test broadcasting. However, unfortunately, the web page was not working during the writing of this report.

Ozturk et al. (2015), in *Spatiotemporal Analysis of Shoreline Changes of the Kizilirmak Delta*, determined the temporal shoreline changes of the Kizilirmak Delta. Landsat-5 thematic mapper satellite images from 1987, 1998, 2002, 2007, and 2011, and three different methods (Shoreline Change Envelope, End Point Rate, and Linear Regression Rate) were used to determine the shoreline changes. The results of the study show that the maximum amount of erosion occurred near the river mouth. Moreover, it is indicated that the dams built on the Kizilirmak River and close to the delta significantly increased erosion. The spurs, which were built to prevent coastal erosion and provide partial protection, were found to be unable to fully prevent erosion.

Ozturk & Sesli (2015) also investigated the shoreline changes of the Lagoon Series located in the Kızılırmak Delta in *Shoreline change analysis of the Kizilirmak Lagoon Series*. The study determined the shoreline changes in the delta between 1962 and 2013 (see Figure 32) and discussed the relationship between the shoreline changes in the Kizilirmak Delta and lagoons. Landsat-MSS/TM/OLI satellite images, 1/100,000 topographic maps, and three methods (the Net Shoreline Movement, End Point Rate and Shoreline Change Envelope) were used to measure the changes in the delta shoreline. As a result of the study, it was determined that the lagoons tended to shrink between 1962 and 1987, the period when the Kızılırmak River carried abundant sediments before the construction of the Altinkaya and Derbent Dams. After the construction of the dams, the delta development stopped due to the disruption of the sediment flow to the delta between 1987-2013. As a result, the increase in wind and wave erosion caused coastal erosion, narrowing the barrier spit in front of the lagoons along the eastern coasts of the delta.

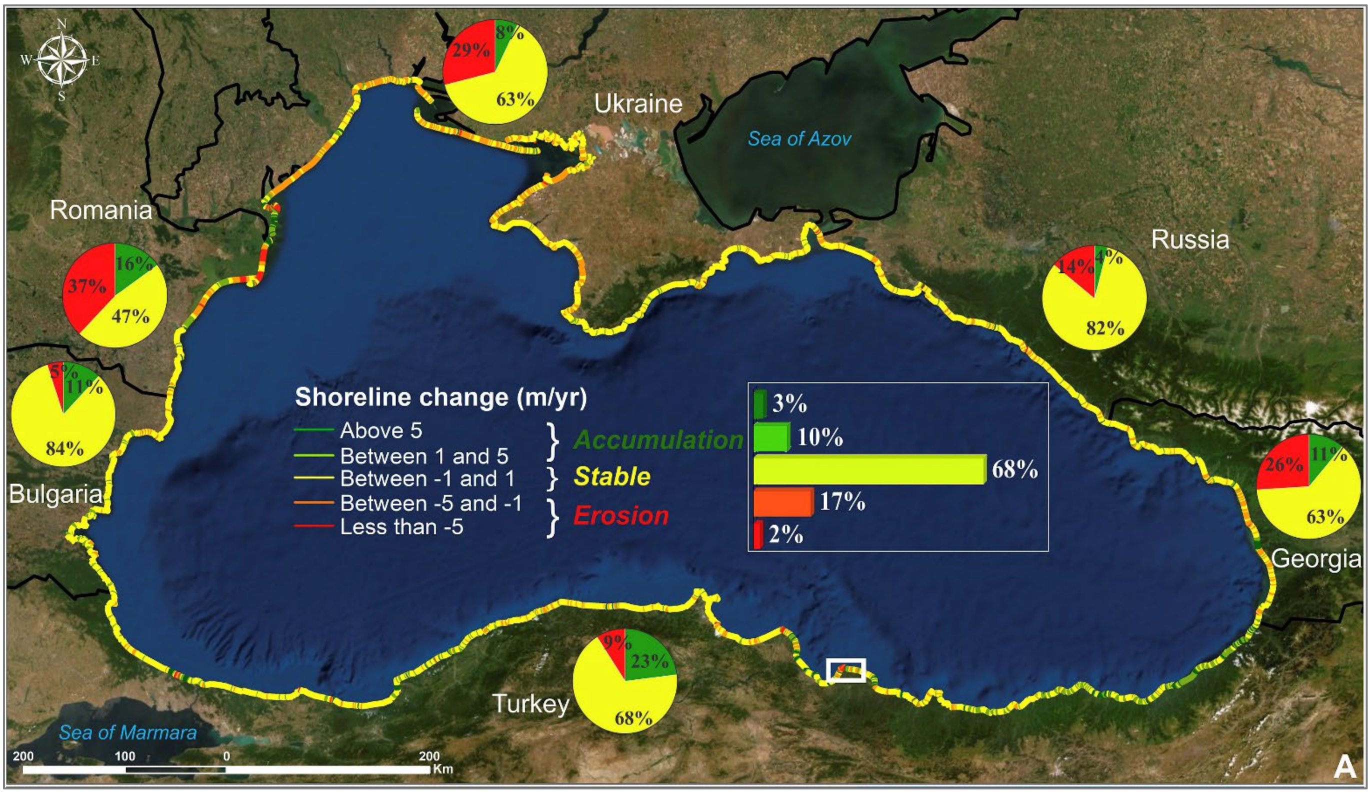
[32] https://www.afad.gov.tr/tabb-turkiye-afet-bilgi-bankasi

Figure 32: The Kizilirmak Delta shoreline changes and Kizilirmak Lagoon Series shrinkage and expansion areas (1962–2013). From: Ozturk & Sesli (2015).



Finally, the shoreline changes (among other parameters) of the Kızılırmak Delta are also analysed in *The Black Sea coastline erosion: Index-based sensitivity assessment and management-related issues*. In this article, Tătui et al. (2019) computed a Coastal Sensitivity Index (CSI) at 1-km spatial scale for more than 4,000 geographical sectors around the Black Sea, taking into consideration geological–geomorphological and physical characteristics of each sector through the following parameters: shoreline changes in the last 33 years; type of coast (coastal geomorphology and lithology); coastal slope (from shoreline to 20m depth); wave incidence; significant wave height during storm conditions; and relative sea level rise. The results for each parameter were aggregated into the CSI. The most sensitive sectors to erosion are superposed on the areas with relatively high storm waves and incidence angles, namely: the deltaic coastlines of the main deltas (Danube, Kizilirmak, Yesilirmak, Sakarya, Rioni, Enguri, Kodori, Chorokhi) of the Black Sea; and the the low-lying areas along the lagoons, limans, coastal barriers and spits from Kalamitsky, Odessa and Karkinitsky Bays, Chornomorske – Yevpatoriya area (in Crimea), Taman – Anapa (in Russia) and Karasu – Karaburun (in Turkey) and the rocky areas Gelendzhik – Tuapse (in Russia), Sevastopol – Cape Meganom (in Crimea) and Inebolu – Eregli (in Turkey) (Figure 33). These highly sensitive sectors cover extensive areas along the coastlines of Russia (57%), Georgia (46%), Turkey (44%), Romania (43%) and Ukraine (35%).

Figure 33: The relative ranking distribution and frequency of the shoreline change variable for the Black Sea coasts. From: Tătui et al. (2019).



Regarding the climate events, a list including historical flooding events was provided by Samsun CCLL. In summary, the total number of events identified is eleven, for the period 1963-2012. The greatest discharge value was produced in the Yilanli Stream in the fourth of July in 2012, reaching a peak discharge of 710 m^3/s. As consequence, seven people lost their lives and the shopping centre, many houses, old industry and stadium of the city were damaged by the flood.

4. SUMMARY AND CONCLUSIONS

Generally speaking, this document constitutes a step forward for the baseline risk analysis and mapping of extreme climate impacts and sea level rise in WP1, after the completion of exposure and vulnerability to climate effects and sea level rise high level studies. Specifically, this document provides the maps of past extreme climate events and the datasets selected for the baseline characterisation of the key climate-related hazards for the coastal cities.

As main outputs, twelve maps have been produced, which may be found in Appendix I – maps. The complementary datasets to these maps are provided in Appendix II – Past events datasets. A summary of the main results for each CCLL is provided in Table 17, including the number of past climate events collected, their categories and analysis period, and the complementary data which was also collected.

Past climate-related events have been collected for all the CCLLs, with the exception of the Dublin CCLL; however, information on past flooding events is available in the online web-viewer from OPW. For the Sligo CCLL, forty-nine (49) past events were collected between 1973-2021, varying between storms, coastal erosion episodes, floods, strong winds, heat waves, cold spells, heavy rainfall, heavy snowfall, droughts, compound hazards and other hazards. In addition to the list of fifteen (15) past events (land flooding, strong winds, storms and forest fires between 1988-2021) produced for Vilanova i la Geltrú CCLL, the areas affected by these events were depicted in collaboration with the partners from the CCLL. Information on the evolution of shoreline changes, hot days and tropical nights, and briefs on extreme weather events were also collected for this CCLL. With the help of Benidorm CCLL partners, thirty-seven (37) past events were reported between 1980-2020, encompassing coastal erosion, coastal and pluvial flooding, heavy precipitation, landslides and strong winds. Storms, coastal, river and pluvial flooding, heavy rainfall and snowfall, landslides, heat waves, cold spells and droughts cover the seventy-five (75) past events collected in Oarsoaldea CCLL between 1900-2022. Information of fifty-one (51) past events of land flooding and landslides between 1865-2021, but also data regarding climate-related occurrences (coastal and land flooding and landslides) and hazard and susceptibility maps from Civil Protection were available for the Oeiras CCLL. In the case of Massa CCLL, thirty-one (31) past events, covering coastal storms, river and pluvial flooding, heavy precipitation and landslides have been collected (1994-2021). Additionally, hazard maps of coastal flooding, river flooding and landslides have been produced for Massa CCLL based in maps from District Basin Authority of the Northern Apennines. Sixteen (16) past land flooding events between 2005-2021 were collected for the Piran CCLL, but also climate-related occurrences for coastal flooding, land flooding, strong winds, cold spells, droughts and landslides and flood and landslide maps. Similarly, twenty-three (23) past land flooding events between 1892-2017 and flood-related occurrences and information on changes in mean annual sea levels, storm surge values, and urban floods were available for the Gdańsk CCLL. Lastly, eleven (11) land flooding events between 1963-2012 and briefs of relevant scientific publications were reported for the Samsun CCLL.

The outputs have been produced bespoke for each city, considering the Frontrunner or Fellow status, although the results are limited by the availability of the information. Nevertheless, the report develops a comprehensive understanding of the key climate change events concerning the CCLLs, thanks to the different data reviewed. Therefore, the overall objective of the report has been achieved.

Table 17: Summary table.

CCLL	No. of past events collected	Event categories*	Analysis period	Complementary data
Sligo	49	CE, CS, HW, HS, HP, ST, DR, LF, CEv, OT	1973-2021	-
Dublin	-	-	-	Past flooding events (online web-viewer).
Vilanova i la Geltrú	15	ST, SW, LF, FF	1988-2021	Briefs on extreme weather events (Meteorology Service of Catalunya). Tropical nights and hot days. Coastal evolution (Cartography and Geology Institute of Catalunya online tool).
Benidorm	37	LS, SW, PF, HP, CE, CF	1980-2020	-
Oarsoaldea	75	DR, ES, ST, HP, HW, CS, HS, LS, CF, PF, RF	1900-2022	-
Oeiras	51	LF, LS	1865-2021	"Climate-related occurrences (landslides, coastal flooding and land flooding) (Civil Protection occurrences database). Hazard and susceptibility maps (Civil Protection Plan 2018)."

Massa	31	RF, LS, PF, CS, HP	1994-2021	Hazard maps on coastal flooding, river flooding and landslides (District Basin Authority of the Northern Apennines).
Piran	16	LF	2005-2021	"Hazard maps on flooding and landslides (Flood Cadastre Warning Map and Analysis of landslide occurrence in Slovenia and preparation of landslide probability map). Climate-related occurrences (coastal flooding, land flooding, strong winds, cold spells, droughts and landslides) (Civil Protection and Disaster Relief)".
Gdańsk	23	LF	1892-2017	"Changes in mean annual sea levels, storm surge values, and urban floods (1992-2016) (Plan of adaptation to climate change in the city of Gdańsk until 2030). Climate-related occurrences (floods) (Regional Water Management Board Gdańsk)."
Samsun	11	LF	1963-2012	Turkish Disaster Data Bank, briefs on relevant scientifical articles

** CE: coastal erosion, CS: cold spell, HW: heat wave, HS: heavy snowfall, HP: heavy precipitation, ST: storm, DR: drought, SW: strong wind, FF: forest fire, LF: land flooding, RF: river flooding, PF: pluvial flooding, CF: coastal flooding, ES: electric storm, LS: landslide, CEv: compound event, OT: other.*

5. REFERENCES

Brečko Grubar, V., Kovačic, G., & Kolega, N. (2019). Climate change increasing frequency of sea flooding. *Geografija v Soli*, *27*(3), 30–34.

Cramer, W., Guiot, J., Fader, M., Garrabou, J., Gattuso, J.-P., Iglesias, A., Lange, M. A., Lionello, P., Llasat, M. C., Paz, S., Peñuelas, J., Snoussi, M., Toreti, A., Tsimplis, M. N., & Xoplaki, E. (2018). Climate change and interconnected risks to sustainable development in the Mediterranean. *Nature Climate Change*, *8*(11), 972–980. https://doi.org/10.1038/s41558-018-0299-2

Fernández Montes, S., & Sánchez Rodrigo, F. (2014). Spatio temporal varibility of precipitation and temperature in the semiarid SE Iberian Peninsula (1950-2007). *Publicaciones de La Asociación Española de Climatología.Serie A; 9*.

Gonzalez-Hidalgo, J., Peña Monné, J. L., & De Luis, M. (2007). A review of daily soil erosion in Western Mediterranean areas. *Catena*, *71*, 193–199. https://doi.org/10.1016/j.catena.2007.03.005

Imeson, A. C., Lavee, H., Calvo, A., & Cerda, A. (1998). The erosional response of calcareous soils along a climatological gradient in Southeast Spain. *Geomorphology*, *24*, 3–16.

Kovačič, G., Kolega, N., & Brečko Grubar, V. (2016). Vpliv podnebnih sprememb na količine vode in poplave morja v slovenski Istri // Climate change impacts on water quantities and sea flooding in Slovene Istria. *Geografski Vestnik*, *88*, 21–36. https://doi.org/10.3986/GV88102

Ozturk, D., Beyazit, I., & Kilic, F. (2015). Spatiotemporal Analysis of Shoreline Changes of the Kizilirmak Delta. *Journal of Coastal Research*, *31*(6), 1389–1402. https://doi.org/10.2112/JCOASTRES-D-14-00159.1

Ozturk, D., & Sesli, F. A. (2015). Shoreline change analysis of the Kizilirmak Lagoon Series. *Ocean & Coastal Management*, *118*, 290–308. https://doi.org/10.1016/j.ocecoaman.2015.03.009

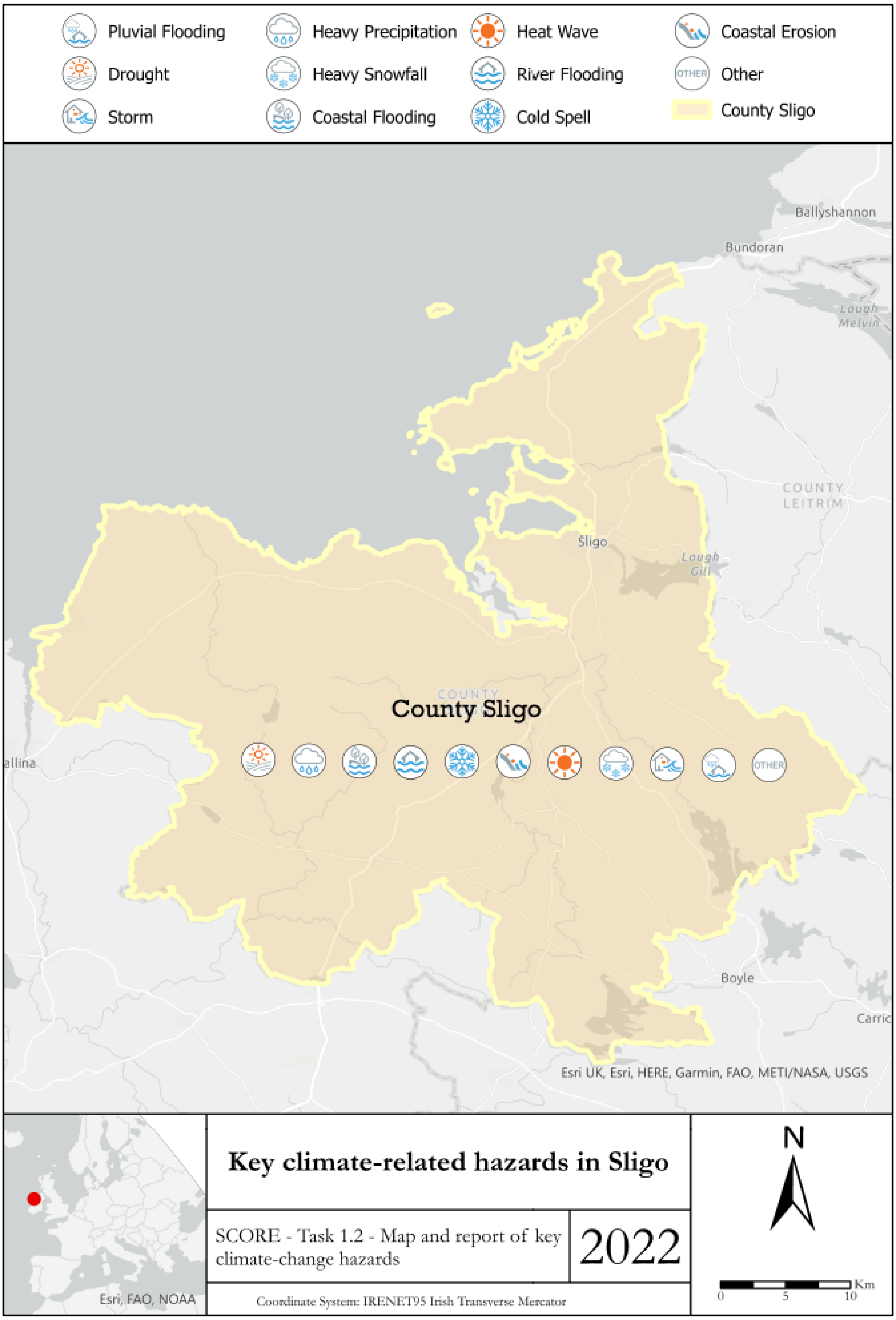
Tătui, F., Pîrvan, M., Popa, M., Aydogan, B., Ayat, B., Görmüş, T., Korzinin, D., Văidianu, N., Vespremeanu-Stroe, A., Zăinescu, F., Kuznetsov, S., Luminița Preoteasa, Shtremel, M., & Saprykina, Y. (2019). The Black Sea coastline erosion: Index-based sensitivity assessment and management-related issues. *Ocean & Coastal Management*, *182*, 104949. https://doi.org/10.1016/j.ocecoaman.2019.104949

Zêzere, J. L., Pereira, S., Tavares, A. O., Bateira, C., Trigo, R. M., Quaresma, I., Santos, P. P., Santos, M., & Verde, J. (2014). DISASTER: a GIS database on hydro-geomorphologic disasters in Portugal. *Natural Hazards*, *72*(2), 503–532. https://doi.org/10.1007/s11069-013-1018-y

APPENDIX I – MAPS

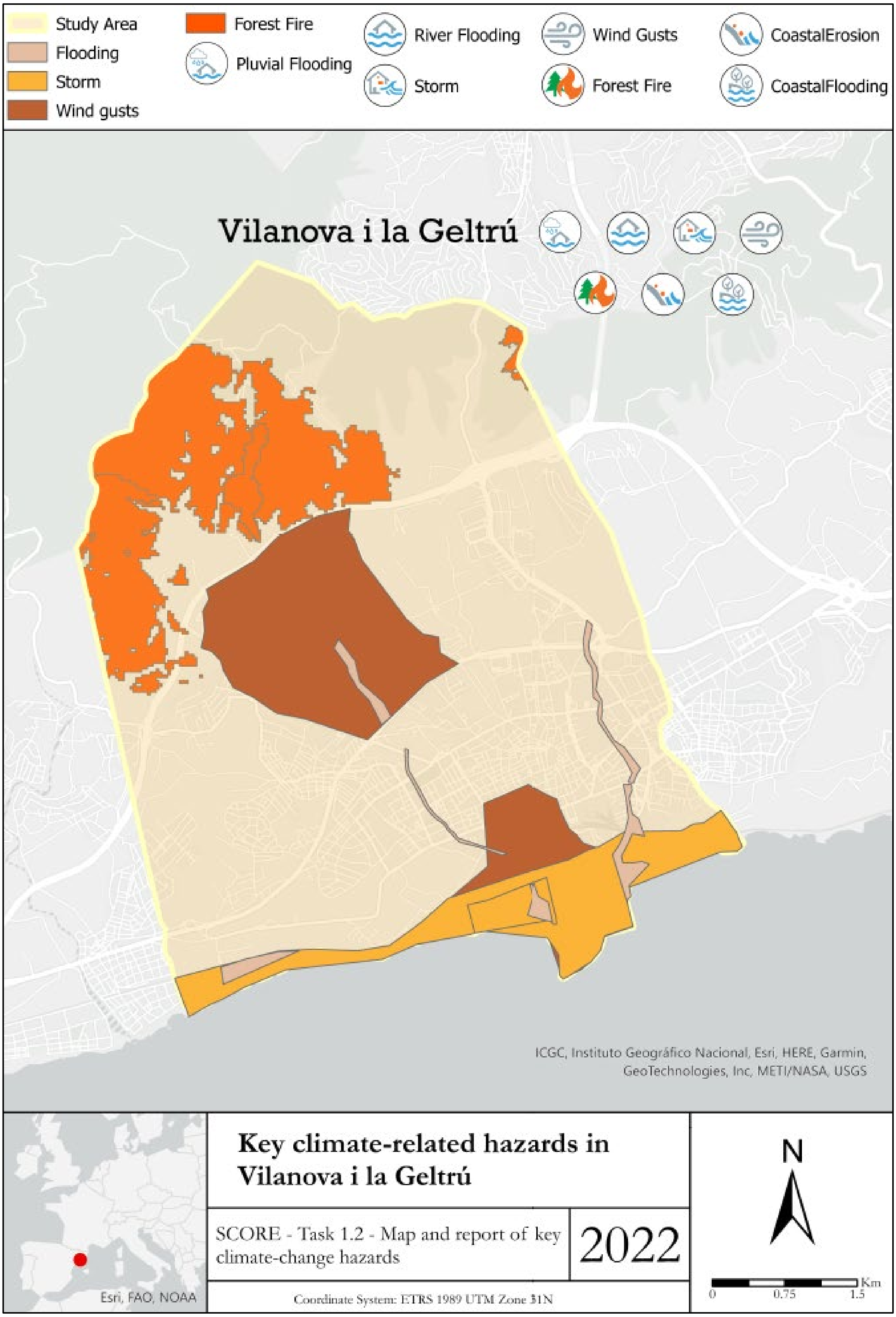
Sligo CCLL

Figure 34: Schematic representation of key climate-related hazards in Sligo CCLL.



Vilanova i la Geltrú CCLL

Figure 35: Schematic representation of key climate-related hazards and past climate events in Vilanova i la Geltrú CCLL.

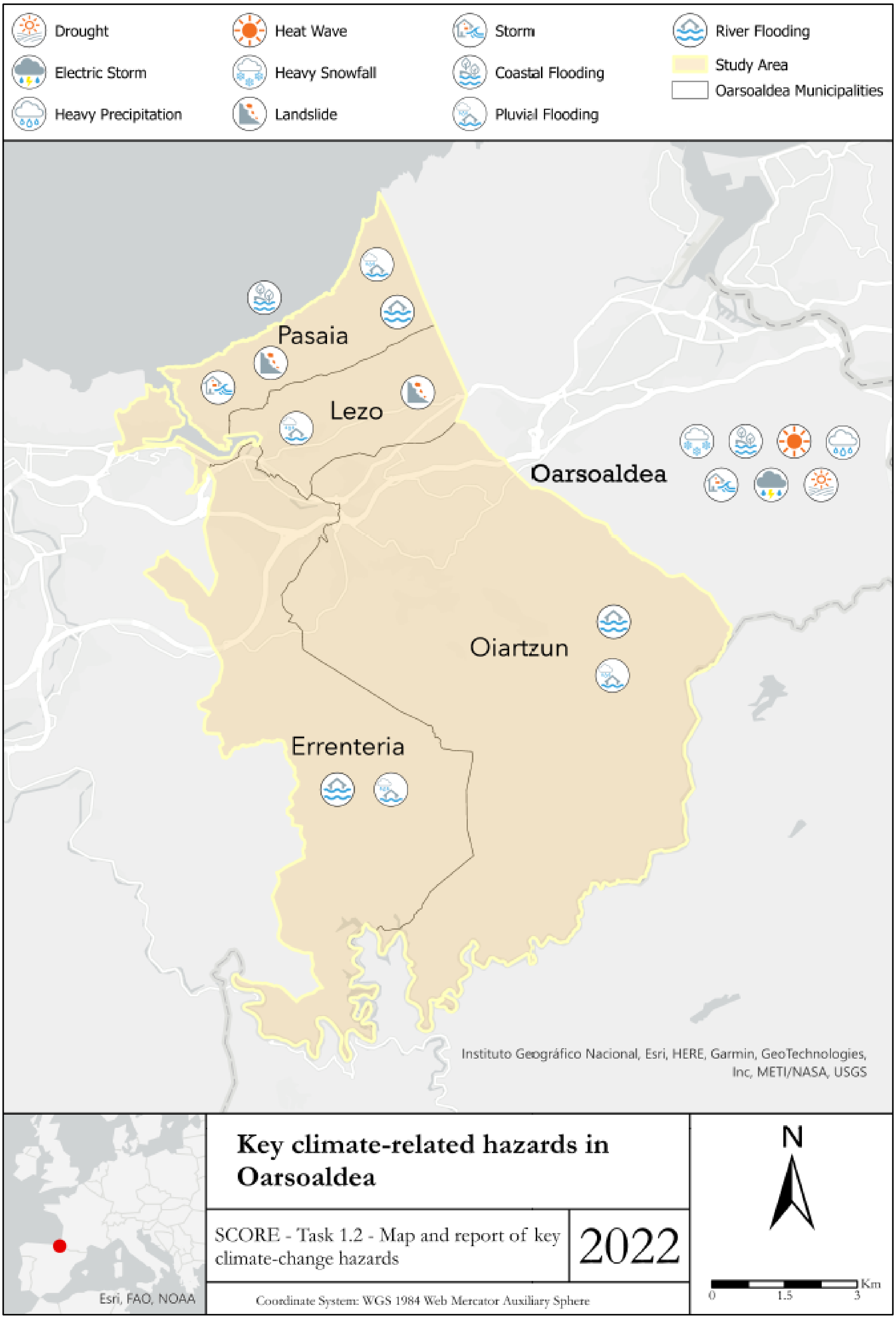


Benidorm CCLL

Figure 36: Schematic representation of key climate-related hazards in Benidorm CCLL.

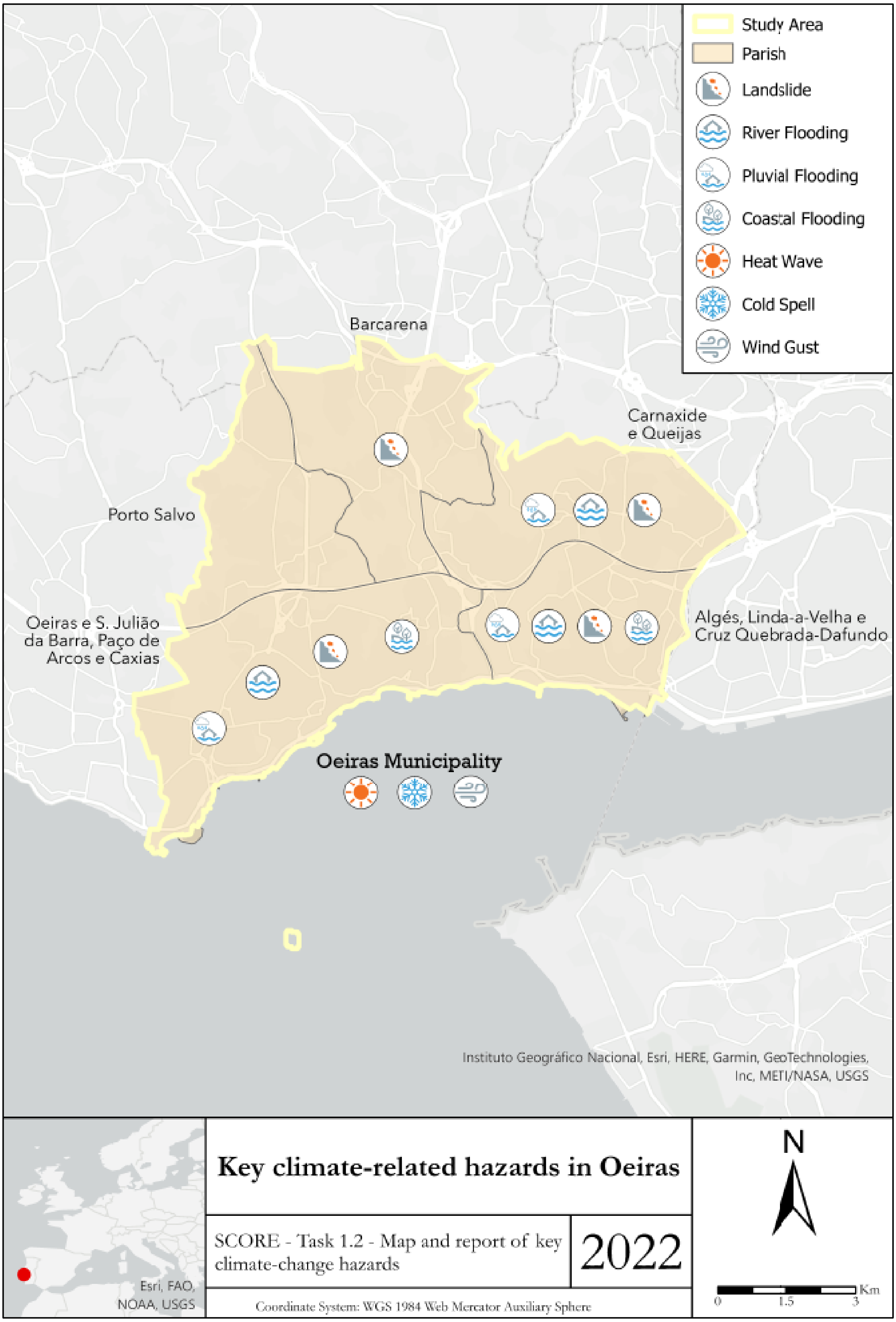
Oarsoaldea CCLL

Figure 37: Schematic representation of key climate-related hazards in Oarsoaldea.



Oeiras CCLL

Figure 38: Schematic representation of key climate-related hazards in Oeiras CCLL.



Massa CCLL

Figure 39: Schematic representation of key climate-related hazards in Massa CCLL.

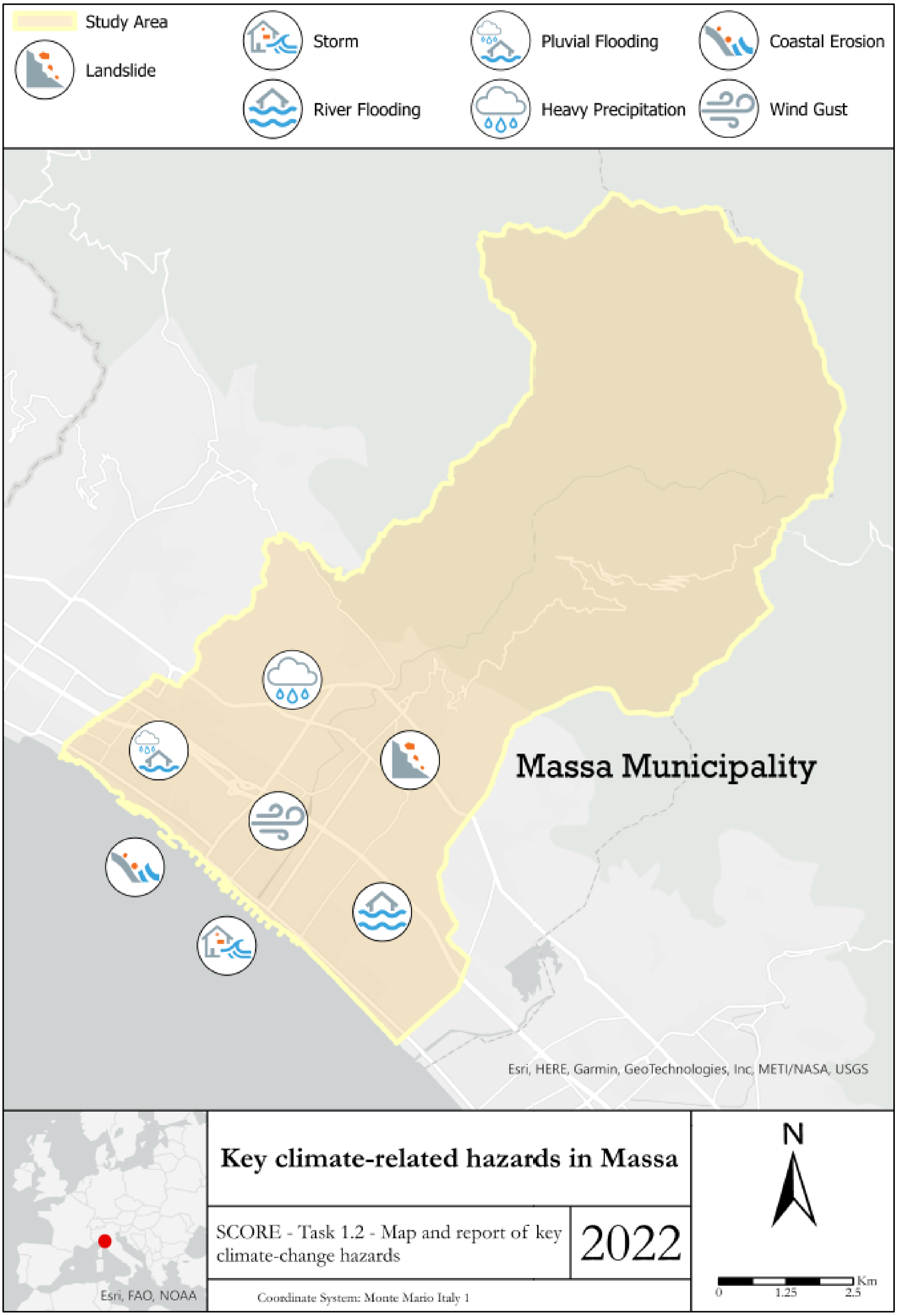


Figure 40: Map of the coastal flooding hazard in Massa CCLL.

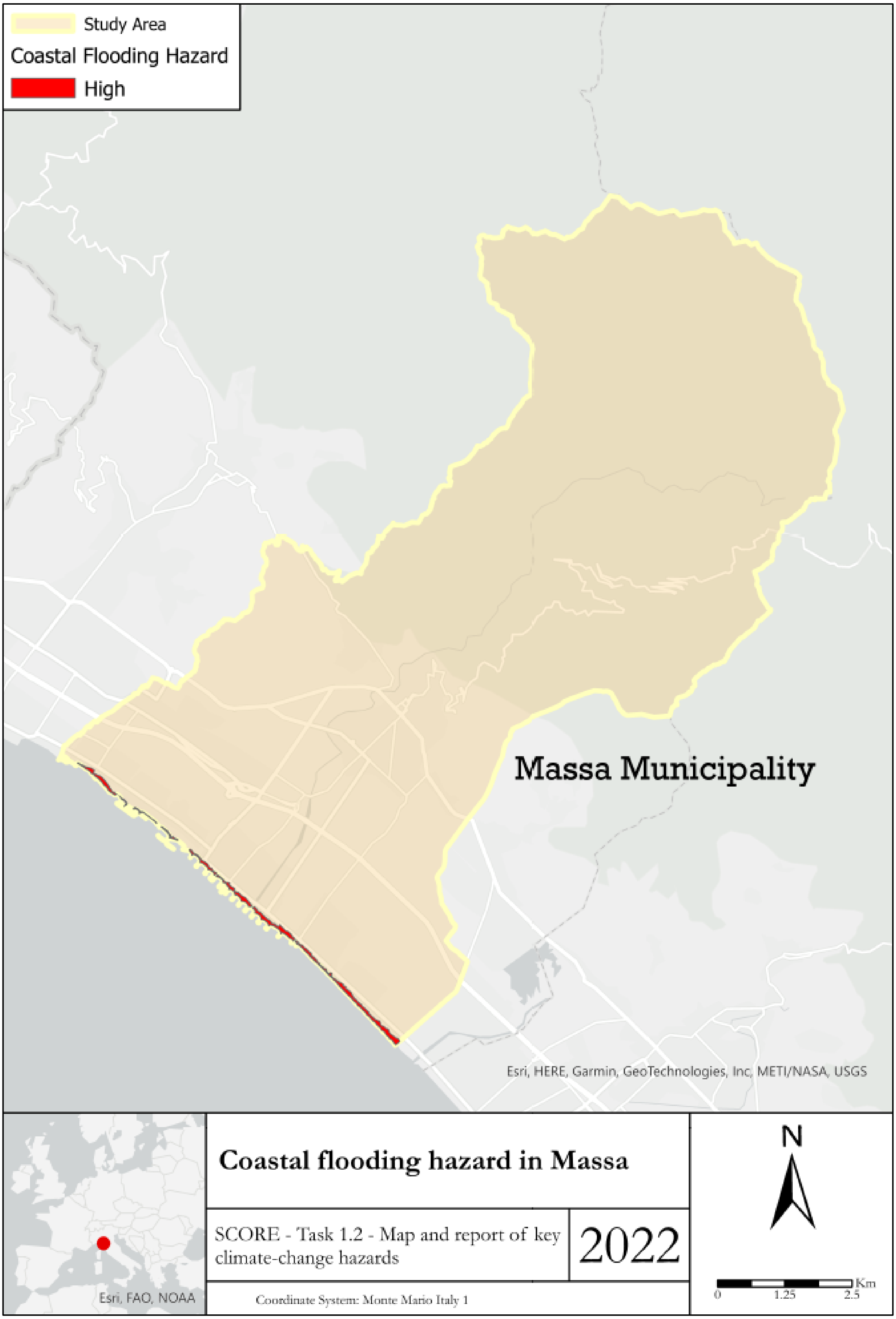


Figure 41: Map of the river flooding hazard in Massa CCLL.

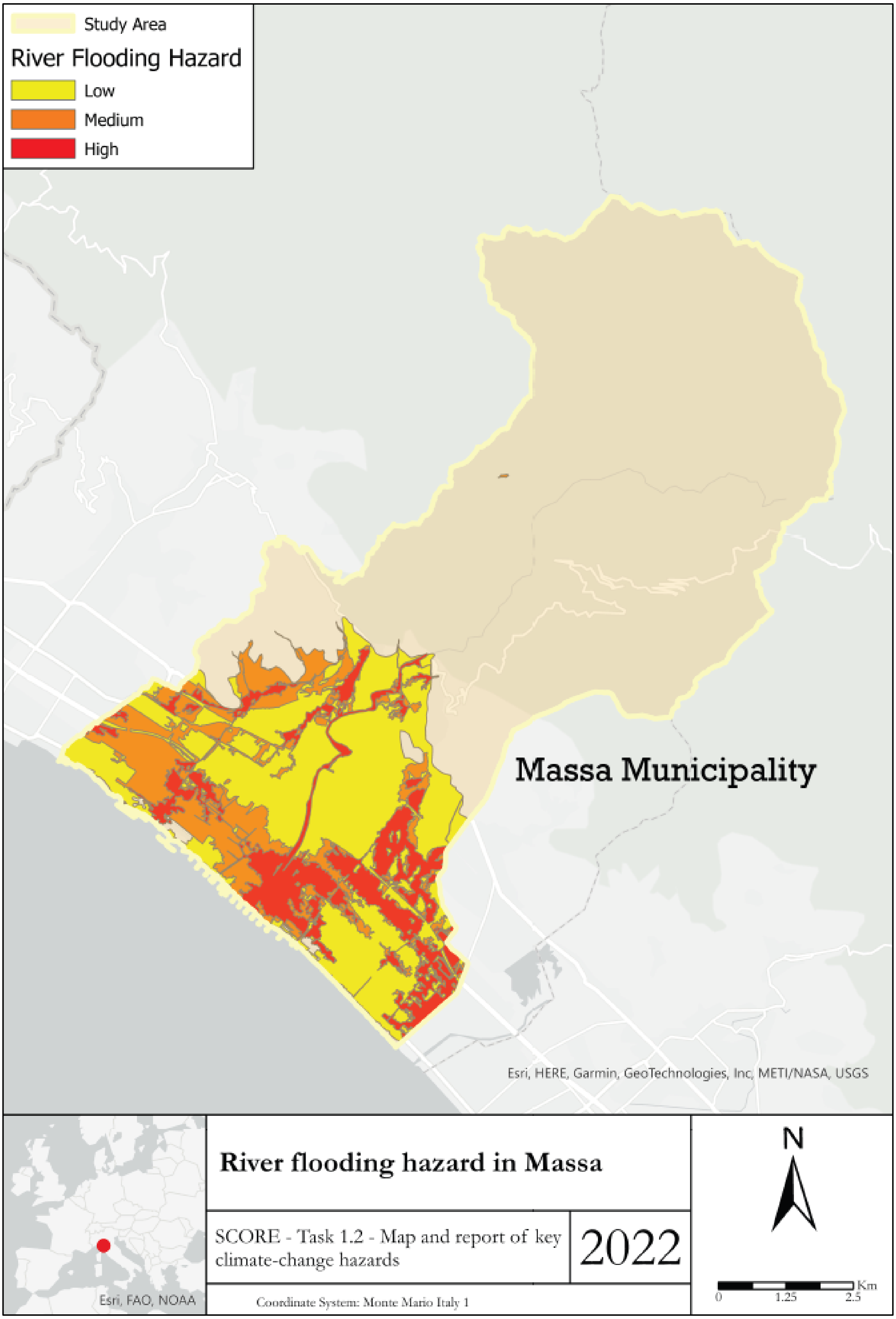
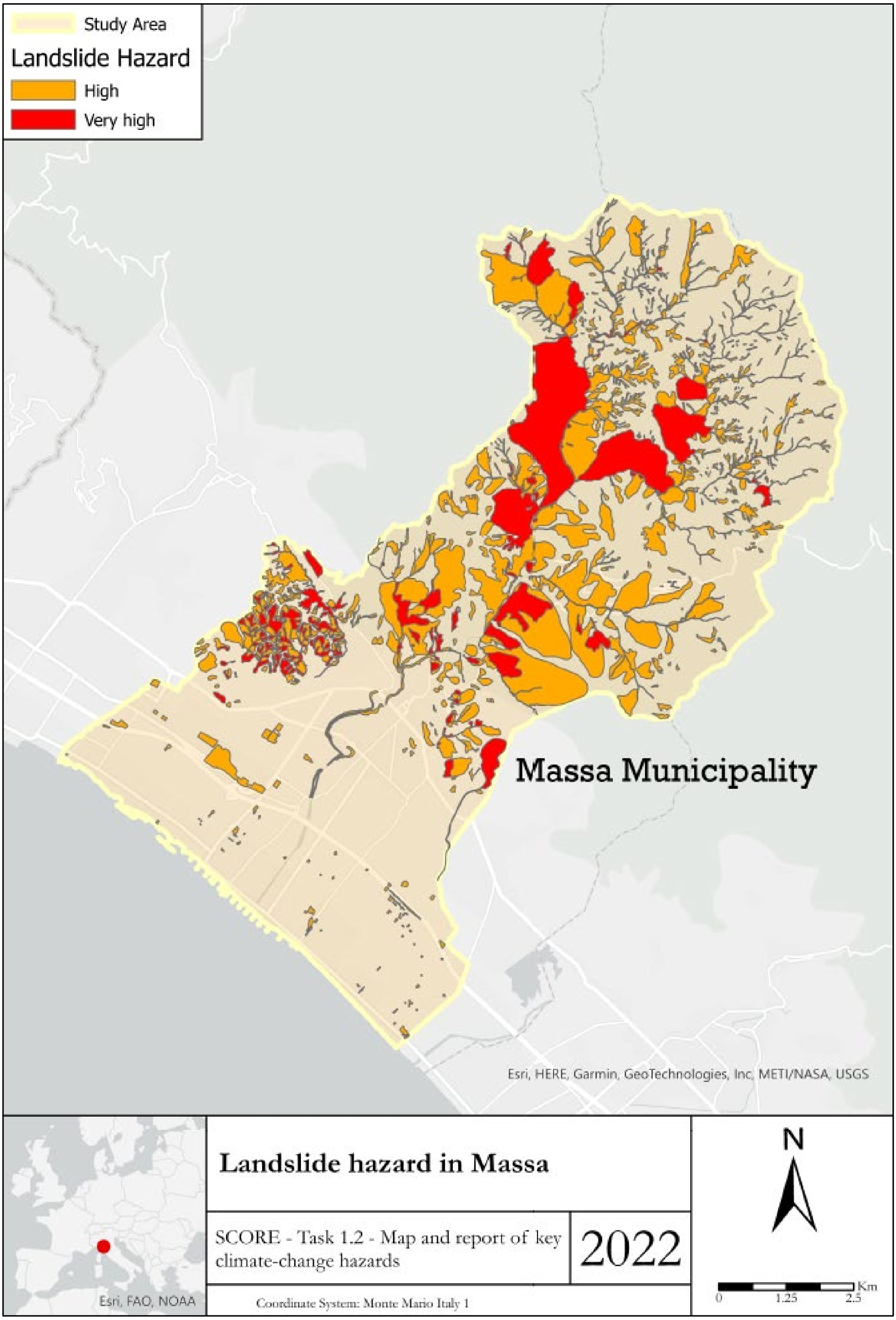


Figure 42: Map of the landslide hazard in Massa CCLL.



Piran CCLL

Figure 43: Map of the landslide hazard in Piran CCLL.

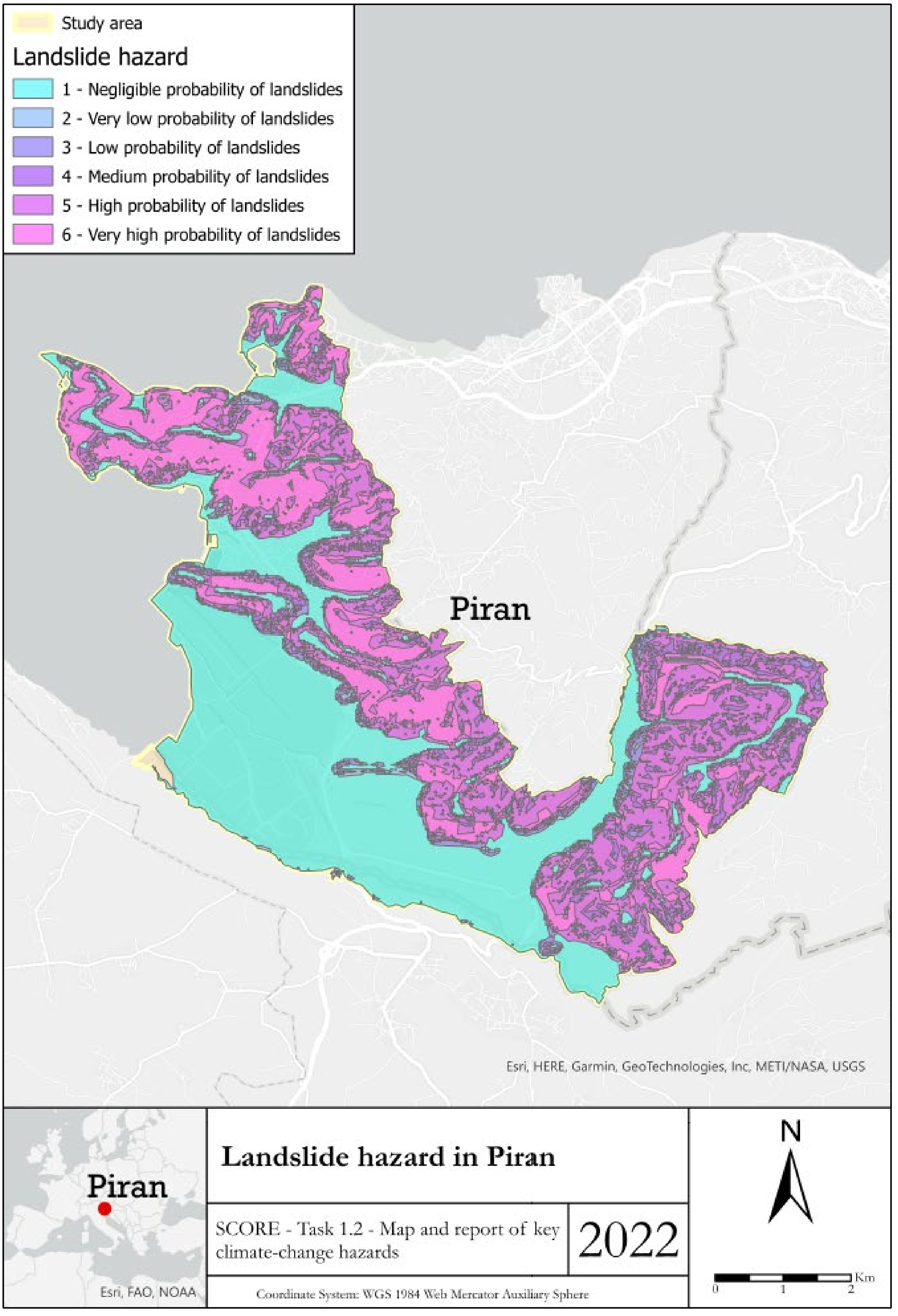


Figure 44: Map of the flooding hazard in Piran CCLL.

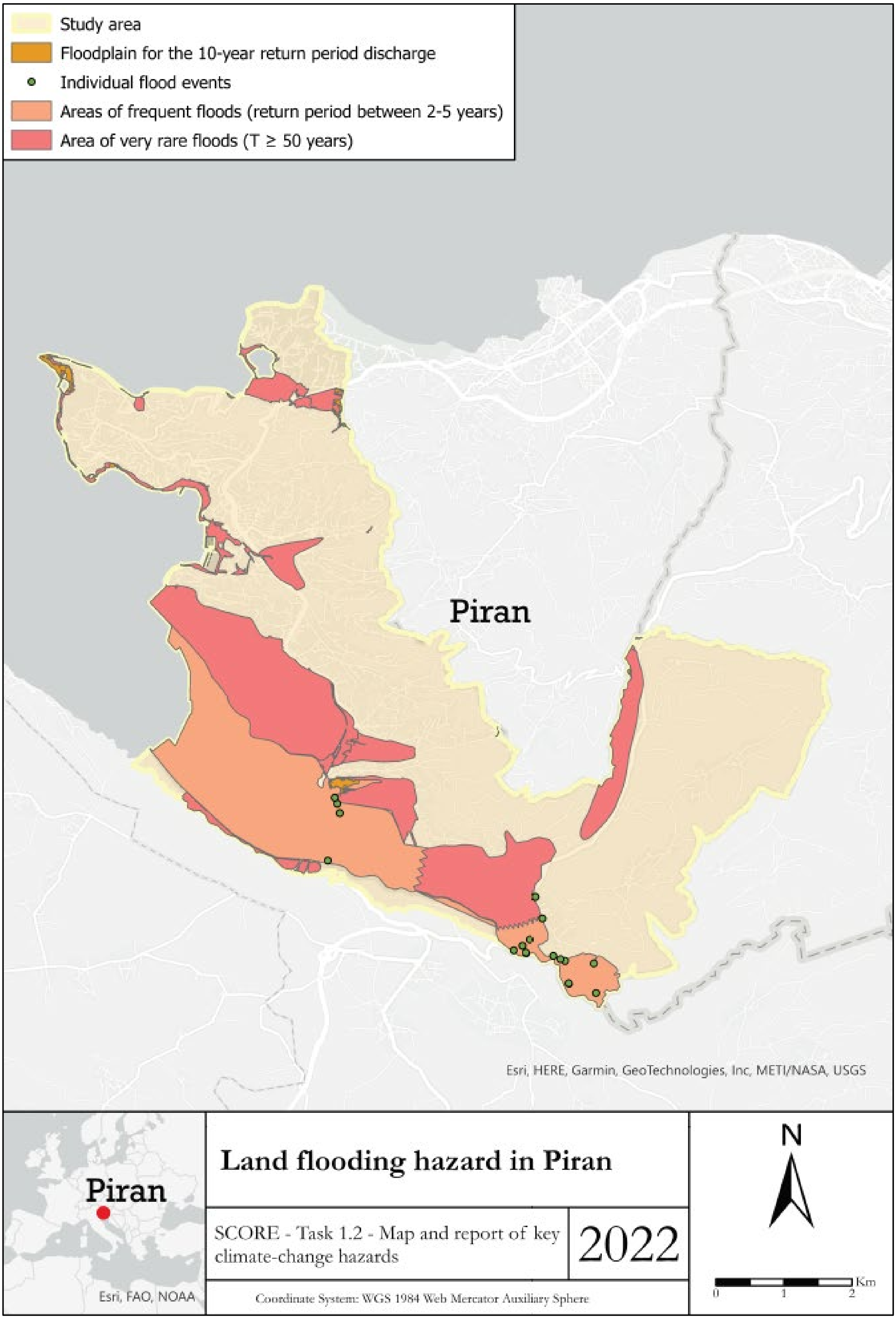
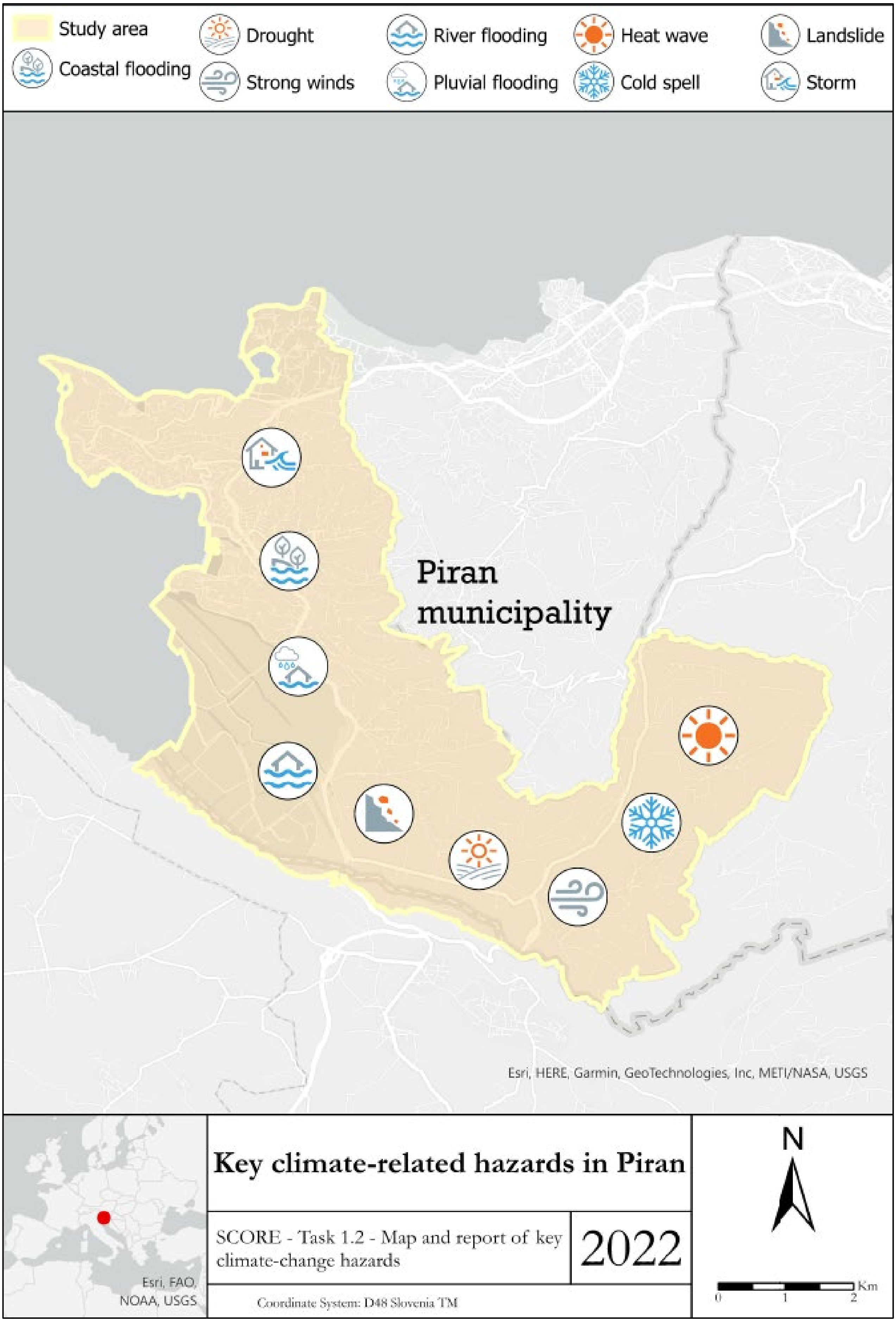
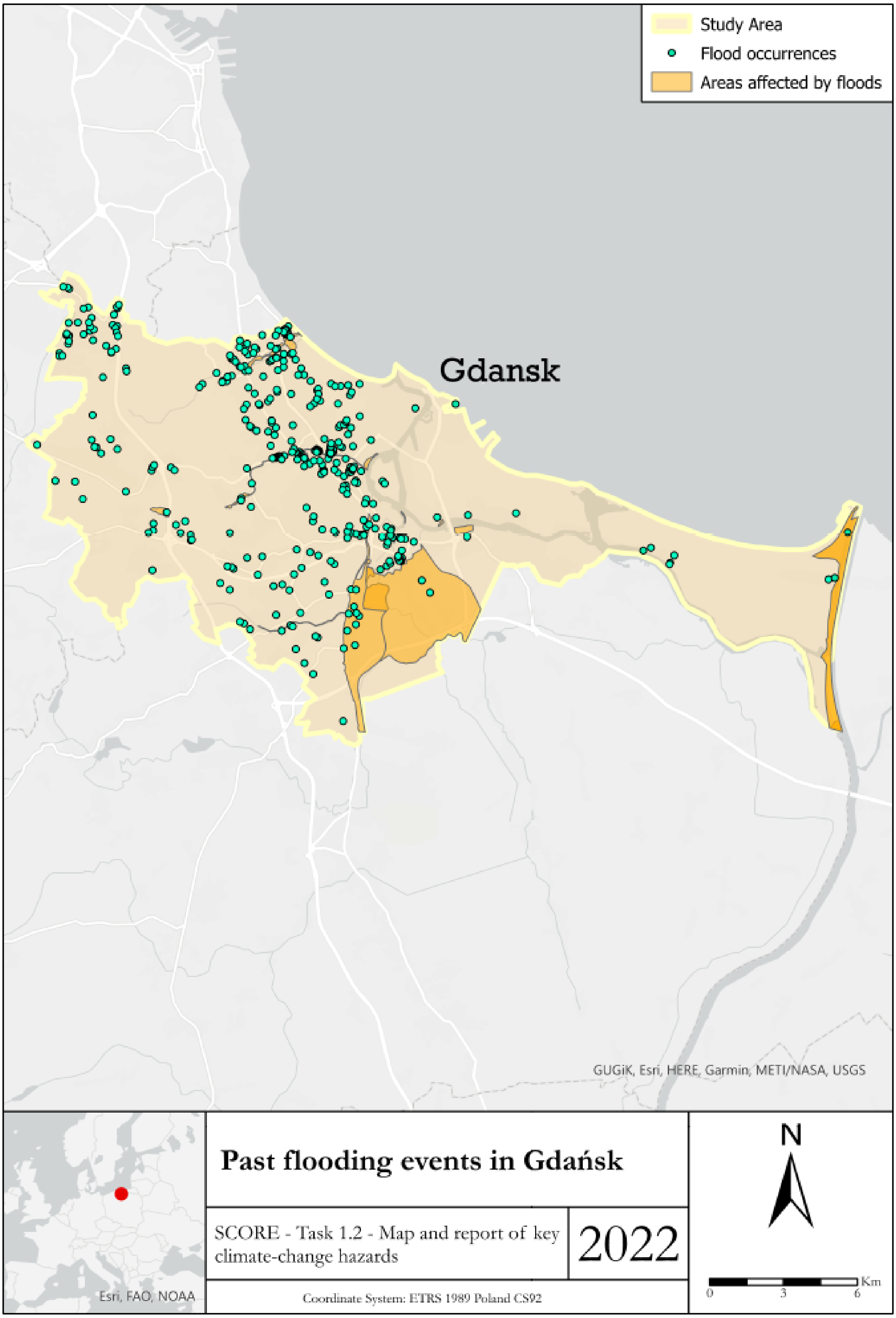


Figure 45: Schematic representation of key climate-related hazards in Piran CCLL.



Gdańsk CCLL

Figure 46: Map of the past flooding events recorded in Gdańsk CCLL.



APPENDIX II – PAST EVENTS DATASETS

Sligo CCLL

Table 18: Past extreme climate events in Sligo, as provided by Sligo CCLL.

Extreme event ID	Extreme event type	Short description	Date	Area affected
C1	Storm and Heavy precipitation	Not provided.	February 1990	Sligo
C2	Storm surge and Coastal flooding	Not provided.	February 2002	Sligo
C3	Flooding and Landslide	Not provided.	September 2003	Sligo
C4	Heavy rain and flooding	Not provided.	Summer 2008	Sligo
C5	Winter storms and storm surges	Not provided.	Winter 2013/14	Sligo
C6	Heatwave and drought	Not provided.	Summer 2018	Sligo
CE1	Coastal erosion	Rosses Point beach (Sligo) suffered from damage in response to storm Darwin, however coastal erosion has been a long-term problem.	1st February, 2014	Sligo
CE2	Coastal erosion	Increased erosion on Strandhill beach, however coastal erosion at Strandhill beach has been a long-term problem.	January 2022	Sligo
CS1	Cold Spell	Coldest winter.	Winter 2009/10	Sligo
CS2	Cold spell	Severe cold spell.	November and December 2010	Sligo
D1	Drought	Not provided.	October 1974 - August 1976	Sligo
D2	Drought	Not provided.	Summer 1995	Sligo
D3	Drought	Regional drought.	2007	Sligo
F1	Flood	Not provided.	November 1973	Sligo
F2	Flood	Not provided.	October 1987	Sligo
F3	Flood	Not provided.	June 1993	Sligo
F4	Flood	Extensive flooding.	August 1997	Sligo
F5	Flood	Not provided.	December 1998	Sligo
F6	Flood	Severe Flooding.	November 2000	Sligo
F7	Flood	Severe Flooding.	November 2002	Sligo

F8	Flood	Severe Flooding (2009 Great Britain and Ireland floods).	November 2009	Sligo
F9	Flood	Flooding of Boyle and Shannon rivers.	26th February 2020	Sligo
H1	Heat Wave	Warmest summer on record.	Summer 2006	Sligo
O1	Storm force winds	Not provided.	February 1988	Sligo
O2	Hurricane force winds	Not provided.	December 1998	Sligo
O3	Driest winter in 25 years	Not provided.	Winter 2016/17	Sligo
P1	Heavy precipitation	Prolonged heavy rainfall.	November 1980	Sligo
P2	Heavy Precipitation	Not provided.	October 1989	Sligo
P3	Heavy precipitation	Not provided.	October 2011	Sligo
P4	Heavy precipitation	Not provided.	Summer 2012	Sligo
P5	Heavy precipitation	Wettest January in 20 years.	January 2016	Sligo
P6	Heavy precipitation	Not provided.	August 2017	Sligo
S1	Storm	Not provided.	January 1976	Sligo
S10	Storm	Storm Ophelia.	October 2017	Sligo
S11	Storm	Storm Emma.	March 2018	Sligo
S12	Storm	Storm Ali.	September 2018	Sligo
S13	Storm	Storm Barra.	7/8 December, 2021	Sligo
S14	Storm	Storm Eunice bringing in multi hazards like sleet and storm force winds.	17/18 February, 2022	Sligo
S15	Storm	Storm Franklin.	20th February, 2022	Sligo
S2	Storm	Severe storm.	January 1974	Sligo
S3	Storm	Storm Fastnet.	August 1976	Sligo
S4	Storm	Thunderstorm.	July 1985	Sligo
S5	Storm	Hurricane Charlie.	August 1986	Sligo
S6	Storm	Windstorm.	January 1991	Sligo
S7	Storm	Tornado.	March 1995	Sligo
S8	Storm	Windstorm.	December 1997	Sligo

S9	Storm	Storm Darwin.	February 2014	Sligo
SF1	Heavy snowfall	Not provided.	January 1982	Sligo
SF2	Heavy snowfall	Not provided.	January 1987	Sligo

Vilanova i la Geltrú CCLL

Table 19: Past extreme climate events in Vilanova i la Geltrú, as provided by Vilanova i la Geltrú CCLL.

Extreme event ID	Extreme event type	Short description	Date	Area affected	Duration
ST1	Storm	Accumulated rainfall of up to 787.7 litres per square meter.	20/01/2020	Mapped	3 days
SW1	Strong winds	Column of air in rapid descent that after impacting the surface extends in all directions.	12/08/2019	Mapped	1 day
SW2	Strong winds	Column of air in rapid descent that after impacting the surface extends in all directions.	12/08/2019	Mapped	1 day
SW3	Strong winds	Secondary area, less affected.	12/08/2019	Mapped	1 day
ST2	Storm	Tornado.	23/11/2021	Mapped	2 days
LF1	Land flooding	Area of periodic flood episodes. Episode data are available from the date indicated.	01/01/2000	Mapped	-
LF2	Land flooding	Area of periodic flood episodes. Episode data are available from the date indicated.	01/01/2000	Mapped	-
LF3	Land flooding	Area of periodic flood episodes. Episode data are available from the date indicated.	01/01/2000	Mapped	-
LF4	Land flooding	Area of periodic flood episodes. Episode data are available from the date indicated.	01/01/2000	Mapped	-
LF5	Land flooding	Area of periodic flood episodes. Episode data are available from the date indicated.	01/01/2000	Mapped	-
LF6	Land flooding	Area of periodic flood episodes. Episode data are available from the date indicated.	01/01/2000	Mapped	-
FF1	Forest fire	Forest fire affecting Vilanova i la Geltrú. Affected area mapped.	02/09/1988	Mapped	-
FF2	Forest fire	Forest fire affecting Vilanova i la Geltrú. Affected area mapped.	03/07/1989	Mapped	-
FF3	Forest fire	Forest fire affecting Vilanova i la Geltrú. Affected area mapped.	13/05/1997	Mapped	-
FF4	Forest fire	Forest fire affecting Vilanova i la Geltrú. Affected area mapped.	12/06/2012	Mapped	-

Benidorm CCLL

Table 20: Past extreme climate events in Benidorm, as provided by Benidorm CCLL.

Extreme event ID	Extreme event type	Short description	Date	Area affected	Duration
CF1	Coastal flood	The sky-cable platform disappears; two Red Cross boats are rescued in Rincón de Loix; the wind knocks down two ice cream kiosks; the waves flood a locutorio del Rincón; the waves flood the road between Torrechó and Pachá; the beach is flooded and covered with dirt; the furniture disappears; the waves rip out the sewage pipes.	27/12/1980	Levante Beach	4 days
CF2	Coastal flood	The beach is filled with dead remains of Posidonia oceanica.	02/01/1982	Poniente Beach	2 days
CF3	Coastal flood	Evicted bathers at the risk of being swept away by the huge waves that break out in 15 minutes.	04/10/1984	Poniente Beach	3 days
CE1	Coastal erosion	Important loss of sand in the Torrechó; undermining the foundations of City Hall.	21/02/1985	Levante Beach	1 day
CF4	Coastal flood	Floods in Avda. de la Marina Española; damage to beach furniture; a freighter takes refuge in the bay.	14/11/1985	Poniente Beach	5 days
CF5	Coastal flood	Beach flooding; the rupture of a pipe causes discharges of sewage into the sea.	27/09/1986	Levante Beach	11 days
CF6	Coastal flood	Flooding of the beach and damage to the foundations of a Telefónica booth.	03/11/1987	Levante Beach	4 days
CF7	Coastal flood	Misalignment of the buoys in the bathing area.	17/10/1988	Levante Beach	1 day
CF7'	Coastal flood	Undermining of foundations of the promenade in Fontanelles; damage to the promenade railing and beach furniture; undermining of the foundations of the promenade in La Cala; a British sailboat runs aground in Fontanelles and suffers damage.	17/10/1988	Poniente Beach	1 day
CF8	Coastal flood	The beach furniture is removed so that the waves do not wash it away; damage to the retaining wall of Avda. de Alcoy and storm drains.	04/09/1989	Levante Beach	4 days
CF8'	Coastal flood	Damage to street furniture in La Cala; the waves exceed the beach and cause damage to the road; significant loss of sand in Fontanelles (1 km of beach disappears); flooding of Avda. de la Marina Española; large deposit of sand accumulated by the sea next to the promenade of La Cala.	04/09/1989	Poniente Beach	4 days
CE2	Coastal erosion	New profile of the beach, 1 km of «llosar» and a pipe in the cable-ski area are exposed.	20/02/1992	Levante Beach	2 days

CE2'	Coastal erosion	Important loss of sand in the Cala; pile of sand near the port.	20/02/1992	Poniente Beach	2 days
CE3	Coastal erosion	Significant loss of sand (sections from 30 to 8-10 m wide); the "llosar" is exposed; damage to street furniture.	06/01/1994	Levante Beach	5 days
CF9	Coastal flood	Damage to the leisure platform.	22/09/1994	Levante Beach	2 days
CF10	Coastal flood	Beach flooding; significant loss of sand in the Torrechó; damage to beach furniture, which is thrown onto the promenade like projectiles.	11/11/1996	Levante Beach	2 days
CF10'	Coastal flood	Beach flooding.	11/11/1996	Poniente Beach	2 days
CF11	Coastal flood	The waves come up to the boardwalk; beach furniture removed; significant loss of sand in the Torrechó.	08/04/1997	Levante Beach	2 days
CF12	Coastal flood	Moderate damage to the boardwalk; sand losses, the pipes are left in the air.	30/09/1997	Levante Beach	1 day
CF13	Coastal flood	A large portion of the beach is flooded; damage to accesses and beach facilities.	06/11/1997	Levante Beach	1 day
CF13'	Coastal flood	The waves reach the wall of the Paseo de Colón; an area is flooded; beach furniture removed.	06/11/1997	Poniente Beach	1 day
CF14	Coastal flood	Damage to disabled access.	10/11/2001	Levante Beach	2 days
CE4	Coastal erosion	Important loss of sands; damage to furniture on the promenade.	30/10/2003	Levante Beach	5 days
CF15	Coastal flood	Accumulation of tons of dead remains of Posidonia.	27/03/2004	Poniente Beach	3 days
CF16	Coastal flood	Losses for the tourism sector; visitors shorten their stay during the bridge of the Constitution.	03/12/2004	Levante Beach	6 days
HP1	Heavy precipitation	89 litres/m2 of precipitation fell in less than 12 hours.	03/11/2006	Benidorm	5 days
PF1	Pluvial flood	Two small hotels were evicted as a result of flooding.	13/10/2007	Benidorm	1 day
SW1	Strong winds	Strong winds up to 90 km/h. There has been "significant damage" to the facilities of the Terra Mítica theme park, especially on the roofs, street furniture, shaded areas, landscaping, signage and even in office buildings.	13/12/2009	Terra Mítica theme park	3 days
PF2	Pluvial flood	Two British tourists killed and five injured in a flood in Cala Finestrat. The water swept people and vehicles.	21/10/2011	Cala Finestrat	2 days
LA1	Landslide	Cutting of the CV-70 road in the municipality of Benidorm due to landslides.	12/11/2012	CV-70 road	4 days

SW2	Strong winds	Eviction of an IES Pere María Orts institute in Benidorm whose barracks gave way to the force of the gale. Strong gusts of wind ripped open the walls and roof of the barracks.	19/01/2013	IES Pere María Orts institute	6 days
PF3	Pluvial flood	The town has collected a total of 74 litres per square meter in the La Cala area. The rain damages an access staircase from the Plaza de la Senyoría to the Mal Pas beach and causes traffic cuts on Toledo Street at its intersection with Bernat de Sarriá and on El Murtal avenue.	01/11/2015	Benidorm	3 days
PF4	Pluvial flood	A deceased by a flood in the street that ends in Cala de Finestrat. Heavy rains also forced the evacuation of some 89 caravans from a campsite in the Rincón de Loix area.	18/12/2016	Cala Finestrat	4 days
PF5	Pluvial flood	Various municipal buildings and facilities, public lighting, trees, El Tossal de La Cala, pumping stations, beaches and the Rincón de Loix health centre were affected.	17/01/2017	Benidorm	6 days
HP2	Heavy precipitation	Benidorm collects 177 litres per square meter in four days. The rains have caused several potholes in the road, the occasional closure of traffic on some streets due to accumulation of water, the fall of some trees, and damage to one of the perimeter fences of the 'Antonio López' football fields.	19/04/2019	Benidorm	4 days
CF18	Coastal flood	The sea level rises half a meter, strong waves in the Torrejó area and the waves break directly against the promenade. Cleaning services have had to remove debris from walkways and beach furniture.	19/01/2020	Levante Beach	6 days
CF18'	Coastal flood	The sea level rises half a meter, waves break directly against the promenade. Cleaning services have had to remove debris from walkways and beach furniture.	19/01/2020	Poniente Beach	6 days

Oarsoaldea CCLL

Table 21: Past extreme climate events in Oarsoaldea, as provided by Oarsoaldea CCLL.

Extreme event ID	Extreme event type	Short description	Date	Area affected	Duration
RF1	River flooding	Serious damage of houses, factories and wineries.	01/04/1915	The whole town of Errenteria	-
RF2	River flooding	Serious material damages.	01/09/1917	The town and the fields of Errenteria	-
RF3	River flooding	Serious damages. Way and road blockages.	01/04/1918	Errenteria and Oiartzun	-
RF4	River flooding	1 person passed away in a landslide in the Jaizkibel mountain. Considerable damages.	01/06/1933	Pasaia	-
RF5	River flooding	Deceases (3 in Errenteria and 2 in Pasaia). Serious damages. Errenteria: 1 m height of water in the streets. Serious damage of houses, factories and infrastructures. Oiartzun: way and road blockages, many flooded houses. Pasaia: flooded streets, fuel storage tank dumped (millions of fuel litres).	23/10/1933	The whole town of Errenteria, Oiartzun, Pasaia (San Juan District)	1 day
RF6	River flooding	Light flooding. No damages.	01/10/1949	Errenteria, riverside of Oiartzun river	1 day
RF7	River flooding	Serious damages. 2 m height of water in the streets of Errenteria. Roadblocks. The sea high tide coincided with high rainfalls.	01/10/1953	Errenteria town centre	1 day
RF8	River flooding	Floods close to the mouth of Oiartzun River.	01/01/1981	Errenteria and Oiartzun	1 day
CF1	Coastal flooding	The sea high tide coincided with sea storm. 20 cm height of water in the streets of Pasaia (San Juan district).	01/02/2014	Pasaia (San Juan District)	1 day
PF1	Pluvial flooding	Ground floors and streets flooded, business and vehicles damaged, street and roadblocks.	01/06/1992	Central areas of Errenteria, Pasaia and Oiartzun.	1 day
PF2	Pluvial flooding	Ground floors and streets flooded, business and vehicles damaged, street and roadblocks.	01/06/1997	Central areas of Errenteria, Pasaia and Lezo.	1 day
PF3	Pluvial flooding	Roadblocks.	01/08/2002	Some areas of Pasaia.	1 day
PF4	Pluvial flooding	Roadblocks.	01/05/2019	Errenteria centre, Oiartzun, Pasaia.	1 day
PF5	Pluvial flooding	Roadblocks.	01/12/2021	Errencia town centre	1 day

HS1	Heavy snowfall	Extremely low temperatures, minimum of -12 ºC. 15 cm of snow at coastline. Road closures.	01/01/1985	The whole shire/county of Oarsoaldea.	13 days
CS1	Cold spell	Extremely low temperatures, minimum of -12 ºC. The snow of the first day became ice. Frozen water pipelines.	01/02/1956	The whole shire/county of Oarsoaldea.	19 days
CS2	Cold spell	Extremely low temperatures, minimum of -12 ºC. The snow of a concurrent snow fall became ice.	01/01/1985	The whole shire/county of Oarsoaldea.	13 days
HW1	Heat wave	Very high temperatures.	01/07/1982	The whole province of Gipuzkoa	4 days
HW2	Heat wave	Very high temperatures.	01/09/1987	The whole province of Gipuzkoa	5 days
HW3	Heat wave	Very high temperatures.	01/07/1989	The whole province of Gipuzkoa	5 days
HW4	Heat wave	Very high temperatures.	01/07/1990	The whole province of Gipuzkoa	7 days
HW5	Heat wave	Very high temperatures.	01/07/1991	The whole province of Gipuzkoa	4 days
HW6	Heat wave	Very high temperatures.	01/08/1998	The whole province of Gipuzkoa	5 days
HW7	Heat wave	Very high temperatures.	01/06/2003	The whole province of Gipuzkoa	3 days
HW8	Heat wave	Very high temperatures.	01/08/2003	The whole province of Gipuzkoa	14 days
HW9	Heat wave	Very high temperatures.	01/08/2012	The whole province of Gipuzkoa	3 days
HW10	Heat wave	Very high temperatures.	01/08/2016	The whole province of Gipuzkoa	3 days
HW11	Heat wave	Very high temperatures.	01/07/2019	The whole province of Gipuzkoa	5 days
HP1	Heavy precipitation	Intense rain, flooding.	01/06/1992	The whole shire/county of Oarsoaldea.	1 day

HP2	Heavy precipitation	Intense rain, landslides.	01/05/1993	The whole shire/county of Oarsoaldea.	-
HP3	Heavy precipitation	230 l/m2 in 12 hours. Flooding.	01/06/1997	The whole shire/county of Oarsoaldea.	1 day
HP4	Heavy precipitation	Intense rain, landslides.	01/06/2010	The whole shire/county of Oarsoaldea.	-
HP5	Heavy precipitation	Intense rain, landslides.	01/10/2012	The whole shire/county of Oarsoaldea.	Some days
HP6	Heavy precipitation	Intense rain, landslides.	01/02/2014	The whole shire/county of Oarsoaldea.	Some days
HP7	Heavy precipitation	Intense rain, landslides.	01/01/2015	The whole shire/county of Oarsoaldea.	Some days
HP8	Heavy precipitation	Intense rain, landslides.	01/03/2016	The whole shire/county of Oarsoaldea.	Some days
HP9	Heavy precipitation	Intense rain, landslides.	01/02/2018	The whole shire/county of Oarsoaldea.	Some days
HP10	Heavy precipitation	Intense rain, landslides and flooding.	01/05/2019	The whole shire/county of Oarsoaldea.	1 day
HP11	Heavy precipitation	135 – 150 L/m² in 24 hours. The sixth greater register since data registration began.	01/11/2021	The whole shire/county of Oarsoaldea.	1 day
HP12	Heavy precipitation	3 weeks raining. Pluvial/River floods in Errenteria and Oiartzun. Landslide blocking the road between Lezo and San Juan district of Pasaia. “Urban waterfalls” in many staircases of Errenteria and Pasaia.	01/12/2021	The whole shire/county of Oarsoaldea.	21 days
ST0	Storm	Depressions and sea storms. Heavy swell, strong wind and rain. Occasional snow in winter, normally in the mountains.	Several during the year, usually in autumn and winter, look at the next examples	The whole shire of Oarsoaldea, especially the coastline and the harbour	Some days
ST1	Storm	Sea storm, Harbour activity suspended.	01/11/2009	Pasaia Harbour area	Some days
ST2	Storm	Depression and sea storm. Heavy swell and strong wind. 5 – 6 m high waves on coast. Maximum wind speed of 125 km/h.	01/01/2019	The whole shire of Oarsoaldea, especially the coastline and the harbour	Some days

ST3	Storm	Depression and sea storm. Heavy swell, strong wind and rain. 4 - 5 m of significant wave height.	01/11/2019	The whole shire of Oarsoaldea, especially the coastline and the harbour	Some days
ST4	Storm	Depression and sea storm. Heavy swell, strong wind and rain. 20 m maximum high wave 16 miles away from the coastline, 8 m of significant wave height.	01/12/2019	The whole shire of Oarsoaldea, especially the coastline and the harbour	Some days
ST5	Storm	Depression and sea storm. Heavy swell, strong wind and rain.	01/02/2020	The whole shire of Oarsoaldea, especially the coastline and the harbour	Some days
ST6	Storm	Depression and sea storm. Heavy swell, strong wind and rain.	01/09/2020	The whole shire of Oarsoaldea, especially the coastline and the harbour	Some days
ST7	Storm	Depression and sea storm. Heavy swell, strong wind and rain. 7 - 8 m of significant wave height.	01/12/2020	The whole shire of Oarsoaldea, especially the coastline and the harbour	Some days
ST8	Storm	Depression and sea storm. Heavy swell and strong wind. 3 – 4.5 m high waves on coast.	01/01/2021	The whole shire of Oarsoaldea, especially the coastline and the harbour	2 days
ST9	Storm	Depression and sea storm. Heavy swell, strong wind and rain.	01/02/2021	The whole shire of Oarsoaldea, especially the coastline and the harbour	Some days
ST10	Storm	Depression and sea storm. Heavy swell, strong wind, rain and snow.	01/12/2021	The whole shire of Oarsoaldea, especially the coastline and the harbour	Some days
ST11	Storm	Depression and sea storm. Heavy swell, strong wind and rain.	01/01/2022	The whole shire of Oarsoaldea, especially the coastline and the harbour	Some days
ES0	Electric storm	Electric storms. Many lightning and thunders, intense rain and hail.	Every year, usually in spring and summer, look at the next examples	The whole shire/county of Oarsoaldea.	Some hours

ES1	Electric storm	Electric storm. Many lightning and intense rain.	01/07/2015	The whole shire/county of Oarsoaldea.	Some hours
ES2	Electric storm	Electric storm. Many lightning and intense rain.	01/06/2017	The whole shire/county of Oarsoaldea.	Some hours
ES3	Electric storm	Electric storm. Many lightning and intense rain.	01/07/2018	The whole shire/county of Oarsoaldea.	Some hours
ES4	Electric storm	Electric storm. Many lightning and intense rain.	01/07/2019	The whole shire/county of Oarsoaldea.	1.5 hours
ES5	Electric storm	Electric storm. Many lightning and intense rain.	01/08/2019	The whole shire/county of Oarsoaldea.	4 hours
ES6	Electric storm	Electric storm. Many lightning and intense rain.	01/01/2020	The whole shire/county of Oarsoaldea.	4 hours
ES7	Electric storm	Electric storms. Many lightning and thunders, intense rain and hail.	01/05/2020	The whole shire/county of Oarsoaldea.	Some hours
ES8	Electric storm	Electric storm. Many lightning and intense rain.	01/06/2021	The whole shire/county of Oarsoaldea.	2 hours
DR1	Drought	Long period with low precipitations and drought (example: 1.020 L/m² during the year 1902, when the average of the 20th century was 1.554 L/m²).	1900 - 1905	The whole province of Gipuzkoa	6 years
DR2	Drought	Long period with low precipitations and drought.	1944 - 1949	The whole province of Gipuzkoa	6 years
DR3	Drought	Long period with low precipitations and drought.	1987 - 1991	The whole province of Gipuzkoa	5 years
DR4	Drought	Soil and plants desiccation.	01/06/2017	The whole province of Gipuzkoa	weeks
LS1	Landslide	1 person died in a landslide on a coastal cliff.	01/05/1993	A coastal cliff in Pasaia.	Seconds
LS2	Landslide	Landslide blocking a railway of Basque railway.	01/06/2010	Antxo district of Pasaia.	Seconds
LS3	Landslide	Landslide on the south slope of Ulia mountain. Some houses damaged and temporary evacuation of some families.	01/10/2012	South slope of Ulia mountain. Trintxerpe district of Pasaia, Arraindegi street.	Seconds

LS4	Landslide	Landslide on the west slope of Jaizkibel mountain, blocking the Bonanza walkway.	01/02/2014	East side of the mouth of the Harbour, Alabortza rock beach, San Juan district.	Seconds
LS5	Landslide	Landslide on the west slope of Jaizkibel mountain, blocking the Bonanza walkway.	01/01/2015	East side of the mouth of Pasaia Harbour, close to the tip and its lighthouse.	Seconds
LS6	Landslide	Landslide on the west slope of Ulia Mountain. Avenue blockage until the present, because jurisdictional disputes between the port authority, the municipality of Pasaia and private landowners.	01/03/2016	Westside of the mouth of Pasaia Harbour, Ondartxo avenue.	Seconds
LS7	Landslide	Slide of a big rock on the south slope of Jaizkibel mountain blocking the road that goes up from San Juan district to Jaizkibel.	01/02/2018	Road Gi-3440, San Juan district of Pasaia.	Seconds
LS8	Landslide	Landslide on the south slope of Ulia mountain. Evacuation of some families.	01/02/2018	Trintxerpe district of Pasaia, Azkuene street.	Seconds
LS9	Landslide	Landslide on the south slope of Jaizkibel mountain blocking the road between Lezo and San Juan district of Pasaia.	01/05/2019	Road GI-3440, between Lezo and San Juan district of Pasaia.	Seconds
LS10	Landslide	Landslide on the south slope of Jaizkibel mountain blocking the road between Lezo and San Juan district of Pasaia.	01/12/2021	Road GI-3440, between Lezo and San Juan district of Pasaia.	Seconds

Oeiras CCLL

Table 22: Past flooding events and landslides in Oeiras (from DISASTER database).

Event ID	Event category	Subcategory	Date	Type of georeference	Location	Mechanism	No. of fatalities	No. of people injured	No. of people evacuated	No. of people displaced	No. of people disappeared	Ensuing damage	Parishes affected
FL1	Flooding	Urban flood	22/1/1881	Approximated (name of place)	Rua dos Passarinhos	Intense precipitation of long duration	0	0	2	0	0	-	Oeiras e S. Julião da Barra, Paço de Arcos e Caxias
FL2	Flooding	Flash flood	7/11/1907	Approximated (based on descriptions)	-	Intense precipitation of short duration	0	0	1	0	0	-	Oeiras e S. Julião da Barra, Paço de Arcos e Caxias
FL3	Flooding	Urban flood	22/12/1909	Approximated (based on descriptions)	-	Intense precipitation of long duration	1	0	0	0	0	-	Oeiras e S. Julião da Barra, Paço de Arcos e Caxias
FL4	Flooding	Urban flood	15/1/1924	Approximated (name of place)	Laveiras	Intense precipitation of long duration	0	0	1	0	0	-	Oeiras e S. Julião da Barra, Paço de Arcos e Caxias
FL5	Flooding	Urban flood	5/1/1940	Parish centroid	-	Mixed	0	0	2	0	0	Fiandeira factory boilers disabled	Oeiras e S. Julião da Barra, Paço de Arcos e Caxias
FL6	Flooding	Urban flood	16/10/1946	Approximated (name of place)	Rua dos Passarinhos	Intense precipitation of short duration	0	0	5	0	0	Phone lines stopped working. Félix Bakery, grocery store, drugstore, pharmacy and other types of establishments damaged	Oeiras e S. Julião da Barra, Paço de Arcos e Caxias
FL7	Flooding	Slow onset flood	7/2/1951	Approximated (based on descriptions)	No tejo em frente a Santo Amaro de Oeiras	Intense precipitation of long duration	1	0	0	0	0	-	Oeiras e S. Julião da Barra, Paço de Arcos e Caxias
LS1	Landslide	Rock collapse	31/3/1952	Exact coordinates	Farol da Gibalta Caxias	Intense precipitation of short duration	10	50	0	0	0	Traffic interruption of 48 hours at least	Oeiras e S. Julião da Barra, Paço de Arcos e Caxias
FL8	Flooding	Flash flood	16/12/1953	Approximated (based on descriptions)	Antigo lugar do Lagoal	Intense precipitation of short duration	0	0	11	0	0	Residential buildings. Commercial buildings (grocery store, shoe store), agricultural crops, small breeding, telephone network, small boats. Lagoal bridge	Oeiras e S. Julião da Barra, Paço de Arcos e Caxias
FL9	Flooding	Flash flood	16/12/1953	Approximated (name of place)	Morganhal	Intense precipitation of long duration	0	0	1	0	0	Residential buildings. Various roads and bridges	Residential buildings. Various roads and bridges
FL10	Flooding	Slow onset flood	26/11/1865	Approximated (based on descriptions)	-	Intense precipitation of long duration	1	0	0	0	0	-	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo
FL11	Flooding	Urban flood	19/1/1895	Approximated (name of place)	Junto à Ponte	Intense precipitation of long duration	0	0	3	0	0	-	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo
FL12	Flooding	Urban flood	17/3/1916	Approximated (name of place)	-	Intense precipitation of short duration	0	0	2	0	0	-	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo
FL13	Flooding	Slow onset flood	2/1/1940	Approximated (name of place)	-	Intense precipitation of long duration	0	0	3	0	0	-	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo
FL14	Flooding	Flash flood	4/11/1942	Approximated (based on descriptions)	-	Intense precipitation of short duration	0	0	3	0	0	-	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo
FL15	Flooding	Urban flood	18/11/1945	Approximated (name of place)	Rua Direita e Rua Sacadura Cabral	Intense precipitation of long duration	0	0	50	0	0	-	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo
FL16	Flooding	Urban flood	16/10/1946	Approximated (name of place)	Rua Direita do Dafundo	Intense precipitation of short duration	0	0	3	0	0	-	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo
FL17	Flooding	Flash flood	13/4/1959	Approximated (name of place)	Vila Conceição	Intense precipitation of short duration	0	0	5	0	0	The flood affected the foundations of building nº11 which led to the evacuation of residents	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo
FL18	Flooding	Urban flood	10/10/1962	Approximated (name of place)	Coor aquário Vasco da Gama	Intense precipitation of short duration	0	0	4	0	0	Commercial buildings and residential buildings	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo
FL19	Flooding	Flash flood	20/11/1937	Approximated (name of place)	Linda-a-Pastora, junto ao Rio Jamour	Intense precipitation of long duration	0	0	2	0	0	-	Carnaxide e Queijas
FL20	Flooding	Other flooding	2/1/1940	Parish centroid		Intense precipitation of long duration	0	0	1	16	0	-	Carnaxide e Queijas

FL21	Flooding	Urban flood	16/10/1946	Approximated (name of place)	largo na antiga carnaxide	Intense precipitation of short duration	0	0	3	0	0	School	Carnaxide e Queijas
FL22	Flooding	Flash flood	16/10/1946	Approximated (name of place)	Santuário da Srª da Rocha	Intense precipitation of short duration	0	0	2	0	0	-	Carnaxide e Queijas
FL23	Flooding	Urban flood	14/1/1966	Approximated (name of place)	Av Infante D. Henrique	Intense precipitation of short duration	0	0	3	0	0	-	Barcarena
FL24	Flooding	Flash flood	25/11/1967	Approximated (name of place)	Fontainhas	Intense precipitation of short duration	2	0	3	3	0	Residential buildings (two distroyed). Pólvora factory, Cooperativa do Pessoal da Fábrica da Pólvora building	Barcarena
LS2	Landslide	Not defined	8/1/1996	Parish centroid	-	Intense precipitation of short duration	0	0	0	12	0	-	Barcarena
FL25	Flooding	Urban flood	18/11/2011	Municipality centroid	-	Intense precipitation of short duration	0	0	90	0	0	Kindergartens	Barcarena
FL26	Flooding	Flash flood	15/1/1964	Approximated (name of place)	Rua São João de Deus	Intense precipitation of long duration	0	0	3	0	0	-	Oeiras e S. Julião da Barra, Paço de Arcos e Caxias
FL27	Flooding	Flash flood	15/1/1964	Approximated (name of place)	Laveiras	Intense precipitation of long duration	0	0	1	0	0	-	Oeiras e S. Julião da Barra, Paço de Arcos e Caxias
FL28	Flooding	Flash flood	25/11/1967	Approximated (based on descriptions)	-	Intense precipitation of short duration	3	0	0	30	0	Residential buildings. Commercial buildings (dairy, shoe store and others)	Oeiras e S. Julião da Barra, Paço de Arcos e Caxias
FL29	Flooding	Flash flood	25/11/1967	Approximated (name of place)	Av Croft de Moura, 4	Intense precipitation of short duration	3	0	0	0	0	-	Oeiras e S. Julião da Barra, Paço de Arcos e Caxias
FL30	Flooding	Flash flood	25/11/1967	Approximated (based on descriptions)	-	Intense precipitation of short duration	18	0	0	0	0	Palácio Pombal. Estação Agronómica (Quinta do Marquês), Centro de Biologia (Fundação Calouste Gulbenkian)	Oeiras e S. Julião da Barra, Paço de Arcos e Caxias
FL31	Flooding	Urban flood	25/11/1967	Approximated (name of place)	Av. Croft de Moura	Intense precipitation of short duration	0	0	1	0	0	Building	Oeiras e S. Julião da Barra, Paço de Arcos e Caxias
FL32	Flooding	Urban flood	25/11/1967	Approximated (name of place)	Rua Cândido dos Reis	Intense precipitation of short duration	0	0	10	0	0	Barracks, Palácio da fundação Calouste Gulbenkian. Camping area.	Oeiras e S. Julião da Barra, Paço de Arcos e Caxias
FL33	Flooding	Flash flood	25/11/1967	Approximated (name of place)	Pedreira n.º 1 próximo do Caminho do Mocho.	Intense precipitation of short duration	3	0	0	0	0	Undetermined number of buildings were affected	Oeiras e S.Julião da Barra, Paço de Arcos e Caxias
FL34	Flooding	Urban flood	19/11/1983	Approximated (based on descriptions)	-	Intense precipitation of short duration	0	0	0	100	0	Residential buildings	Oeiras e S.Julião da Barra, Paço de Arcos e Caxias
LS3	Landslide	Not defined	8/1/1996	Approximated (name of place)	Bairro da Tapada do Mocho	Intense precipitation of short duration	0	0	0	44	0	-	Oeiras e S.Julião da Barra, Paço de Arcos e Caxias
FL35	Flooding	Urban flood	8/1/1996	Approximated (name of place)	Bairro do Alto da Loba	Intense precipitation of short duration	0	0	0	60	0	-	Oeiras e S.Julião da Barra, Paço de Arcos e Caxias
FL36	Flooding	Urban flood	18/2/1966	Approximated (name of place)	Algés	Intense precipitation of long duration	0	0	3	0	0	Residential buildings	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo
FL37	Flooding	Flash flood	25/11/1967	Approximated (name of place)	-	Intense precipitation of short duration	1	0	0	0	0	Telephone lines, electricity distribution network, Fermentos Holandeses factory, plant nurseries	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo
FL38	Flooding	Flash flood	25/11/1967	Approximated (name of place)	antiga Quinta da Carapuça	Intense precipitation of short duration	1	0	0	0	0	-	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo
FL39	Flooding	Urban flood	25/11/1967	Approximated (based on descriptions)	Vale de Algés	Intense precipitation of short duration	0	0	2	0	0	-	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo
FL40	Flooding	Flash flood	25/11/1967	Approximated (name of place)	estrada das Romeiras	Intense precipitation of short duration	0	0	0	3	0	Barracks	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo
LS4	Landslide	Land collapse	13/3/1969	Approximated (name of place)	Rua Sacadura Cabral	Not specified	0	0	3	0	0	-	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo
LS5	Landslide	Not defined	18/3/1969	Approximated (name of place)	Rua Sacadura Cabral	Not specified	0	1	0	0	0	Factory	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo
LS6	Landslide	Not defined	3/3/1978	Approximated (name of place)	Ao cimo da Rua de Olivença em Algés	Intense precipitation of long duration	0	0	28	0	0	Uninsured homes resulted damaged.	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo

FL41	Flooding	Urban flood	18/11/1983	Approximated (name of place)	Baixa de Algés	Intense precipitation of short duration	0	0	4	0	0	-	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo
FL42	Flooding	Urban flood	30/10/1993	Approximated (name of place)	Alto de Santa Catarina	Mixed	0	0	0	48	0	Barracks where sixteen families lived in	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo
FL43	Flooding	Urban flood	8/1/1996	Approximated (name of place)	Dafundo, Algés	Intense precipitation of short duration	0	0	8	0	0	-	Algés, Linda-a-Velha e Cruz Quebrada-Dafundo
FL44	Flooding	Flash flood	25/11/1967	Approximated (name of place)	Srª da Rocha	Intense precipitation of short duration	1	0	0	3	0	Barracks. Part of the bridge over the river Jamor (Srª da Rocha) disappeared	Carnaxide e Queijas
FL45	Flooding	Flash flood	25/11/1967	Approximated (name of place)	Lage	Intense precipitation of short duration	4	3	0	3	0	Residential buildings	Porto Salvo

Massa CCLL

Table 23: Past extreme climate events in Massa, as provided by Massa CCLL.

Extreme event ID	Extreme event type	Short description	Date	Area affected	Duration
HP1	Heavy precipitation	Intense and exceptional rainfalls.	6/11/1994	Hilly area	24 hours
HP2	Heavy precipitation	Intense and exceptional rainfalls.	10/11/1994	Hilly area	24 hours
CS1	Coastal Storm	Intense storm with erosion of the beach and damage to bathing facilities.	14/05/1995	East coast	24 hours
CS2	Coastal Storm	Intense storm with erosion of the beach and damage to bathing facilities.	1/07/1997	East coast	24 hours
CS3	Coastal Storm	Intense storm with erosion of the beach and damage to bathing facilities.	9/02/1998	East coast	24 hours
CS4	Coastal Storm	Intense storm with erosion of the beach and damage to bathing facilities.	28/12/1999	East coast	24 hours
CS5	Coastal Storm	Intense storm with erosion of the beach and damage to bathing facilities.	8/11/2001 9/11/2001	West coast	48 hours
PF1	Pluvial Flood	Intense and exceptional rainfalls that have caused various damages.	21/9/2002 22/9/2022	City centre and coastal area	48 hours
PF2	Pluvial Flood	Intense and exceptional rainfalls that have caused various damages.	23/09/2003	Mountain area	24 hours
CS6	Coastal Storm	Violent storm surge with erosion of the beach, damage to coastal defence works (cliffs and groynes), roads and bathing facilities.	October 2003	West coast	48 – 72 hours
L1	Landslide	Exceptional rainfalls and strong winds have caused landslides and collapse of the forest in the hilly and mountain areas.	10/4/2004 11/4/2004	Mountain areas	48 hours
L2	Landslide	Landslide movements due to atmospheric precipitation in the mountain area.	27/2/2007 28/02/2007	Mountain area of Guadine	48 hours
L3	Landslide	Exceptional rainfalls and strong winds have caused landslides in the hilly and mountain areas.	5/3/2008	Hilly and mountain areas	24 hours
L4	Landslide	Landslide movements due to atmospheric precipitation in the mountain area.	19/5/2008 20/5/2008	Mountain area (Belvedere)	48 hours
PF3	Pluvial Flood	Intense and exceptional rainfalls that have caused various damages.	30/10/2008 31/10/2008	City centre and hilly area	48 hours

PF4	Pluvial Flood	Intense and exceptional rainfalls that have caused various damages.	4/11/2008	City centre and hilly area	24 hours
PF5	Pluvial Flood	Intense and exceptional rainfalls and strong winds.	10/12/2008	Hilly and mountain areas	24 hours
L5	Landslide	Exceptional rainfalls have caused landslides in the hilly and mountain areas.	20/01/2009	Hilly and mountain areas	24 hours
L6	Landslide	Exceptional rainfalls have caused landslides in the hilly and mountain areas.	2/2/2009	Hilly and mountain areas	24 hours
RF1	River flood	Intense and prolonged rainfall caused flooding in coastal areas and flooding of canals.	29/7/2009 30/7/2009	Coastal area	48 hours
L7	Landslide	Intense and prolonged rainfall have caused landslides in the hilly and mountain areas.	10/01/2010	Hilly and mountain areas	24 hours
HP3	Heavy precipitation	Intense and prolonged rainfall caused flooding in coastal areas.	31/10/2010 1/11/2010	Coastal area	48 hours
L8	Landslide	Intense and prolonged rainfall caused have caused landslides.	24/10/2011 25/10/2011	Hilly and mountain areas	48 hours
RF2	River Flood	Intense and prolonged rainfall caused flooding in coastal areas and flooding of canals.	10/11/2012 11/11/2012	Coastal area	48 hours
HP4	Heavy precipitation	Intense and prolonged rainfall caused flooding in coastal areas and landslides in the hilly and mountain areas.	27/11/2012	Coastal area (Ricortola) and hilly area (Romagnano)	24 hours
L9	Landslide	Important landslide movements in the mountain area.	4/1/2014 5/1/2014	Mountain area (Casette, Forno)	48 hours
L10	Landslide	Important landslide movements in the mountain area.	14/1/2014	Mountain area	24 hours
L11	Landslide	Important landslide movements in the mountain area.	20/1/2014	Mountain area	24 hours
L12	Landslide	Important landslide movements in the mountain area.	30/1/2014	Mountain area	24 hours
L13	Landslide	Important landslide movements in the mountain area.	1/2/2014	Mountain area	24 hours
CS7	Coastal Storm	Strong winds have cut down trees, torn roofs and caused electrical and telephone blackouts in the coastal area.	4/3/2015 5/3/2015	Coastal area	48 hours
CS8	Coastal Storm	Strong winds have cut down trees, torn roofs and caused electrical and telephone blackouts in the city centre, outskirts and coastal area.	26/9/2021	City centre and coastal area	24 hours

Piran CCLL

Table 24: Past extreme land flooding events in Piran, as provided by Piran CCLL.

Extreme event ID	Extreme event type	Short description	Date	Area affected (km^2)
LF1	Land flooding	Not available	Not available	2.814526 (mapped)
LF2	Land flooding	Not available	Not available	0.068272 (mapped)
LF3	Land flooding	Not available	Not available	5.923209 (mapped)
LF4	Land flooding	Location of individual flood event point marked in map.	Not available	Not available
LF5	Land flooding	Location of individual flood event point marked in map.	Not available	Not available
LF6	Land flooding	Location of individual flood event point marked in map.	Not available	Not available
LF7	Land flooding	Location of individual flood event point marked in map.	Not available	Not available
LF8	Land flooding	Location of individual flood event point marked in map.	Not available	Not available
LF9	Land flooding	Location of individual flood event point marked in map.	Not available	Not available
LF10	Land flooding	Location of individual flood event point marked in map.	Not available	Not available
LF11	Land flooding	Location of individual flood event point marked in map.	Not available	Not available
LF12	Land flooding	Location of individual flood event point marked in map.	Not available	Not available
LF13	Land flooding	Location of individual flood event point marked in map.	Not available	Not available
LF14	Land flooding	Location of individual flood event point marked in map.	Not available	Not available
LF15	Land flooding	Location of individual flood event point marked in map.	Not available	Not available
LF16	Land flooding	Location of individual flood event point marked in map.	Not available	Not available
LF17	Land flooding	Location of individual flood event point marked in map.	Not available	Not available
LF18	Land flooding	Location of individual flood event point marked in map.	Not available	Not available
LF19	Land flooding	Location of individual flood event point marked in map.	Not available	Not available

LF20	Land flooding	Location of individual flood event point marked in map.	Not available	Not available
LF21	Land flooding	Location of individual flood event point marked in map.	Not available	Not available

Gdańsk CCLL

Table 25: Identified flash floods in Gdańsk in 1992-2016 with their consequences.

Extreme event ID	Extreme event type	Short description	Date	Duration of rainfall [min]	Precipitation height [mm]
PF1	Pluvial flooding	Not provided.	11-07-1992	1440	78
PF2	Pluvial flooding	Flash flood, 1 person died.	10-09-1994	1440	63.2
PF3	Pluvial flooding	Flooded most of the city, traffic difficulties, streets turned into rivers.	11-07-2000	1440	60.2
PF4	Pluvial flooding	Flooding of Gdańsk (significant damage to streets, buildings, etc.).	09-07-2001	1440 1440 1440	71.5 127.7 118
PF5	Pluvial flooding	Not provided.	28-05-2002	1440	60.3
PF6	Pluvial flooding	Flooded streets: Grunwaldzka, Miszewski, Sobieski, Trakt św. Wojciecha, Nowe Ogrody, 3 Maja, Falowa, Turystyczna, flooded cellars of the District and District Courts.	28-07-2003	60	20
PF7	Pluvial flooding	Flooded buildings, streets: 3 Maja, Nowe Ogrody, Kartuska, flooded court archives, communication paralysis, flooded parking lot CH Manhattan.	21-07-2004	90	25
PF8	Pluvial flooding	Not provided.	19-09-2006	1440	56.2
PF9	Pluvial flooding	Flooded basements, streets, tracks, parking lots, tunnels, garages, flooded underground parking CH Manhattan.	13-08-2007	25	5
PF10	Pluvial flooding	Flooded streets, railway tracks, building archives, traffic paralysis, flooded tunnel in Wrzeszcz.	01-07-2009	1440	41.3
PF11	Pluvial flooding	Flooded streets, basements, garages.	18-07-2009	1440	57.3
PF12	Pluvial flooding	Flooded technical rooms of the orphanage in Stogi, flooded streets, warehouses, flooded parking lot in Manhattan Shopping Center, flooded streets: Kartuska, Czyżewskiego, Nowe Ogrody, 3 May, Polanki, Obrońców Westerplatte, flooded basements of the District Court and City Hall.	03-08-2010	1440	32.6
PF13	Pluvial flooding	Flooded Gdańsk, flooded streets: Czarny Dwór, Hallera, broken dam of the reservoir on Strzyża in Matemblewo.	27-09-2010	1440	71.5
PF14	Pluvial flooding	Flooded streets, basements, garages, City Hall, SKM tunnel.	07-13-2011	720	37
PF15	Pluvial flooding	Flooded streets, flooding.	24-08-2011		22.3

PF16	Pluvial flooding	Flooded streets, crossings under viaducts, paralyzed car traffic for several dozen minutes, manholes like geysers, flooded cellars.	07-07-2012	1440	17.6
PF17	Pluvial flooding	Flood in the Tri-City, flash flood, people trapped in buildings and cars on the streets, flooded tunnels, underground passages, flooded tram tracks, flooded basements, buildings, garages, damaged pavements, flooded tunnel SKM in Żabianka.	03-08-2012	120	14.5
PF18	Pluvial flooding	Streets turned into rushing rivers. Water collected in the tunnels.	20-08-2012	10	7.6
PF19	Pluvial flooding	Flooded streets turned into rushing streams, partially impassable under the viaducts, flooded tracks in Przeróbka and Nowy Port.	23-06-2013	30	11.9
PF20	Pluvial flooding	Flooded streets, garages mainly in the Chełm district.	05-08-2014	45	2
PF21	Pluvial flooding	Flooded Al. Niepodległości, Armii Krajowej	08-09-2014	30	2.5
PF22	Pluvial flooding	Not provided.	14-11-2015	25	3
PF23	Pluvial flooding	Two people living in the Wrzeszcz district died while rescuing their belongings from the basement; flooded houses, streets: Opacka, Grunwaldzka, Pomorska, Czarny Dwór, Hallera, Uczniowska, Partyzantów, Obywatelska, junction Kliniczna, Dmowskiego, Biała, Szopy, Kamienna Grobla, Kartuska, around Galeria Bałtycka, communication paralysis, flooded zoo, Park Oliwa, destroyed PKM embankments, failures of the Nowiec II, Subisława, Orłowska II reservoirs, damaged reservoirs: Kiełpinek, Górne Młyny, Ogrodowa, Myśliwska, Zabornia, Mokra Moat, Spacerowa.	14-07-2016	1440	140

Table 26: Flooding events database provided by the Regional Water Management Board Gdańsk.

Event ID	Location	Event category	Mechanism of flooding	Short description	Impacts (human health)	Impacts (environment)	Impacts (cultural heritage)	Impacts (economy)	Date (y/m/d)	Size of flooding	Return Period (years)	LAT	LON
CE1	Motława	A11, A14	A21, A24, A25	Flood caused by backwater from the Baltic Sea	B13	B25	B33	B45	1829-04-09	*Not available*	*Not available*	18° 39' 5.623" E	54° 20' 20.370" N
CE2	Motława	A11, A14	A21, A24, A25	Flood caused by backwater from the Baltic Sea	B13	B25	B33	B45	1829-04-09	*Not available*	*Not available*	18° 39' 32.363" E	54° 21' 2.470" N
CE3	Motława	A11, A14	A21, A24, A25	Flood caused by backwater from the Baltic Sea	B13	B25	B33	B45	1829-04-09	*Not available*	*Not available*	18° 39' 27.807" E	54° 21' 5.112" N
CE4	Motława	A11, A14	A21, A24, A25	Flood caused by backwater from the Baltic Sea	B13	B25	B33	B45	1829-04-09	*Not available*	*Not available*	18° 39' 28.777" E	54° 21' 12.169" N
CF1	Przymorze od Martwej Wisły do granicy państwa na Mierzei Wiślanej	A14	A21	*Not available*	B13	B25	B34	B45	1843-12-16	*Not available*	*Not available*	18° 41' 53.245" E	54° 23' 58.707" N
CE5	Wisła od Drwęcy do ujścia	A11, A14	A21, A25	Flood caused by backwater from the Vistula Lagoon and the Baltic Sea	B14	B25	B34	B45	1956-03-16	*Not available*	*Not available*	18° 56' 37.751" E	54° 21' 10.830" N
CE6	Wisła od Drwęcy do ujścia	A11, A14	A21, A25	Flood caused by backwater from the Vistula Lagoon and the Baltic Sea	B14	B25	B34	B45	1956-03-16	*Not available*	*Not available*	18° 56' 8.762" E	54° 20' 11.120" N
CE7	Martwa Wisła	A11, A14	A21, A25	Flood caused by backwater from the Baltic Sea	B14	B24	B34	B45	1983-01-18	*Not available*	*Not available*	Affected area is mapped	
CE8	Martwa Wisła	A11, A14	A21, A25	Flood caused by backwater from the Vistula Lagoon and the Baltic Sea	B14	B25	B34	B45	1992-01-17	*Not available*	*Not available*	18° 48' 57.417" E	54° 20' 46.703" N
RF1	Motława	A11	A21	*Not available*	B13	B24	B33	B45	2001-07-09	*Not available*	*Not available*	Affected area is mapped	
RF2	Martwa Wisła	A11	A23	*Not available*	B13	B24	B33	B45	2001-07-09	*Not available*	*Not available*	Affected area is mapped	
RF3	Potok Oliwski (Potok Prochowy)	A11	A21	*Not available*	B13	B24	B33	B45	2001-07-09	*Not available*	*Not available*	Affected area is mapped	
RF4	Martwa Wisła	A11	A23	*Not available*	B13	B24	B33	B45	2001-07-09	*Not available*	*Not available*	Affected area is mapped	
CE9	Martwa Wisła od Czarnej łachy do Motławy (I)	A11, A14	A21, A25	Flood caused by backwater from the Baltic Sea	B14	B25	B34	B45	2004-11-23	*Not available*	*Not available*	Affected area is mapped	
CE10	Martwa Wisła	A11, A14	A21, A25	Flood caused by backwater from the Baltic Sea	B14	B25	B34	B45	2004-11-23	*Not available*	*Not available*	Affected area is mapped	
PF1	Strzyża od dopł. spod Kokoszek II do ujęcia	A12	A21	*Not available*	B11	B25	B34	B46	2016-07-14	*Not available*	*Not available*	Affected area is mapped	
RF5	Strzyża	A11	A22	*Not available*	B14	B22	B34	B46	2016-07-14	*Not available*	*Not available*	Affected area is mapped	
RF6	Strzyża	A11	A22	*Not available*	B14	B25	B34	B46	2016-07-14	*Not available*	*Not available*	Affected area is mapped	
RF7	Przymorze od Kaczej do Martwej Wisły	A11	A22	*Not available*	B14	B22	B34	B46	2016-07-14	*Not available*	*Not available*	Affected area is mapped	
PF2	Potok Oliwski (Potok Prochowy)	A12	A22	*Not available*	B14	B25	B34	B46	2016-07-14	*Not available*	*Not available*	Affected area is mapped	
PF3	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B34	B42	2016-07-14	lokalne	250	476790.35	54.3546
PF4	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	120	475356.032	54.3833
PF5	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	120	475366.459	54.3833
PF6	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	120	475377.816	54.3833
PF7	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	100	475322.599	54.3836
PF8	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	120	475397.232	54.3833
PF9	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	474849.192	54.3825
PF10	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	474848.502	54.3823
PF11	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	małe	20	474848.502	54.3823
PF12	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-07-15	lokalne	20	474848.618	54.3821
PF13	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	474848.618	54.3821
PF14	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	małe	20	474848.618	54.3821
PF15	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	80	474866.025	54.3821
PF16	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	474866.025	54.3821
PF17	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B42	2015-07-09	lokalne	40	475739.733	54.406
PF18	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B45	2017-08-23	lokalne	100	475570.772	54.3779
PF19	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-07-15	lokalne	600	474313.553	54.3789
PF20	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B42	2016-07-15	lokalne	100	474261.19	54.3796
PF21	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	200	474104.747	54.3816
PF22	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-08-02	lokalne	100	474021.628	54.3814

PF23	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	100	474000.95	54.3813
PF24	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B42	2016-07-15	lokalne	500	474041.916	54.3819
PF25	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	80	473987.972	54.3814
PF26	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-07-15	lokalne	60	473987.972	54.3814
PF27	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	100	473942.141	54.3817
PF28	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	100	473920.759	54.3818
PF29	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	lokalne	20	473854.314	54.3826
PF30	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	lokalne	20	473841.32	54.3828
PF31	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	100	473834.356	54.383
PF32	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-15	lokalne	100	473102.987	54.3907
PF33	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2013-06-23	lokalne	60	472937.651	54.3924
PF34	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2017-09-23	lokalne	20	472937.651	54.3924
PF35	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2010-06-11	lokalne	50	472440.357	54.3989
PF36	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2010-07-11	lokalne	30	472440.357	54.3989
PF37	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2012-08-11	lokalne	100	472440.357	54.3989
PF38	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2010-08-03	lokalne	20	472413.705	54.3993
PF39	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	70	475030.398	54.3755
PF40	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B42	2016-07-15	lokalne	200	472930.864	54.3933
PF41	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-07-15	lokalne	600	472930.864	54.3933
PF42	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-07-15	lokalne	600	472930.864	54.3933
PF43	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-07-19	lokalne	100	472941.154	54.3932
PF44	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-07-19	lokalne	100	472941.154	54.3932
PF45	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2012-07-21	lokalne	250	472240.543	54.4031
PF46	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2015-07-21	lokalne	100	472240.543	54.4031
PF47	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2012-08-03	lokalne	60	471849.491	54.4114
PF48	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-03	lokalne	150	471849.491	54.4114
PF49	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B42	2017-07-26	lokalne	60	471838.759	54.4131
PF50	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B42	2017-07-26	lokalne	60	471838.759	54.4131
PF51	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2010-07-24	lokalne	20	474482.64	54.3775
PF52	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2012-07-24	małe	600	474482.64	54.3775
PF53	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2012-08-24	lokalne	800	474482.64	54.3775
PF54	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2012-08-24	lokalne	500	474482.64	54.3775
PF55	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	lokalne	4	474783.31	54.4044
PF56	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	średnie	100	474822.367	54.405
PF57	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B12	B25	B34	B41	2016-07-15	lokalne	80	474834.75	54.4031
PF58	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B45	2016-07-15	lokalne	40	473721.924	54.403
PF59	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2013-06-23	lokalne	30	472790.29	54.3892
PF60	Martwa Wisła od Motławy do Strzyży (I)	A12	A21	*Not available*	B14	B25	B34	B45	2013-06-25	małe	20	475951.469	54.3697
PF61	Martwa Wisła od Motławy do Strzyży (I)	A12	A21	*Not available*	B14	B25	B34	B42	2013-06-25	lokalne	2000	475856.165	54.3694
PF62	Martwa Wisła od Motławy do Strzyży (I)	A12	A21	*Not available*	B14	B25	B34	B42	2017-08-22	lokalne	400	475979.428	54.3681
PF63	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-15	lokalne	200	473411.74	54.3804
PF64	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2013-06-23	lokalne	60	472313.45	54.3895
PF65	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	50	471102.505	54.4075
PF66	Kanał Raduński od dopł. z Borkowa do dopł. z Łostowic (I)	A12	A21	*Not available*	B11	B25	B34	B41	2011-08-24	lokalne	20	474808.616	54.3141
PF67	Kanał Raduński od dopł. z Borkowa do dopł. z Łostowic (I)	A12	A21	*Not available*	B11	B25	B34	B41	2011-08-24	lokalne	20	474717.158	54.3145
PF68	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2011-02-05	lokalne	70	478353.573	54.3502
PF69	Kanał na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	100	478169.777	54.3505

PF70	Kanał na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	100	478169.777	54.3505
PF71	Kanał na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	100	478169.777	54.3505
PF72	Kanał na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	100	478169.777	54.3505
PF73	Kanał na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	20	478169.777	54.3505
PF74	Kanał na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	100	478133.78	54.3505
PF75	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2013-06-23	lokalne	40	472115.992	54.3907
PF76	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2013-06-25	małe	10	471967.753	54.4173
PF77	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B41, B44	2012-08-25	małe	20	471967.753	54.4173
PF78	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2012-08-25	lokalne	100	471967.753	54.4173
PF79	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2013-06-25	małe	30	472788.039	54.4002
PF80	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2011-02-09	lokalne	10	474149.377	54.3395
PF81	Dopływ z Barniewic	A12	A21	*Not available*	B14	B22	B34	B42	2017-07-26	lokalne	15	464699.289	54.4238
PF82	Dopływ z Barniewic	A12	A21	*Not available*	B14	B22	B34	B41	2016-07-16	lokalne	120	464684.678	54.4233
PF83	Dopływ z Barniewic	A12	A21	*Not available*	B11	B22	B34	B41	2016-07-16	lokalne	80	464307.291	54.4173
PF84	Dopływ z Barniewic	A12	A21	*Not available*	B11	B22	B34	B41	2011-02-08	lokalne	60	464308.887	54.4163
PF85	Dopływ z jez. Wysockiego do dopł. z Braniewic (I)	A12	A21	*Not available*	B11	B22	B34	B41	2014-09-08	lokalne	25	465055.906	54.4286
PF86	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B42	2016-07-14	lokalne	1000	472897.62	54.3841
PF87	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2012-08-03	lokalne	20	471901.676	54.4203
PF88	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2012-08-03	małe	5	471844.538	54.4185
PF89	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2012-08-03	lokalne	40	471937.386	54.4213
PF90	Dopływ z Barniewic	A12	A21	*Not available*	B11	B22	B34	B41	2013-06-25	lokalne	30	465544.284	54.4256
PF91	Dopływ z Barniewic	A12	A21	*Not available*	B12	B22	B34	B41	2017-07-10	lokalne	100	465702.932	54.4261
PF92	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	473588.331	54.4254
PF93	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	50	473518.243	54.4247
PF94	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	473572.932	54.4253
PF95	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	50	473557.975	54.4251
PF96	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	30	473543.992	54.4251
PF97	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	30	473534.402	54.4249
PF98	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2010-08-03	lokalne	50	475063.573	54.3751
PF99	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2017-06-03	lokalne	200	475063.573	54.3751
PF100	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-03	lokalne	150	475063.573	54.3751
PF101	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	80	475063.381	54.3747
PF102	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	475063.381	54.3747
PF103	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-19	lokalne	70	475042.369	54.3746
PF104	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2013-06-25	małe	20	475077.145	54.3867
PF105	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2010-07-24	lokalne	80	476156.394	54.3317
PF106	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2010-08-24	lokalne	20	476156.394	54.3317
PF107	Dopływ spod Kokoszek	A12	A21	*Not available*	B14	B25	B34	B42	2010-09-28	lokalne	1200000	464941.107	54.3704
PF108	Dopływ spod Kokoszek	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-28	lokalne	10	464941.107	54.3704
PF109	Dopływ spod Kokoszek II	A12	A21	*Not available*	B14	B22	B34	B42	2011-02-05	małe	300	468052.867	54.3747
PF110	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B22	B34	B42	2010-09-28	lokalne	2000	468092.661	54.3759
PF111	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	100	473541.335	54.426
PF112	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	473546.932	54.4258
PF113	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	50	473534.626	54.4257
PF114	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	35	473524.27	54.4256
PF115	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	30	473515.38	54.4255
PF116	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	10	473506.087	54.4254
PF117	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	15	473496.048	54.4253
PF118	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	30	473486.047	54.4252

PF119	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	18	473476.07	54.425
PF120	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	80	473456.786	54.4251
PF121	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	100	473468.646	54.4253
PF122	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	80	473481.466	54.4254
PF123	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	60	473494.862	54.4255
PF124	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	80	473507.519	54.4257
PF125	Dopływ spod Kokoszek	A12	A21	*Not available*	B11	B25	B34	B41	2017-07-28	lokalne	20	465255.9	54.3641
PF126	Dopływ spod Kokoszek	A12	A21	*Not available*	B14	B25	B34	B45	2017-10-28	małe	50	465255.9	54.3641
PF127	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B31	B41 ,B44	2012-08-03	lokalne	100	470116.259	54.4064
PF128	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41, B44	2012-08-03	lokalne	50	469998.317	54.4053
PF129	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	200	478204.817	54.3432
PF130	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	200	478228.482	54.3431
PF131	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	200	478221.796	54.3433
PF132	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-15	małe	600	473190.988	54.4117
PF133	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	120	473168.586	54.4196
PF134	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	150	473092.989	54.4193
PF135	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	małe	30	476141.37	54.3765
PF136	Martwa Wisła od Motławy do Strzyży (l)	A12	A21	*Not available*	B11	B25	B34	B41	2012-07-07	lokalne	8	476168.339	54.376
PF137	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	lokalne	140	476133.575	54.3762
PF138	Dopływ z Łostowic	A12	A21	*Not available*	B14	B25	B34	B41, B44	2010-07-24	lokalne	30	473112.736	54.3222
PF139	Dopływ z Barniewic	A12	A21	*Not available*	B14	B22	B34	B41, B44	2017-07-26	lokalne	10	465674.011	54.4222
PF140	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B14	B25	B34	B42	2012-07-07	lokalne	50	473726.706	54.4177
PF141	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B14	B25	B34	B42	2012-07-07	lokalne	25	473726.706	54.4177
PF142	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-07-16	małe	10	473904.473	54.4156
PF143	Stara Motława	A12	A21	*Not available*	B14	B25	B31	B41 ,B44	2010-08-03	lokalne	100	477619.02	54.348
PF144	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B22	B34	B41	2016-07-15	małe	200	472097.942	54.3617
PF145	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B22	B34	B42	2016-08-05	lokalne	5	471693.816	54.3648
PF146	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B42	2015-07-28	lokalne	50	476040.842	54.4063
PF147	Stara Motława	A12	A21	*Not available*	B14	B25	B34	B41, B44	2010-08-03	lokalne	30	477658.18	54.349
PF148	Opływ Motławy od dopł. z polderu Rudniki do Rozwójki (p)	A12	A21	*Not available*	B11	B25	B34	B41	2016-06-25	lokalne	50	478710.696	54.3492
PF149	Martwa Wisła od Kan. Młynówka do oddzielenia siê Wisły śmiałej	A12	A21	*Not available*	B14	B22	B34	B41	2017-08-01	lokalne	15	489298.074	54.3446
PF150	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B22	B34	B41	2011-02-05	lokalne	350	466479.385	54.4278
PF151	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	50	475283.051	54.382
PF152	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	50	475254.227	54.3808
PF153	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2013-06-23	lokalne	15	473051.767	54.388
PF154	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2012-08-23	lokalne	16	473051.767	54.388
PF155	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B22	B34	B41	2017-07-26	lokalne	200	466653.429	54.4274
PF156	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B22	B34	B41	2017-07-26	lokalne	200	466653.429	54.4274
PF157	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B22	B34	B41	2017-07-26	lokalne	500	466602.82	54.419
PF158	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B12	B25	B34	B41	2012-08-03	lokalne	10	476510.57	54.4068
PF159	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2010-11-23	lokalne	100	476119.639	54.4028
PF160	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2015-07-28	małe	100	476180.102	54.4038
PF161	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B45	2011-02-05	lokalne	6400	475630.181	54.3995
PF162	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B45	2011-02-05	lokalne	6400	475630.181	54.3995
PF163	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-05	lokalne	1000	475630.181	54.3995

PF164	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-05	lokalne	100	475630.181	54.3995
PF165	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B42	2016-07-05	lokalne	500	475630.181	54.3995
PF166	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B45	2016-07-05	lokalne	30	475630.181	54.3995
PF167	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B45	2016-08-05	lokalne	100	475630.181	54.3995
PF168	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B14	B25	B34	B41, B44	2013-06-25	lokalne	70	472589.385	54.4093
PF169	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B11	B25	B34	B41	2015-07-25	lokalne	200	472589.385	54.4093
PF170	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2010-08-22	małe	20	476193.442	54.3523
PF171	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B42	2016-07-15	małe	200	474966.059	54.374
PF172	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	450	474956.117	54.3738
PF173	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	450	474941.486	54.3739
PF174	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-15	małe	1	474956.117	54.3738
PF175	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	30	475429.872	54.3819
PF176	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	30	475429.895	54.3821
PF177	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	30	475430.04	54.3821
PF178	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	30	475429.768	54.3823
PF179	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	30	475429.653	54.3826
PF180	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	35	475429.98	54.3828
PF181	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	35	475429.98	54.3828
PF182	Martwa Wisła od Motławy do Strzyży (I)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	małe	20	475625.439	54.3743
PF183	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B41	2013-06-25	lokalne	4	472893.46	54.4205
PF184	Polder Orunia	A12	A21	*Not available*	B11	B25	B34	B41	2011-08-24	lokalne	20	476064.218	54.3228
PF185	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B31	B41 ,B44	2016-07-14	małe	100	476666.272	54.3571
PF186	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	474692.719	54.3823
PF187	Motława od Starej Motławy do Kanału Raduńskiego (I)	A12	A21	*Not available*	B11	B25	B34	B41, B44	2013-06-25	lokalne	50	477794.798	54.354
PF188	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2010-06-11	lokalne	200	475476.744	54.3754
PF189	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-20	lokalne	90	476037.461	54.3884
PF190	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B22	B34	B41	2016-07-14	lokalne	100	466586.436	54.4267
PF191	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B22	B34	B41	2016-08-01	lokalne	20	466629.157	54.425
PF192	Strzyża do dopł. spod Kokoszek II (I)	A12	A21	*Not available*	B14	B25	B34	B42	2010-09-01	lokalne	600	468114.166	54.3528
PF193	Martwa Wisła od Kan. Młynówka do oddzielenia siê Wisły śmiałej	A12	A21	*Not available*	B14	B22	B34	B45	2017-07-27	lokalne	10	489131.649	54.3419
PF194	Martwa Wisła od Kan. Młynówka do oddzielenia siê Wisły śmiałej	A12	A21	*Not available*	B11	B22	B34	B41	2017-08-27	lokalne	20	489131.649	54.3419
PF195	Martwa Wisła od Kan. Młynówka do oddzielenia siê Wisły śmiałej	A12	A21	*Not available*	B14	B22	B34	B41, B44	2010-08-27	lokalne	80	489131.649	54.3419
PF196	Martwa Wisła od Kan. Młynówka do oddzielenia siê Wisły śmiałej	A12	A21	*Not available*	B14	B22	B34	B45	2017-07-26	małe	5	489108.47	54.3413
PF197	Martwa Wisła od Kan. Młynówka do oddzielenia siê Wisły śmiałej	A12	A21	*Not available*	B14	B22	B34	B42	2012-08-26	lokalne	100	489108.47	54.3413
PF198	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B11	B25	B34	B41	2013-06-25	lokalne	40	474133.152	54.4124
PF199	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B14	B25	B34	B42	2017-07-26	lokalne	20	473417.291	54.4128
PF200	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2015-07-28	małe	10	471909.922	54.399
PF201	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B42	2017-07-26	lokalne	20	471310.08	54.4095
PF202	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B42	2017-08-26	lokalne	400	471310.08	54.4095
PF203	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	475796.077	54.3836
PF204	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-07-14	lokalne	25	474609.414	54.3566
PF205	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B12	B25	B34	B41	2016-07-14	lokalne	10	474609.414	54.3566
PF206	Martwa Wisła od Motławy do Strzyży (I)	A12	A21	*Not available*	B11	B25	B34	B41	2013-06-25	lokalne	30	476775.89	54.3647
PF207	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2013-06-28	lokalne	3	474653.711	54.3995

PF208	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	małe	80	471801.576	54.3974
PF209	Dopływ z Łostowic	A12	A21	*Not available*	B11	B25	B34	B41	2011-08-24	lokalne	300	472056.081	54.3169
PF210	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B22	B34	B41	2016-07-15	lokalne	10	466682.969	54.4238
PF211	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	300	473567.493	54.4259
PF212	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	lokalne	750	473614.568	54.4277
PF213	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41, B44	2016-07-15	lokalne	60	473528.776	54.4266
PF214	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-07-15	lokalne	400	473451.592	54.4266
PF215	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-07-15	lokalne	1500	473484.182	54.4263
PF216	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-07-15	lokalne	1000	473422.925	54.4257
PF217	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B45	2017-07-28	lokalne	70	473200.293	54.4261
PF218	Martwa Wisła od oddzielenia siê Rozwójki do Opływu Motławy	A12	A21	*Not available*	B11	B25	B34	B41	2017-01-05	lokalne	30	480914.419	54.359
PF219	Martwa Wisła od oddzielenia siê Rozwójki do Opływu Motławy	A12	A21	*Not available*	B11	B25	B34	B41	2017-07-05	lokalne	50	480914.419	54.359
PF220	Martwa Wisła od Czarnej Łachy do oddzielenia siê Rozwójki	A12	A21	*Not available*	B12	B25	B34	B41	2010-06-11	lokalne	100	482861.416	54.3598
PF221	Martwa Wisła od Czarnej Łachy do oddzielenia siê Rozwójki	A12	A21	*Not available*	B12	B25	B34	B41	2010-08-11	lokalne	100	482861.416	54.3598
PF222	Martwa Wisła od Czarnej Łachy do oddzielenia siê Rozwójki	A12	A21	*Not available*	B12	B25	B34	B41	2017-07-11	lokalne	100	482861.416	54.3598
PF223	Martwa Wisła od Czarnej Łachy do oddzielenia siê Rozwójki	A12	A21	*Not available*	B14	B25	B34	B41	2010-08-11	lokalne	60	482861.416	54.3598
PF224	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2010-07-24	lokalne	30	472318.042	54.3895
PF225	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B41	2015-07-06	lokalne	5	471298.716	54.4157
PF226	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B41, B44	2012-08-03	małe	40	471282.453	54.4164
PF227	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2013-06-25	małe	25	471641.098	54.4224
PF228	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B45	2013-06-25	lokalne	99	471369.007	54.4156
PF229	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B41	2012-08-03	lokalne	400	471397.901	54.4156
PF230	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B41, B44	2012-08-03	lokalne	300	471466.379	54.4147
PF231	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	lokalne	5	476010.28	54.3529
PF232	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B42	2013-06-25	lokalne	100	473768.672	54.3818
PF233	Dopływ spod Kokoszek II	A12	A21	*Not available*	B14	B22	B34	B42	2012-06-18	małe	20	468837.464	54.3759
PF234	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-17	lokalne	300	473448.817	54.3804
PF235	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-17	lokalne	150	473448.817	54.3804
PF236	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2013-06-17	lokalne	100	473448.817	54.3804
PF237	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2014-08-17	lokalne	30	473448.817	54.3804
PF238	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2013-10-17	lokalne	50	473448.817	54.3804
PF239	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2013-11-17	lokalne	30	473448.817	54.3804
PF240	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B22	B34	B41	2016-07-19	lokalne	8	468154.196	54.3767
PF241	Dopływ spod Kokoszek	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-14	lokalne	40	465809.55	54.383
PF242	Dopływ spod Kokoszek	A12	A21	*Not available*	B14	B25	B34	B41, B44	2017-07-14	lokalne	50	465809.55	54.383
PF243	Dopływ spod Kokoszek	A12	A21	*Not available*	B14	B25	B34	B41	2017-07-14	lokalne	50	465809.55	54.383
PF244	Dopływ spod Kokoszek	A12	A21	*Not available*	B14	B25	B34	B41	2017-07-14	lokalne	20	465809.55	54.383
PF245	Dopływ spod Kokoszek	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-14	lokalne	2	465731.786	54.3832
PF246	Dopływ spod Kokoszek	A12	A21	*Not available*	B14	B25	B34	B42	2017-07-10	lokalne	400	465999.106	54.3809
PF247	Dopływ z jez. Wysockiego od dopł. z Braniewic do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B42	2017-07-27	lokalne	20	463399.203	54.3838
PF248	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2012-07-07	lokalne	60	473260.33	54.3802
PF249	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2012-07-07	lokalne	400	473260.33	54.3802
PF250	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	250	473230.345	54.3799
PF251	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	100	473230.345	54.3799
PF252	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	100	473211.57	54.38
PF253	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	20	473231.578	54.3803

PF254	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	20	473183.523	54.38
PF255	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2014-08-05	lokalne	60	473203.415	54.3802
PF256	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	30	473159.18	54.3799
PF257	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	lokalne	30	473123.016	54.3796
PF258	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	lokalne	60	473123.016	54.3796
PF259	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B42	2016-07-15	lokalne	100	473090.822	54.3797
PF260	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B12	B25	B34	B46	2016-07-15	lokalne	500	473055.66	54.3796
PF261	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-07-15	lokalne	60	473014.676	54.3795
PF262	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	473003.155	54.3795
PF263	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	120	473003.155	54.3795
PF264	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	lokalne	100	472986.881	54.3795
PF265	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	lokalne	60	472986.881	54.3795
PF266	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	20	472968.049	54.3794
PF267	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	100	472968.049	54.3794
PF268	Dopływ z Łostowic	A12	A21	*Not available*	B11	B25	B34	B41	2017-08-27	lokalne	100	473695.986	54.3185
PF269	Dopływ z Łostowic	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	4	473782.664	54.318
PF270	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B34	B45	2016-07-14	lokalne	2000	473949.265	54.3462
PF271	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2012-07-07	lokalne	2	476011.051	54.3505
PF272	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2012-11-30	małe	20	471986.653	54.4052
PF273	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B41	2012-08-03	lokalne	20	471623.993	54.4199
PF274	Kanał Raduński od dopł. z Borkowa do dopł. z Łostowic (I)	A12	A21	*Not available*	B14	B25	B34	B41	2014-09-01	lokalne	10	474620.462	54.3007
PF275	Dopływ spod Kokoszek	A12	A21	*Not available*	B11	B22	B34	B41	2017-07-27	lokalne	100	466385.142	54.3861
PF276	Dopływ z jez. Wysockiego do dopł. z Braniewic (I)	A12	A21	*Not available*	B14	B22	B34	B41	2017-09-18	małe	300	465480.25	54.4342
PF277	Dopływ z jez. Wysockiego do dopł. z Braniewic (I)	A12	A21	*Not available*	B14	B22	B34	B42	2010-07-13	lokalne	300	464706.29	54.4409
PF278	Dopływ z jez. Wysockiego do dopł. z Braniewic (I)	A12	A21	*Not available*	B14	B22	B34	B41	2010-07-28	małe	40	464634.693	54.4414
PF279	Dopływ z jez. Wysockiego do dopł. z Braniewic (I)	A12	A21	*Not available*	B11	B22	B34	B41	2010-09-28	lokalne	100	464634.693	54.4414
PF280	Dopływ z jez. Wysockiego do dopł. z Braniewic (I)	A12	A21	*Not available*	B14	B22	B34	B42	2010-06-11	lokalne	100	464462.298	54.4416
PF281	Martwa Wisła od Motławy do Strzyży (I)	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-15	małe	600	476727.415	54.3632
PF282	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-15	lokalne	50	475664.039	54.3909
PF283	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2011-02-05	lokalne	5000	475722.292	54.3917
PF284	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2011-02-05	lokalne	5000	475722.292	54.3917
PF285	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B14	B25	B34	B42	2010-08-03	małe	100	474519.723	54.4078
PF286	Dopływ z Łostowic	A12	A21	*Not available*	B11	B25	B34	B41	2010-07-24	lokalne	30	471807.951	54.319
PF287	Dopływ z Łostowic	A12	A21	*Not available*	B14	B25	B34	B42	2016-07-14	lokalne	10	471644.739	54.3196
PF288	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2013-06-25	lokalne	30	475233.572	54.3794
PF289	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	474780.506	54.3823
PF290	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	474758.587	54.3829
PF291	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	474759.391	54.3827
PF292	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	474760.616	54.3825
PF293	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	474761.289	54.3823
PF294	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	474763.216	54.3821
PF295	Dopływ z Barniewic	A12	A21	*Not available*	B11	B22	B34	B41	2010-11-23	lokalne	500	464666.774	54.4208
PF296	Dopływ z Barniewic	A12	A21	*Not available*	B11	B22	B34	B41	2010-11-23	małe	300	464666.774	54.4208
PF297	Dopływ z Barniewic	A12	A21	*Not available*	B11	B22	B34	B41	2010-11-23	lokalne	200	464666.774	54.4208
PF298	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-14	małe	20	477140.663	54.354
PF299	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2017-07-26	lokalne	10	470694.495	54.4105

PF300	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2010-07-24	małe	20	471934.657	54.343
PF301	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-15	lokalne	60	478192.9	54.3503
PF302	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	200	478190.232	54.3421
PF303	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	200	478178.044	54.3422
PF304	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	300	478166.808	54.3423
PF305	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	478160.42	54.3428
PF306	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	200	478125.934	54.3424
PF307	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	200	478112.799	54.3422
PF308	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	200	478112.799	54.3422
PF309	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B42	2016-07-15	lokalne	10	473157.54	54.4038
PF310	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B42	2013-07-29	małe	120	473143.478	54.4045
PF311	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B45	2016-07-15	lokalne	100	474982.027	54.3773
PF312	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B42	2013-06-25	lokalne	30	474881.869	54.3787
PF313	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2013-07-30	małe	25	471386.5	54.339
PF314	Dopływ z Łostowic	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	małe	60	471230.842	54.3313
PF315	Dopływ z jez. Wysockiego do dopł. z Braniewic (l)	A12	A21	*Not available*	B11	B22	B34	B41	2017-07-26	lokalne	15	464575.141	54.4241
PF316	Dopływ z jez. Wysockiego do dopł. z Braniewic (l)	A12	A21	*Not available*	B11	B22	B34	B41	2016-07-15	małe	20	464602.448	54.4245
PF317	Dopływ z jez. Wysockiego do dopł. z Braniewic (l)	A12	A21	*Not available*	B14	B22	B34	B41	2012-06-30	lokalne	30	464684.04	54.4285
PF318	Strzyża do dopł. spod Kokoszek II (l)	A12	A21	*Not available*	B11	B25	B34	B41	2017-07-26	małe	1	467927.097	54.3519
PF319	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	120	475347.914	54.382
PF320	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	120	475343.33	54.3823
PF321	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	120	475330.5	54.3823
PF322	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	120	475329.195	54.3826
PF323	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	120	475328.444	54.3827
PF324	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	50	475336.704	54.3811
PF325	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	50	475324.824	54.3811
PF326	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	50	475336.095	54.3812
PF327	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	50	475343.11	54.3814
PF328	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	50	475334.745	54.3815
PF329	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B34	B45	2017-07-28	lokalne	10	472547.426	54.3435
PF330	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-06-25	lokalne	50	478055.739	54.3433
PF331	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-25	lokalne	20	478055.739	54.3433
PF332	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	200	478081.026	54.3441
PF333	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B14	B25	B34	B41	2016-06-25	małe	100	478076.215	54.344
PF334	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	lokalne	4	478222.612	54.346
PF335	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2010-09-27	lokalne	100	473655.639	54.3313
PF336	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2010-09-27	lokalne	1	473655.639	54.3313
PF337	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2010-08-03	małe	10	475262.31	54.3298
PF338	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B45	2017-07-28	lokalne	300	475871.891	54.3918
PF339	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B45	2010-09-29	lokalne	20	475947.903	54.393
PF340	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B45	2016-07-15	lokalne	80	475979.09	54.3936

PF341	Martwa Wisła od Motławy do Strzyży (l)	A12	A21	*Not available*	B14	B25	B34	B41	2013-06-25	małe	5	475824.643	54.3681
PF342	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-19	lokalne	20	474649.685	54.3786
PF343	Martwa Wisła od Motławy do Strzyży (l)	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-17	lokalne	40	475998.544	54.3666
PF344	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B22	B34	B41	2017-07-27	lokalne	2	466205.866	54.4202
PF345	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B22	B34	B41	2017-07-27	małe	20	466205.866	54.4202
PF346	Martwa Wisła od Motławy do Strzyży (l)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	200	476345.438	54.3715
PF347	Martwa Wisła od Motławy do Strzyży (l)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-14	lokalne	300	476411.543	54.3707
PF348	Martwa Wisła od Motławy do Strzyży (l)	A12	A21	*Not available*	B14	B25	B34	B42	2015-07-14	lokalne	100	476411.543	54.3707
PF349	Martwa Wisła od Motławy do Strzyży (l)	A12	A21	*Not available*	B14	B25	B34	B42	2017-09-18	lokalne	30	476305.25	54.3709
PF350	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2017-07-26	lokalne	10	476965.262	54.3863
PF351	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-18	lokalne	40	474254.123	54.3766
PF352	Dopływ z Barniewic	A12	A21	*Not available*	B14	B22	B34	B45	2016-07-16	lokalne	500	466072.236	54.4086
PF353	Polder Rudniki	A12	A21	*Not available*	B14	B25	B34	B41	2014-09-10	lokalne	30	480872.213	54.351
PF354	Polder Sobieszewo (Kanał Młynówka)	A12	A21	*Not available*	B11	B22	B34	B41	2017-07-26	lokalne	10	495571.044	54.3359
PF355	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B22	B34	B42	2017-07-10	lokalne	25	466415.29	54.4178
PF356	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B22	B34	B42	2017-07-26	lokalne	20	466415.81	54.418
PF357	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B22	B34	B41	2017-07-26	lokalne	10	466415.81	54.418
PF358	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	475941.362	54.3795
PF359	Polder Olszynka	A12	A21	*Not available*	B11	B25	B34	B41	2016-06-25	lokalne	4	479035.676	54.3351
PF360	Polder Olszynka	A12	A21	*Not available*	B11	B25	B34	B41	2017-07-28	małe	30	479369.183	54.3307
PF361	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	małe	50	471235.4	54.352
PF362	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2012-07-07	lokalne	150	477443.672	54.3713
PF363	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2012-07-19	lokalne	150	477527.297	54.3705
PF364	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2017-07-27	lokalne	40	474991.185	54.3535
PF365	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2017-07-27	lokalne	45	474991.185	54.3535
PF366	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B14	B25	B34	B41, B44	2015-07-28	lokalne	300	475354.166	54.4068
PF367	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-07-15	lokalne	1000	475509.863	54.4059
PF368	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-17	lokalne	80	476234.346	54.384
PF369	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-07-17	lokalne	1000	476234.346	54.384
PF370	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B22	B34	B41	2013-05-25	lokalne	50	471925.794	54.3757
PF371	Kanał Raduński od dopł. z Borkowa do dopł. z Łostowic (l)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	50	473915.524	54.3098
PF372	Kanał Raduński od dopł. z Borkowa do dopł. z Łostowic (l)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	10	474264.53	54.3046
PF373	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B12	B25	B34	B41	2016-07-14	lokalne	40	476522.675	54.3513
PF374	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-14	lokalne	10	476522.675	54.3513
PF375	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B34	B45	2010-09-27	lokalne	40	476683.098	54.3518
PF376	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-15	lokalne	300	476571.31	54.3517
PF377	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B12	B25	B34	B41	2016-07-15	lokalne	80	476493.46	54.3516
PF378	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B12	B25	B34	B41	2016-07-14	lokalne	200	476522.675	54.3513
PF379	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2010-08-03	lokalne	150	476684.716	54.3515
PF380	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-03	lokalne	120	476684.716	54.3515
PF381	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B22	B34	B41	2016-07-16	lokalne	300	471685.068	54.364
PF382	Kanał Raduński od dopł. z Borkowa do dopł. z Łostowic (l)	A12	A21	*Not available*	B14	B25	B34	B41, B44	2010-07-24	lokalne	50	475861.602	54.3101
PF383	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	lokalne	4	474827.409	54.344
PF384	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2014-08-14	lokalne	20	474826.541	54.344
PF385	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-07-15	lokalne	200	474250.37	54.41
PF386	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B14	B25	B34	B45	2016-07-15	lokalne	100	474008.454	54.41

PF387	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B22	B34	B41	2017-07-26	małe	300	466525.545	54.4316
PF388	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B22	B34	B42	2017-07-27	lokalne	70	466670.681	54.4339
PF389	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B22	B34	B45	2010-09-28	lokalne	200	466636.667	54.4344
PF390	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B22	B34	B45	2017-07-28	lokalne	700	466721.327	54.4352
PF391	Dopływ spod Kokoszek	A12	A21	*Not available*	B14	B25	B34	B42	2017-02-23	lokalne	10500	467008.176	54.367
PF392	Martwa Wisła od Motławy do Strzyży (I)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-18	lokalne	20	476080.698	54.3751
PF393	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-15	lokalne	400	471633.232	54.4129
PF394	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B41	2012-08-15	lokalne	70	471633.232	54.4129
PF395	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	lokalne	600	471682.029	54.4127
PF396	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-15	lokalne	150	473097.966	54.4244
PF397	Strzyża do dopł. spod Kokoszek II (I)	A12	A21	*Not available*	B11	B25	B34	B41	2014-03-22	lokalne	16	471310.136	54.3395
PF398	Strzyża do dopł. spod Kokoszek II (I)	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-07-14	lokalne	50	471133.177	54.3398
PF399	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B22	B34	B45	2016-07-22	lokalne	20	467016.748	54.4119
PF400	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B22	B34	B41	2010-09-30	lokalne	18	467035.92	54.4109
PF401	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2010-07-24	lokalne	5	474508.541	54.3452
PF402	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2010-09-29	lokalne	70	474499.305	54.3452
PF403	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-06-25	lokalne	20	477608.891	54.3546
PF404	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2013-06-25	lokalne	50	477608.891	54.3546
PF405	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2017-07-10	lokalne	30	473974.088	54.379
PF406	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2013-06-25	małe	50	473340.01	54.3791
PF407	Dopływ z Barniewic	A12	A21	*Not available*	B11	B22	B34	B41	2010-11-23	małe	2500	464426.874	54.4164
PF408	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B14	B25	B34	B41, B44	2012-08-06	małe	30	473788.311	54.418
PF409	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	20	473421.298	54.4173
PF410	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	25	473425.439	54.4176
PF411	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-14	lokalne	100	471996.92	54.4114
PF412	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2017-07-14	lokalne	100	471996.92	54.4114
PF413	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B11	B25	B34	B41	2013-06-25	lokalne	30	472851.25	54.4149
PF414	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B11	B25	B34	B41	2013-06-23	małe	400	472913.907	54.4151
PF415	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	małe	20	472963.424	54.4156
PF416	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B14	B25	B34	B41	2013-06-25	lokalne	20	473416.517	54.415
PF417	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B14	B25	B34	B45	2010-09-28	lokalne	100	473105.091	54.4163
PF418	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B14	B25	B34	B41, B44	2012-09-19	lokalne	80	473128.676	54.4162
PF419	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B31	B41	2013-06-25	lokalne	60	473791.903	54.3916
PF420	Polder Orunia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	małe	0	476279.238	54.3254
PF421	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B42	2016-07-18	lokalne	30	476898.22	54.3555
PF422	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2010-09-28	lokalne	100	472052.771	54.3911
PF423	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2011-02-28	lokalne	30	472052.771	54.3911
PF424	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B12	B25	B34	B41	2016-07-14	lokalne	100	471872.265	54.3934
PF425	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	50	475068.2	54.3745
PF426	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	lokalne	100	477612.432	54.3403
PF427	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-06-25	lokalne	20	473693.634	54.4238
PF428	Dopływ z Łostowic	A12	A21	*Not available*	B14	B25	B34	B42	2017-07-26	lokalne	250	470843.421	54.3337
PF429	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B22	B34	B42	2016-07-14	lokalne	800	472126.604	54.3703
PF430	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B22	B34	B42	2010-09-14	duże	5000	472126.604	54.3703

PF431	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B12	B25	B34	B41	2016-07-15	małe	100	476365.102	54.352
PF432	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2012-08-11	lokalne	8	476093.366	54.3548
PF433	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	20	474904.225	54.4005
PF434	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B42	2015-01-10	lokalne	10	474772.661	54.4012
PF435	Dopływ spod Kokoszek	A12	A21	*Not available*	B14	B25	B34	B45	2016-07-17	małe	100	464142.215	54.3707
PF436	Strzyża do dopł. spod Kokoszek II (I)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	150	469637.255	54.3513
PF437	Strzyża do dopł. spod Kokoszek II (I)	A12	A21	*Not available*	B11	B25	B34	B41	2017-08-03	lokalne	150	469648.211	54.3493
PF438	Strzyża do dopł. spod Kokoszek II (I)	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-07-14	lokalne	100	469689.274	54.3495
PF439	Dopływ z jez. Wysockiego do dopł. z Braniewic (I)	A12	A21	*Not available*	B11	B22	B34	B41	2013-08-19	małe	10	465289.499	54.4337
PF440	Dopływ spod Kokoszek	A12	A21	*Not available*	B14	B22	B34	B41, B44	2011-02-05	lokalne	100	466660.685	54.3824
PF441	Dopływ z Barniewic	A12	A21	*Not available*	B11	B22	B34	B41	2016-07-16	lokalne	20	465564.479	54.4271
PF442	Martwa Wisła od Motławy do Strzyży (I)	A12	A21	*Not available*	B11	B25	B34	B41	2010-08-06	lokalne	100	477056.336	54.363
PF443	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B42	2013-06-25	lokalne	20	472546.783	54.4244
PF444	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2017-09-18	lokalne	40	474638.605	54.3583
PF445	Polder Orunia	A12	A21	*Not available*	B11	B25	B34	B41	2012-07-07	lokalne	50	476360.661	54.3316
PF446	Polder Orunia	A12	A21	*Not available*	B11	B25	B34	B41	2010-08-07	lokalne	60	476360.661	54.3316
PF447	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-14	lokalne	20	471236.308	54.4169
PF448	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2012-08-08	lokalne	3	475723.699	54.3841
PF449	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2012-08-08	małe	3	475723.699	54.3841
PF450	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2010-08-22	lokalne	120	475529.356	54.3524
PF451	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2011-05-23	lokalne	100	475466.694	54.3531
PF452	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2012-10-23	lokalne	100	475466.694	54.3531
PF453	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B14	B25	B34	B42	2017-02-28	lokalne	30	470940.459	54.4076
PF454	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B14	B25	B34	B42	2017-02-24	lokalne	200	470925.652	54.4071
PF455	Przymorze od Potoku Oliwskiego do Martwej Wisły	A12	A21	*Not available*	B14	B25	B34	B42	2017-10-24	lokalne	30	470925.652	54.4071
PF456	Polder Orunia	A12	A21	*Not available*	B11	B25	B34	B41	2017-07-10	małe	20	476353.674	54.3189
PF457	Dopływ spod Kokoszek	A12	A21	*Not available*	B11	B25	B34	B41	2011-02-05	lokalne	4000	465620.269	54.3857
PF458	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	50	475346.548	54.3841
PF459	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	45	475336.711	54.3842
PF460	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	41	475337.207	54.3843
PF461	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-14	lokalne	40	475344.697	54.3838
PF462	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	50	475349.021	54.3843
PF463	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	475349.526	54.3844
PF464	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	475354.132	54.3844
PF465	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	475339.154	54.3845
PF466	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	475351.03	54.3846
PF467	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	475353.648	54.3848
PF468	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-14	lokalne	40	475345.258	54.3839
PF469	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	475355.274	54.385
PF470	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B42	2016-07-14	lokalne	120	471135.541	54.4091
PF471	Strzyża do dopł. spod Kokoszek II (I)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-14	lokalne	7000	468127.545	54.3553
PF472	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B41	2013-06-25	małe	15	472305.655	54.4194
PF473	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B11	B25	B34	B41	2013-07-29	lokalne	90	472243.515	54.4199
PF474	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B41, B42	2012-08-03	lokalne	720	472194.47	54.4179
PF475	Potok Oliwski (Potok Prochowy)	A12	A21	*Not available*	B14	B25	B34	B41, B42	2012-08-03	małe	5	472194.47	54.4179
PF476	Martwa Wisła od Motławy do Strzyży (I)	A12	A21	*Not available*	B14	B25	B34	B42	2016-07-15	lokalne	10000	476570.96	54.375
PF477	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2013-06-25	lokalne	30	472873.043	54.4013

PF478	Strzyża do dopł. spod Kokoszek II (I)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-14	lokalne	80	469231.245	54.3519
PF479	Strzyża do dopł. spod Kokoszek II (I)	A12	A21	*Not available*	B14	B25	B34	B42	2016-07-14	małe	50	469043.461	54.3549
PF480	Strzyża do dopł. spod Kokoszek II (I)	A12	A21	*Not available*	B14	B22	B34	B41	2010-07-17	lokalne	10	469419.414	54.3562
PF481	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-15	lokalne	90	472371.195	54.3368
PF482	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-15	lokalne	300	477754.59	54.3412
PF483	Motława od oddzielenia siê Opływu Motławy do oddzielenia siê Kanału na Stêpce	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-15	lokalne	35	477720.661	54.3421
PF484	Dopływ z Łostowic	A12	A21	*Not available*	B11	B25	B34	B41	2011-08-24	lokalne	50	474101.277	54.323
PF485	Motława od Starej Motławy do Kanału Raduńskiego (I)	A12	A21	*Not available*	B11	B25	B34	B41	2010-08-03	lokalne	25	477739.768	54.3524
PF486	Dopływ z Barniewic	A12	A21	*Not available*	B11	B22	B34	B41	2017-08-02	lokalne	50	465657.795	54.3948
PF487	Martwa Wisła od oddzielenia siê Rozwójki do Opływu Motławy	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-15	lokalne	50	479660.399	54.3582
PF488	Martwa Wisła od Kan. Młynówka do oddzielenia siê Wisły śmiałej	A12	A21	*Not available*	B14	B22	B34	B41	2010-05-11	lokalne	75	488351.65	54.3473
PF489	Polder Orunia	A12	A21	*Not available*	B11	B25	B34	B41	2017-07-27	lokalne	80	476003.844	54.3166
PF490	Martwa Wisła od Motławy do Strzyży (I)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-17	lokalne	60	475872.54	54.3731
PF491	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B14	B25	B34	B42	2012-07-19	małe	100	476285.478	54.3766
PF492	Martwa Wisła od Motławy do Strzyży (I)	A12	A21	*Not available*	B14	B25	B34	B42	2013-06-25	lokalne	500	476184.525	54.3755
PF493	Martwa Wisła od Motławy do Strzyży (I)	A12	A21	*Not available*	B14	B25	B34	B42	2016-07-15	lokalne	20000	476075.562	54.3744
PF494	Martwa Wisła od Motławy do Strzyży (I)	A12	A21	*Not available*	B11	B25	B34	B41	2012-08-03	lokalne	30	476155.674	54.3746
PF495	Martwa Wisła od Motławy do Strzyży (I)	A12	A21	*Not available*	B14	B25	B34	B42	2010-08-22	lokalne	100	476211.911	54.3754
PF496	Martwa Wisła od Motławy do Strzyży (I)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	lokalne	10	476236.946	54.3756
PF497	Martwa Wisła od Motławy do Strzyży (I)	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-18	lokalne	50	476241.543	54.3759
PF498	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2016-07-15	lokalne	15	475482.613	54.3409
PF499	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2017-07-28	lokalne	20	475341.519	54.342
PF500	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B42	2017-07-27	lokalne	500	476518.145	54.395
PF501	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B42	2017-07-27	średnie	500	476518.145	54.395
PF502	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B42	2016-07-27	małe	500	476518.145	54.395
PF503	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B14	B25	B34	B41	2010-08-27	lokalne	2000	476518.145	54.395
PF504	Dopływ z Barniewic	A12	A21	*Not available*	B14	B22	B34	B41	2016-07-14	lokalne	10	465615.157	54.4303
PF505	Dopływ z Barniewic	A12	A21	*Not available*	B14	B22	B34	B45	2013-06-25	lokalne	30	465507.584	54.4287
PF506	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	474835.205	54.3819
PF507	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	małe	20	474835.205	54.3819
PF508	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	małe	20	474817.035	54.3819
PF509	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	małe	10	474797.015	54.3819
PF510	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	20	474797.015	54.3819
PF511	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	30	474797.015	54.3819
PF512	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	40	474756.684	54.3818
PF513	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B31	B41	2012-07-20	lokalne	30	477172.661	54.3579
PF514	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2010-08-03	lokalne	150	473845.06	54.3371
PF515	Dopływ z Łostowic	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	małe	0	473366.217	54.3333
PF516	Dopływ z Łostowic	A12	A21	*Not available*	B11	B25	B34	B41	2010-09-28	lokalne	50	473010.479	54.3327
PF517	Dopływ z Łostowic	A12	A21	*Not available*	B11	B25	B34	B41	2011-02-28	lokalne	100	473010.479	54.3327
PF518	Dopływ z Łostowic	A12	A21	*Not available*	B11	B25	B34	B41	2010-07-28	lokalne	100	473010.479	54.3327
PF519	Dopływ z Sulmina	A12	A21	*Not available*	B14	B25	B34	B42	2010-11-20	lokalne	700	468085.22	54.3382
PF520	Dopływ z Barniewic	A12	A21	*Not available*	B11	B22	B34	B41	2011-02-05	lokalne	3000	464694.695	54.4218
PF521	Dopływ z Łostowic	A12	A21	*Not available*	B14	B25	B34	B41	2011-08-24	lokalne	150	473341.57	54.3164
PF522	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B12	B25	B34	B41	2016-07-14	lokalne	50	474346.803	54.3615
PF523	Strzyża od dopł. spod Kokoszek II do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-16	lokalne	30	473736.966	54.3858
PF524	Kanał Raduński od dopł. z Łostowic do ujścia	A12	A21	*Not available*	B14	B25	B34	B41, B44	2014-08-05	małe	12	475084.922	54.3344

PF525	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2016-06-25	lokalne	70	478769.848	54.398
PF526	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2017-07-28	lokalne	12	476152.917	54.3908
PF527	Kanał Raduński od dopł. z Borkowa do dopł. z Łostowic (I)	A12	A21	*Not available*	B14	B25	B34	B42	2017-07-26	lokalne	50	475839.766	54.2835
PF528	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B12	B25	B34	B41	2016-07-14	lokalne	15	474502.441	54.3984
PF529	Dopływ z Barniewic	A12	A21	*Not available*	B14	B22	B34	B41, B44	2016-07-14	lokalne	20	465286.712	54.4243
PF530	Dopływ spod Kokoszek II	A12	A21	*Not available*	B11	B22	B34	B41	2016-07-16	lokalne	200	468982.786	54.3749
PF531	Dopływ spod Kokoszek II	A12	A21	*Not available*	B11	B22	B34	B41	2016-07-16	lokalne	200	468982.786	54.3749
PF532	Dopływ spod Kokoszek II	A12	A21	*Not available*	B11	B22	B34	B41	2016-07-16	lokalne	200	468982.786	54.3749
PF533	Dopływ spod Kokoszek II	A12	A21	*Not available*	B11	B22	B34	B41	2016-07-16	lokalne	200	468982.786	54.3749
PF534	Motława od Starej Motławy do Kanału Raduńskiego (I)	A12	A21	*Not available*	B14	B25	B34	B41, B44	2016-07-19	lokalne	200	477429.057	54.3509
PF535	Polder Orunia	A12	A21	*Not available*	B11	B25	B34	B41	2010-09-29	lokalne	27	476490.328	54.322
PF536	Polder Orunia	A12	A21	*Not available*	B11	B25	B34	B41	2011-08-24	małe	20	476377.258	54.323
PF537	Polder Orunia	A12	A21	*Not available*	B11	B25	B34	B41	2016-07-15	lokalne	50	476319.029	54.3113
PF538	Martwa Wisła od Strzyży do ujścia	A12	A21	*Not available*	B11	B25	B34	B41	2012-07-07	lokalne	6	475653.167	54.3854
PF539	Dopływ spod Kokoszek II	A12	A21	*Not available*	B14	B22	B34	B42	2017-07-27	lokalne	120	468666.4	54.3595

Samsun CCLL

Table 27: Past pluvial flooding events in Samsun, as provided by Samsun CCLL.

Extreme event ID	Date	Extreme event type	Location	Discharge value	Damage
PF1	17.02.1963	Pluvial Flood	Bafra's Kosu Village,	Kizilirmak River, 556 m3/s	Various damages occurred along with the coastal carvings by overflowing.
PF2	09.06.1971	Pluvial Flood	Alacam District	Gumenez Stream, 92.5 m3/s	A person died at the area of the flood.
PF3	31.07.1972	Pluvial Flood	Samsun	Kurtun River, 270 m3/s	Flood caused a great damage in the area.
PF4	04.07.1977	Pluvial Flood	19 Mayıs,	Engiz Stream, 456 m3/s	No information
PF5	04.07.1977	Pluvial Flood	19 Mayıs	Karakoy stream, 306 m3/s	No information
PF6	06.18.2010	Pluvial Flood	19 Mayıs,	Değirmendere Stream	No information
PF7	04.07.2012	Pluvial Flood	Samsun	Yilanli Stream, 710 m3/s	7 people lost their lives and the shopping centre, many houses, old industry and stadium of the city were damaged by the flood.
PF8	04.07.2012	Pluvial Flood	Samsun	İncirli Stream, 172.7 m3/s	A big damage in shopping areas
PF9	07.08.2012	Pluvial Flood	Samsun	Kuruzeytin Stream, 55 m3/s	Material damage in many buildings and workplaces around the access road.
PF10	07.08.2012	Pluvial Flood	Samsun	Afanli Stream, 75 m3/s	Material damage has occurred in vehicles and workplaces.
PF11	07.08.2012	Pluvial Flood	Samsun	Degirmendere Stream, 35 m3/s	Property damage has occurred in the vehicles and in the workplaces.