D2.1 – Catalogue of CENTAUR data and related specifications

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HISTORY OF CHANGES

Date	Version	Author	Change Description
16.05.2023	1.0	EG, GMV	Initial version with a ToC
31.08.2023	1.0	EG, GMV, ITH, ADE, CLS, ECM, VIT, UNISTRA, DLR	First version of the document

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1 EXECUTIVE SUMMARY

The present document represents the deliverable D2.1 - Catalogue of CENTAUR data and related specifications of CENTAUR project and it is produced under the WP2 – Thematic Product engineering, particularly under Task 2.1, 2.2, and 2.3 carried out in parallel, which have the aim of harvesting and pre-processed data collected from several repositories.

The document contains a list of the following data that will be stored in the data catalogue accessible through the CENTAUR platform:

- input data needed for the development of innovative indicators within CENTAUR project and identified in the previous phase (WP1) related to the User requirements review.
- innovative indicators produced in the perspective of Urban Flood, Political and socio-economic and Water & Food security, that will be stored in the catalogue for end-users' accessibility.

The collection of the data information from the three tasks mentioned above has been centralized using this report, where all the partners responsible to generate innovative indicators have listed the relevant dataset for this purpose. Particularly, the data catalogue has been organized per data collection type:

- geospatial data domain (Chapter 3.2).
- open-source data domain (Chapter 3.3).
- meteorological data modelling (Chapter 3.4).

For each data type, specifications relevant to the context of the project have been tracked and mapped with reference to each innovative indicator under design.

2 INTRODUCTION

2.1 CENTAUR PROJECT DESCRIPTION

Climate change is a fact and its impact on human lives and security is continuously growing. The EU understood the importance and consequences of climate change a long time ago, adopting ambitious legislation in different policy areas. The Green Deal recognises that tackling climate change and striving for climate neutrality should be placed at the centre of societal and economic transformation. Over the last 50 years, more than 11.000 reported disasters related to extreme weather and climate conditions have caused over 2 million deaths and US$ 3,64 trillion in losses. The number of disasters has multiplied by a factor of five during that period, mainly driven by climate and more weather extremes[1]. In particular, the last twenty years have seen the number of major floods more than double, from 1.389 to 3.254, while the incidence of storms grew from 1,457 to 2,034[2]. Floods and storms were the most prevalent events and floods are the most common type of disaster worldwide, accounting for 44% of total events registered in the last twenty years. A global temperature increase of the global climate is estimated to boost the frequency of potentially high impact natural hazard events across the world. This could render current national and local strategies for disaster risk reduction and climate change adaptation obsolete in many countries. In total, between 2000 and 2019, there were 3,068 disaster events in Asia, 1,756 events in the Americas and 1,192 events in Africa. Climate change is increasingly acknowledged within the EU's integrated approach to security. The related environmental degradation is recognized as a threat multiplier and an

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[1] World Meteorological Organization (2021). WMO atlas of mortality and economic losses from weather, climate, and water extremes (1970–2019).

[2] UNDRR report: The human cost of disasters: an overview of the last 20 years (2000-2019).

aggravating factor for political instability with serious implications for peace and security across the globe[3]. Nowadays, climate change is already causing people to migrate, and while migration should not be directly labelled as a security problem, implicitly the link with pressures on society and increased competition for resources are often made[4]. People living in places affected by violent conflict are particularly vulnerable to climate change and it is agreed that some of the factors that increase the risk of violent conflict are sensitive to climate change[5] . This way, it is estimated that 95 % of new displacements by conflicts in 2020 happened in countries that have high or very high vulnerability to climate change[6]. From 2008 to 2016, this represents over 20 million people per year that have been forced to migrate due to climate change effects[7]. Within Copernicus Security and Emergency Services evolution, the objective of CENTAUR is to respond to societal challenges deriving from climate change threats by developing and demonstrating new service components for the Copernicus Emergency Management Service (CEMS) and Copernicus Security Service - Support to EU External Action service (CSS-SEA), aiming to:

1. Improve situational awareness and preparedness around climate change and its impact on complex emergencies and multi-dimensional (security) crises;
2. Anticipate the occurrence and possible knock-on effects of crisis events, in particular those triggered by climatic extremes, thus contributing to resilience and effective adaptation.

In the emergency domain, CENTAUR will address the flood-related threats to population, assets and infrastructures in urban areas. In the security domain, CENTAUR will address water & food insecurity. The two work streams will be connected via a cross-cutting component focusing on exposure and vulnerability to climate change, as well as resilience and societal capacity for managing environmental risks and social conflict. Across work streams, indicators and models will be validated by different methods. CENTAUR will integrate data coming from multiple heterogeneous sources, with a specific focus on those generated by other Copernicus services, and, in particular, those of the Climate Change Service. It will combine these with meteorological data, socio-economic data, and data coming from new sensors (e.g., traditional and social media). Thus, it will enhance current capacities to produce composite risk indexes and to perform multi-criteria analyses in the emergency and security domains.

2.2 SCOPE OF THE DOCUMENT

This document is produced under **WP2 – Thematic product engineering**, that has the objective to generate workflows for collecting necessary data for the development of risk indicators and crisis indexes as well as for their implementation accounting for the user requirements collected in WP1. The final output of this package shall consist in a number of service pipelines that will combine earth observations and forecasts of meteorological and hydrological data; open intelligence data from traditional and social media, socio-economic and political data; other types of geospatial data, using geospatial and temporal information as common homogenising feature to merge these data into synthetic indexes.

Particularly, Task 2.1, Task 2.2 and Task 2.3 have the objective of harvesting and pre-processing data collected from several repositories in order to set-up a catalogue of datasets needed and related connection to external

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[3] Meyer, C., Vantaggiato, F. P., & Youngs, R. (2021). Preparing the CSDP for the new security environment created by climate change. European Union.

[4] Schaik, L., Bakker, T. (2017). Climate-migration-security: Policy Brief Making the most of a contested relationship. Planetary Security.

[5] W.N., J.M. Pulhin, J. Barnett, G.D. Dabelko, G.K. Hovelsrud, M. Levy, Ú. Oswald Spring, and C.H. Vogel (2014). Human security. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken,
P.R. Mastrandrea, and L.L. White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 755-791.

[6] University of Notre Dame. (n.d.). Country index // Notre Dame Global Adaptation Initiative // University of Notre Dame. Notre Dame Global Adaptation Initiative. Retrieved January 23, 2022, from https://gain.nd.edu/our-work/country-index/.

[7] WEF (2020). *The Global Risks Report 2020*, Insight Report 15th Edition. World Economic Forum, Geneva Switzerland, p. 102. https://www.weforum.org/reports/the-global-risks-report-2020.

repositories through specific APIs. The present D2.1 deliverable includes all the components that set up CENTAUR platform, the catalogue service is one of them, allocated in the central node. Using Viewer component, the information will be displayed to the end-user in different ways, always in a user-friendly way and through a web site. The distributed architecture selected for this platform is meant to allocate the processor distributed in several clouds and the central node will be in charge of the orchestration of the information generated by the local nodes. There will be one entry point for the end-user to access to the information generated by the platform. This will be the central node, especially the viewer component. The heterogeneous data accessible from the central node will be presented to the user in several formats, always giving the end-user the best way to do it, as a layer on a map, as an alert, depending on the format of the data. The catalogue includes the datasets that will be used as inputs to generate the CENTAUR innovate indicators, as well as the innovate indicators themselves that will be provided through the CENTAUR platform for the project domains: urban flood, water and food security and socio-economic/political related matters to both the two domains above. A significant number of specifications for each dataset have been collected and provided in the catalogue.

Each row of the tables represents an individual dataset that is either data used to generate the innovate indicators or the innovate indicators themselves:

- The **input** can be available data generated by an external data provider (e.g., Copernicus, ESA, etc.) that are collected and made available for the project by a CENTAUR partner. Input can be a product developed and provided by a CENTAUR partner. These datasets will be stored in the CENTAUR platform to be used for any component developed within this project, for further detail on the components see D3.1 - Platform Design Document – v1 [RD05].
- The **innovative indicators** are quantitative metrics that provide a signal or sign of the presence, state, or rate of change of a situation or condition. The input data described above is employed in a process of analysis and interpretation and is used to provide insights into specific phenomena or trends. The indicators will be developed for both target CENTAUR domains: Urban Flood (UF) and Water and Food Security (WFS) and were previously introduced in D1.1 ([RD03]). In D2.2 ([RD04]) they will be further described, providing preliminary information about the data workflow and the methodology to generate these indicators. The innovative indicators themselves will be stored in a catalogue for end-users' consultation. There are several ways of accessing the innovative indicators, discovering them using search and list functions to have an overview of the indicators, relevant information will be displayed too, as license, remove source, main applications and copyright. Another way that platform offers to the user is by subscribing an alert, the information of the indicators can be sent to a user by email if required, using the early-functions capability. There will be also a map that can be set up by the end-user to overlap the indicators (if possible) on a map and configure the way of visualisation. add further on this, according to the platform functionalities itself. A resume of these innovative indicators is shown in Table 5 and Table 6.

The collection of the data information from the three tasks (T2.1, T2.2, and T2.3) has been centralized using a common excel file where the partners responsible to collect ([RD06]), provide or develop the needed data have been requested to include the required information for each dataset. The development of the data catalogue as part of WP2 has been carried out in parallel to Task 3.1 which consolidates the design of the CENTAUR platform integrating all WP2 services. The design of the platform includes the components that build the platform. Using the components in the central node some processing chains will be launched (on-demand request capabilities) although other indicators will be generated continuously using processing chains allocated in the local nodes, their descriptions are detailed in D2.3 deliverable and later on in D2.4.

The information gathered through the excel file has been analysed and adapted to be presented in a friendly way in this document ([RD06]). Following this approach, the fields of the excel file have been split into two tables for a better readability: the first one, Table 1, refers to the information related to the CENTAUR context, and the second one, Table 4, refers to the data technical specifications.

To cover the above objectives, the document is structured into the following sections:

- Section 1. Executive summary.
- Section 2. Introduction, scope of the document, definitions, abbreviations, acronyms, and reference documents.
- Section 3. Data and specifications.
- Section 4. Data licenses and copyright.
- Section 5. Data harvesting.
- Section 6: Conclusions.

2.3 DEFINITIONS, ABBREVIATIONS AND ACRONYMS

Table 1. Table with abbreviations and acronyms.

Acronym	Description
AOI	Area of Interest
CEMS	Copernicus Emergency Management Service
CLC	Corine Land Cover
CMC	Country Map Coverage
CPCC	Civilian Planning and Conduct Capability
CSCDA	Copernicus Space Component Data Access
CSDP	Common Security and Defence Policy
CSS-SEA	Copernicus Security Service in Support to EU External Action
DIEM	Data in Emergencies Monitoring
DNB	Day Night Band
DSM	Digital Surface Model
DTM	Digital Terrain Model
EC	European Commission
ECA&D	European Climate Assessment & Dataset
EMO	European Meteorological Observations
EO	Earth Observation
EU	European Union
EUMS	European Union Military Staff
FAO	Food and Agriculture Organisation of the United Nations
FEWS NET	Famine Early Warning Systems Network
FIES	Food insecurity experience scale
GDACS	Global Disaster Alert and Coordination System
GHSL	Global Human Settlement Layer
GIS	Geographic Information System
GPM	Global Precipitation Measurement
HDDS	Household Dietary Diversity Score
HOT	Humanitarian OpenStreetMap
HR/VP	High Representative of the Union for Foreign Affairs and Security Policy/Vice-President of the European Commission

Acronym	Description
IDP	Internally Displaced Persons
IOM DTM	International Organization for Migration Displacement Tracking Matrix
IPC	Integrated Food Security Phase Classification
ISTAT	Italian National Institute of Statistics
JRC	Joint Research Centre
LCSI	Livelihood-based Coping Strategies Index
LIDAR	LIght Detection And Ranging
MODIS	Moderate Resolution Imaging Spectroradiometer
NDVI	Normalized Difference Vegetation Index
OSINT	Open-Source Intelligence
OSM	OpenStreetMap
PNOA	Plan Nacional de Ortofotografía Aérea
PSC	Political and Security Committee EU
QR	Quick Report
SAR	Synthetic-Aperture Radar
SMAP	Soil Moisture Active Passive
SNCZI	Sistema Nacional de Cartografía de Zonas Inundables
UF	Urban Flood
UNHCR	United Nations High Commissioner for Refugees
WaPOR	Water Productivity Open-access portal
WFS	Water & Food Security
WSF	World Settlement Footprint
VHR	Very High Resolution
VIIRS	Visible and Infrared Imaging Suite

2.4 APPLICABLE AND REFERENCE DOCUMENTS

Table 2. Applicable and reference documents.

ID	Document name
[RD01]	Copernicus Service in Support to EU External Action: https://sea.security.copernicus.eu/
[RD02]	Disaster Risk Reduction in EU external action - Council conclusions (28 November 2022): https://data.consilium.europa.eu/doc/document/ST-14463-2022-INIT/en/pdf

ID	Document name
[RD03]	D1.1 - Report on Urban Flood and Water & Food security indicators
[RD04]	D2.2 - Urban flood and Water & Food Insecurity Design
[RD05]	D3.1 - Platform Design Document – v1
[RD06]	CENTAUR_D2.1-DATASETS_v0.3 – Editable_<dateofupdates>.xls
[RD07]	Copernicus Emergency Management Service – Rapid Mapping and Risk & Recovery: https://emergency.copernicus.eu/

3 DATA AND SPECIFICATIONS

This section includes relevant data identified as part of the Tasks 2.1 "Geospatial data harvesting and customization", 2.2 "Open and socio-economic data mining and customization" and 2.3 "Meteorological data access and modelling". These tasks harvest and pre-process datasets collected from several repositories. In this section, relevant datasets are identified and listed in the format of a data catalogue.

As an overview of the information provided below, Table 3 and Table 4details the field names and the field descriptions for each of the two tables. Further, Table 5 and Table 6 provide an overview of the innovative indicators for the urban flood and water & food security domains, respectively.

Table 3: CENTAUR context fields: name and description of the fields related to the dataset's information table

Field	Description
CENTAUR context fields	
Input dataset ID or Innovative indicator ID	Unique ID to identify the datasets, either Input data or innovative indicator ID
Dataset name	Name of the dataset
Description	Brief description of the dataset
ID-X	ID numbers of the related innovative indicators identified (see Table 5): - UF: Urban Flood. - WFS: Water & Food Security
CENTAUR Team / Product Owner	Who is in charge/will use this dataset for which purpose (i.e., innovative indicator design and development)?
CENTAUR Use Case / AOI	Pre-defined CENTAUR Use Cases or any other potential applicable geographical area of interest
Main applications	The application of the data
Tags	Tags that can be used to filter

Table 4: Technical specifications fields: name and description of the fields related to the dataset's information table

Field	Description
Technical specifications fields	
Input dataset ID or Innovative indicator ID	Unique ID to identify the datasets, either Input data or innovative indicator ID
Dataset name	Name of the dataset**
Raw input data	Origin of the raw data used to derive the input data
Sensor	If applicable, the sensor source
Data-sources & Provider	Identified data sources used to generate the product (includes media sources), links to the resources that may be related to and the CENTAUR team which is providing the dataset
Spatial coverage and resolution	Geographical area where data was collected (for example, Global, Local, or geo-political entities) including Lat and Lon extent and measure of data.
Temporal extent	Time period covered by the data (from-to)
Update frequency	The frequency that the data is updated / the granularity of data entries. In media, "typical Update Frequency" as there may be slight deviations due to media availability, publishing behaviour etc.
Format	Format of the data
Publication	Date that the dataset has been published
Version	Tracks dataset version

Language(s)	Languages present in the dataset, ISO639-1 codes where possible*
Modality	Modalities the dataset is in (text, audio, image, video)*

* These fields are only applicable for open-source socio-economic data

** The field "dataset name" is included in both tables, CENTAUR context and dataset specifications (from Table 8 to Table 40).

Table 5. Summary of innovative indicators for Urban Flood and related socio-economic thematic area (UF-ID-X)

ID-X	Name of Indicator	Indicator description	In pipeline? Yes/No +Justification for not producing the indicator
UF-ID-1	Static map of precipitation associated to return period	Static maps of expected precipitation intensity accumulated over 6 hours corresponding to 1-,5-,10-,20-,100- ,500- return period events will be calculated. These maps will be used in conjunction with the speed-flood hydraulic model to derive inundation maps connected to return periods which will be employed to allow for a more efficient workflow.	Yes
UF-ID-2	Forecast of return period	A novel forecasting system will be implemented based on a convolutional neural network model to predict return period-based precipitation event 2-3 days in advance. The return period forecast will be related to the catalogue of static precipitation and inundation maps.	Yes
UF-ID-3	High-Resolution urban flood risk maps for various return periods	Speedy-flood model with precipitation intensity maps based on return period analysis which allows to reconstruct future floods scenarios.	Yes
UF-ID-4	Inferred INSAR urban flood extent.	Floodwater detection over urban areas using Radar and artificial intelligence (FLORIA).	Yes
UF-ID-5	Enhanced urban flood damage assessment	Speedy Flood Tool combined with InSAR coherence analysis for floods maps generation.	Yes
UF-ID-6	Social/Traditional media indicators for Urban Flooding Map	Floods maps rebuilt using social/traditional media markers information like videos, pictures, etc.	Yes
UF-ID-7	Hazard web sources indicator	Index based on several indicators available on the web that allow to characterize an extreme flood event in an area of interest in terms of hazard.	Yes
UF-ID-8	Robustness and quality of the built environment	This group includes indicators of fragile urban infrastructure (e.g., poor drainage network and pipelines). It also includes indicators of uncontrolled urbanisation and settlement on marginalised land, as well as different indicators of the quality of materials used to build houses (e.g., for roofing). For example, garbage, adobe, clay bricks, and plastic are considered as poor building materials that increase households' vulnerability to floods.	No. Due to limited capacities, the project will first focus on a subset of socio-economic (SE) indicators (prioritization by relevance for users, data availability, and effort needed for indicator creation). Further SE can be added at a later stage pending available resources.

ID-X	Name of Indicator	Indicator description	In pipeline? Yes/No +Justification for not producing the indicator
UF-ID-9	Assets and financial resources	This group includes indicators of household wealth/poverty (which can be proxied by population density, as well-off neighbourhoods tend to be less dense in terms of population and built structure, although this assumption may not apply in all regions/contexts), house ownership, housing prices, job opportunities/unemployment, and access to insurance, credit, and community safety nets.	Yes
UF-ID-10	Public services and government support	This group includes indicators of access to basic health and other emergency response services, as well as the general capacity and predisposition of responsible actors to protect people against the detrimental effects of floods. For the latter, housing density per block as well as density of communication networks such as roads and railways could be used as proxies for government efforts in investing in urban planning.	Yes
UF-ID-11	Social networks and community support	This group includes indicators that measure access to social networks and support by fellow community members, which are essential to effectively cope with or prepare for urban flood events.	No. Due to limited capacities, the project will first focus on a subset of socio-economic (SE) indicators (prioritization by relevance for users, data availability, and effort needed for indicator creation). Further SE can be added at a later stage pending available resources.
UF-ID-12	Timely access to information	This group includes indicators that measure the level of access to information that is crucial to quickly react and adequately prepare for urban flood risks.	No. Due to limited capacities, the project will first focus on a subset of socio-economic (SE) indicators (prioritization by relevance for users, data availability, and effort needed for indicator creation). Further SE can be added at a later stage pending available resources.
UF-ID-13	Ability to evacuate	This group includes indicators that measure people's abilities to move out of harm's way, in terms of available infrastructure, physical conditions, and social context (e.g., presence of vulnerable and dependent groups such as children, elderly, and disabled persons).	Yes. Name of indicator changed with respect to D1.1, to better reflect its purpose.
UF-ID-14	Economic impact of floods	This group includes indicators of estimated economic damage of floods, including visual evidence of flood damages (e.g. images, videos).	Yes

Table 6. Summary of innovative indicators for Water & Food Security and related socio-economic thematic area (WFS-ID-X)

ID-X	Name of Indicator	Indicator description	In pipeline? Yes/No +Justification for not producing the indicator
WFS-ID-1	Meteorological drought indicator (Monitoring)	Indicators to monitor current drought conditions expressed in terms of precipitation deficit	Yes
WFS-ID-2	Meteorological drought indicator (Forecast)	Indicators to forecast drought conditions expressed in terms of precipitation deficit at different lead times	Yes
WFS-ID-3	Meteorological drought indicator (danger levels)	Evaluation of seamless drought forecast in relation to monitoring status to derive simplified warning/actable levels. Identification of tendency towards intensification of events.	Yes
WFS-ID-4	Agricultural drought monitoring (near real-time)	Indicator that expresses the relative impact of drought events on the current vegetation condition and productivity. It integrates current and historical information on plant condition (NDVI), thermal drought stress and environmental conditions (precipitation, temperature, and soil moisture).	Yes
WFS-ID-5	Agricultural drought forecast	Indicator that expresses the relative impact of future drought conditions on the vegetation condition and productivity. It combines knowledge on the current drought conditions (WFS-ID-4) with meteorological forecasts to predict the likelihood of adverse impacts on vegetation productivity potentially occurring in the future, up to several months in advance.	Yes
WFS-ID-6	Agricultural drought risk zone map	Risk of occurrence of adverse drought impact on agricultural production, expressed at a categorical scale and at different monthly lead times. Integration of indicators WFS-ID-4 and WFS-ID-5.	Yes
WFS-ID-7	IDP camps status indicator	The analysis of the development of camps can provide information about the people movements related to food insecurity events, conflicts, or political disorders.	Yes. Name of indicator changed with respect to D1.1, to better reflect its purpose.
WFS-ID-8	Populations at risk of food insecurity	Compound-indicator that estimates the total number (proportion or percentage) of people at risk of food insecurity derived from level or status of food security within a given area.	Yes
WFS-ID-9	Populations at risk of water insecurity	Compound-indicator that measures the potentially available physical water per person, allowing to derive the degree of water (in) sufficiency, and estimate the total number (proportion or percentage) of people at risk of water insecurity.	Yes
WFS-ID-10	Number of people living in conflict-affected areas	Compound-indicator that estimates the total number (proportion or percentage) of people living in (or in the proximity of) conflict-affected areas.	Yes
WFS-ID-11	Food security	Scale for level of food security of the population in a given area. Can contain several components (e.g.,	Yes

ID-X	Name of Indicator	Indicator description	In pipeline? Yes/No +Justification for not producing the indicator
		available/produced food, food prices, ease of access, etc.). Disaggregating by groups (e.g., IDPs, vulnerable groups) would be useful.	
WFS-ID-12	Economic security	Scale for level of economic and livelihood security of the population in a given area. Can contain several components (e.g., job and other economic opportunities, incomes).	Yes
WFS-ID-13	Displaced persons	Estimate of the number of persons displaced, including IDP and refugees in neighbouring countries. Disaggregation by mobility type would be useful.	Yes
WFS-ID-14	Violent conflict	Number/frequency of violent conflict events. Events may also include crimes and other illicit activities, that are indicative of maladaptive practices and susceptible to conflict escalation.	Yes. The name and description have been changed to better fit the input data that are planned to be used for this indicator. In particular, data on violent conflict events (e.g. ACLED) will be used as such data can help overcome potential cost, frequency and availability issues that may arise when using EO data to estimate illicit activities (e.g. illegal logging, mining).
WFS-ID-15	Radicalisation and polarisation	Scale for level of radicalisation, polarisation, and animosity in the population that is conducive to periodic outbursts of violence (e.g., riots, clashes) and/or recruitment into armed groups. If necessary, possibility to distinguish sub-classes for this indicator, e.g., anti-government sentiment, ethnic/communal tensions, ideological/religious radicalisation, etc.	Yes
WFS-ID-16	Disruptions in food supply chains	Disruptions in food supply occasioned by non-climatic/non-environmental factors, such as fuel price hikes and embargos. Relevant for modelling food security and economic security in rural and urban areas.	No. Disruptions in supply chains are already accounted for in food insecurity indicators and datasets such as FEWS NET. Furthermore, there is a need to prioritise quality over quantity, i.e. developing fewer well-structured indicators rather than developing many poorly developed ones.
WFS-ID-17	Humanitarian aid	Aid provided by national and international actors (e.g., government, international organisations, NGOs) to	Yes

ID-X	Name of Indicator	Indicator description	In pipeline? Yes/No +Justification for not producing the indicator
		cushion the effect of extreme climatic conditions. Relevant for modelling food and economic security.	
WFS-ID-18	Resource capture	Appropriation of natural resources essential for food production and/or sustaining agricultural and pastoralist livelihoods by powerful actors (e.g., land grabbing by large companies) or specific groups (e.g., communal groups).	Yes
WFS-ID-19	Climate sensitivity of agri-food systems	Degree to which rural livelihoods and food production are sensitive to erratic climatic conditions.	Yes
WFS-ID-20	Obstacles to mobility	Obstacles to people's ability to move (both voluntarily and involuntarily).	No. This indicator has lower priority as the focus is on conflict rather than displacement.
WFS-ID-21	Public services and infrastructures	Degree to which the government effectively and inclusively delivers services that are essential for withstanding extreme climatic conditions	Yes
WFS-ID-22	Strength of armed groups	Degree to which armed groups are present and potentially aggressive in an area.	No. EO data on camps, vehicles, troops, etc. are likely to be expensive to collect and incomplete, as well as being a very sensitive issue in case direct assessments based on imagery interpretation need to be performed. However, if time and resources allow to explore the necessary data further, this indicator should be prioritised.
WFS-ID-23	State-citizen relations	Degree to which citizens trust public officials and feel included in political decision making. High levels of trust and inclusion are expected to motivate people to seek non-violent means of addressing concerns and grievances	Yes
WFS-ID-24	Dispute resolution mechanisms	Presence of trusted formal and informal mechanisms (e.g., legal recourse, inter- and intra-community dialogue) to address disputes, for e.g., over access to and usage of resources.	Yes
WFS-ID-25	Social cohesion and trust	Degree to which people feel connected and eager to stick together in the face of major challenges. (Perceived) social (in)equality might be a sub-component or a separate indicator.	Yes

The following three subsections include the tables listing the relevant datasets and their specifications for the considered domains: subsection 3.1 lists geospatial data (Task 2.1), subsection 3.2 lists open-source socio-economic data (Task 2.2), and subsection 3.3 details meteorological data (Task 2.3).

3.1 MAPPING DATASETS AND INNOVATIVE INDICATORS

In this section (Table 7), both the input and the innovative indicators are mapped to the related innovative indicators ID(s) (both UF and WFS).

Table 7: Input datasets required for related innovative indicators

Input data ID	Dataset name	Indicators ID and name
Input-ID-01	Flood footprint (from satellite data for past event with the same return period)	UF-ID-3: High-Resolution urban flood risk maps for various return periods UF-ID-5: Enhanced urban flood damage assessment
Input-ID-02a Input-ID-02b	Land Use	UF-ID-3: High-Resolution urban flood risk maps for various return periods UF-ID-5: Enhanced urban flood damage assessment
Input-ID-03a Input-ID-03b	Hydrography	UF-ID-3: High-Resolution urban flood risk maps for various return periods UF-ID-5: Enhanced urban flood damage assessment
Input-ID-04	BD TOPO® v3.3 – (French territory and infrastructures)	UF-ID-3: High-Resolution urban flood risk maps for various return periods UF-ID-5: Enhanced urban flood damage assessment
Input-ID-05	VHR_IMAGE_2021	UF-ID-3: High-Resolution urban flood risk maps for various return periods UF-ID-5: Enhanced urban flood damage assessment
Input-ID-06	PREs and POST event INSAR compatible data	UF-ID-4: Inferred INSAR urban flood extent
Input-ID-07	NDVI	WFS-ID-4: Agricultural drought monitoring (near real-time) WFS-ID-5: Agricultural drought forecast WFS-ID-6: Agricultural drought risk zone map
Input-ID-08	S3-LST	WFS-ID-4: Agricultural drought monitoring (near real-time) WFS-ID-5: Agricultural drought forecast WFS-ID-6: Agricultural drought risk zone map
Input-ID-09	MODIS-LST	WFS-ID-4: Agricultural drought monitoring (near real-time) WFS-ID-5: Agricultural drought forecast WFS-ID-6: Agricultural drought risk zone map
Input-ID-10	GRACE RZSM	WFS-ID-4: Agricultural drought monitoring (near real-time) WFS-ID-5: Agricultural drought forecast WFS-ID-6: Agricultural drought risk zone map
Input-ID-11	GRACE ground water	WFS-ID-4: Agricultural drought monitoring (near real-time) WFS-ID-5: Agricultural drought forecast WFS-ID-6: Agricultural drought risk zone map
Input-ID-12	Land Cover	WFS-ID-4: Agricultural drought monitoring (near real-time) WFS-ID-5: Agricultural drought forecast WFS-ID-6: Agricultural drought risk zone map
Input-ID-13	FAO Wapor: Land Cover Classification 2021	WFS-ID-19 - Climate sensitivity of agri-food systems
Input-ID-14	SMAP L4 RZSM	WFS-ID-4: Agricultural drought monitoring (near real-time) WFS-ID-5: Agricultural drought forecast WFS-ID-6: Agricultural drought risk zone map
Input-ID-15	Rangeland land cover change	WFS-ID-18: Resource capture

Input data ID	Dataset name	Indicators ID and name
Input-ID-16	Livestock heat stress	WFS-ID-12: Economic security
Input-ID-17	VHR DTM	UF-ID-3: High-Resolution urban flood risk maps for various return periods UF-ID-5: Enhanced Urban Flood Damage Assessment
Input-ID-18	VHR DTM (Piedmont)	UF-ID-3: High-Resolution urban flood risk maps for various return periods UF-ID-5: Enhanced Urban Flood Damage Assessment
Input-ID-19	RGE ALTI® 1m	UF-ID-3: High-Resolution urban flood risk maps for various return periods UF-ID-5: Enhanced Urban Flood Damage Assessment
Input-ID-20	WSF World Settlement Footprint	UF-ID-4: Inferred INSAR urban flood extent UF-ID-5: Enhanced Urban Flood Damage Assessment UF-ID-7: Hazard web sources indicator
Input-ID-21	WSF-Imperviousness	UF-ID-9: Assets and financial resources
Input-ID-22	WSF-3D	UF-ID-4: Inferred INSAR urban flood extent UF-ID-5: Enhanced Urban Flood Damage Assessment UF-ID-9: Assets and financial resource
Input-ID-23	BDTRE Struttura Aggregata for Piedmont Region and Settlements Municipality of Turin	UF-ID-5: Enhanced Urban Flood Damage Assessment UF-ID-7: Hazard web sources indicator UF-ID-9: Assets and financial resources
Input-ID-24	GHS-Built-S R2023A	UF-ID-7: Hazard web sources indicator
Input-ID-25	GHS-Built-V R2023A	UF-ID-9: Assets and financial resource
Input-ID-26	GHS-Built-C R2023A	UF-ID-7: Hazard web sources indicator
Input-ID-27	GHS-SMOD- R2023A	UF-ID-7: Hazard web sources indicator
Input-ID-28	GHS-DUC R2023A	UF-ID-7: Hazard web sources indicator
Input-ID-29	Open Street Map (OSM)	UF-ID-9: Assets and financial resources UF-ID-10: Public services and government support UF-ID-13: Ability to evacuate
Input-ID-30	Main roads	WFS-ID-21: Public services and infrastructure
Input-ID-31	BD TOPO® v3.3 - (French settlement data)	UF-ID-9: Assets and financial resources UF-ID-10: Public services and government support UF-ID-13: Ability to evacuate
Input-ID-32	HOT (Humanitarian OpenStreetMap)	WFS-ID-21: Public services and infrastructure
Input-ID-33	Global Disaster Alert and Coordination System (GDACS) indicator	UF-ID-7: Hazard web sources indicator
Input-ID-34	HR-VHR SAR EO	WFS-ID-7: IDP camps status indicator
Input-ID-35	Social/Traditional media data on assets and financial resources	UF-ID-9: Assets and financial resources
Input-ID-36	Social/Traditional media on public services and government support	UF-ID-10: Public services and government support

Input data ID	Dataset name	Indicators ID and name
Input-ID-37	Social/Traditional media indicator on ability to evacuate	UF-ID-13: Ability to evacuate
Input-ID-38	Social/Traditional media data on economic impacts of floods	UF-ID-14: Economic impact of floods
Input-ID-39	Social/Traditional media data on radicalisation and polarisation	WFS-ID-15: Radicalisation and polarisation
Input-ID-40	Social/Traditional media indicator on resource capture	WFS-ID-18: Resource capture
Input-ID-41	Social/Traditional media data on public services and infrastructure	WFS-ID-21: Public services and infrastructure
Input-ID-42	Social/Traditional media data on state-citizen relations	WFS-ID-23: State-citizen relations
Input-ID-43	Social/Traditional media data on dispute resolution mechanisms	WFS-ID-24: Dispute resolution mechanisms
Input-ID-44	Social/Traditional media data on social cohesion and trust	WFS-ID-25: Social cohesion and trust
Input-ID-45	Social and traditional media related to a flooding event	UF-ID-6: Social/Traditional media indicators for Urban Flooding Map
Input-ID-46	WSF-Population	WSF-ID-8: Populations at risk of food insecurity WSF-ID-9: Populations at risk of water insecurity WSF-ID-10: Number of people living in conflict-affected areas UF-ID-5: Enhanced Urban Flood Damage Assessment UF-ID-7: Hazard web sources indicator UF-ID-9: Assets and financial resource UF-ID-13: Ability to evacuate
Input-ID-47	GHS-Pop R2023A	WSF-ID-8: Populations at risk of food insecurity WSF-ID-9: Populations at risk of water insecurity WSF-ID-10: Number of people living in conflict-affected areas UF-ID-9: Assets and financial resource UF-ID-13: Ability to evacuate
Input-ID-48	Resident Population by Municipality of Turin and Italian National Institute of Statistics (ISTAT)	UF-ID-7: Hazard web sources indicator UF-ID-9: Assets and financial resource UF-ID-13: Ability to evacuate
Input-ID-49	INSEE census	UF-ID-7: Hazard web sources indicator UF-ID-9: Assets and financial resource UF-ID-13: Ability to evacuate
Input-ID-50	EOG Nighttime Light	WFS-ID-21: Public services and infrastructures
Input-ID-51	FEWS NET	WFS-ID-11: Food security

Input data ID	Dataset name	Indicators ID and name
Input-ID-52	FAO DIEM (Data in Emergencies Monitoring)	WFS-ID-11: Food security WFS-ID-12: Economic security WFS-ID-17: Humanitarian aid
Input-ID-53	Afrobarometer	WFS-ID-11: Food security WFS-ID-12: Economic security WFS-ID-15: Radicalisation and polarisation WFS-ID-21: Public services and infrastructure WFS-ID-23: State-citizen relations WFS-ID-24: Dispute resolution mechanisms WFS-ID-25: Social cohesion and trust
Input-ID-54	IOM DTM Flow monitoring	WFS-ID-13: Displaced persons
Input-ID-55	IOM DTM Mobility tracking	WFS-ID-13: Displaced persons WFS-ID-7: IDP camps status indicator
Input-ID-56	ACLED	WFS-ID-14: Violent conflict
Input-ID-57	DHS (Demographic and Health Surveys)	WFS-ID-11: Food security WFS-ID-21: Public services and infrastructure
Input-ID-58	Restaurant prices	UF-ID-9 Assets and financial resources
Input-ID-59	European Meteorological Observations (EMO)	UF-ID-1: Static map of precipitation associated to return period UF-ID-2: Forecast of return period
Input-ID-60	Global Precipitation Measurement (GPM) constellation data referred to the period of interest	UF-ID-1: Static map of precipitation associated to return period UF-ID-2: Forecast of return period
Input-ID-61	E-OBS daily gridded meteorological data for Europe	UF-ID-1: Static map of precipitation associated to return period UF-ID-2: Forecast of return period
Input-ID-62	ERA5 air temperature	WFS-ID-4: Agricultural drought monitoring (near real-time) WFS-ID-5: Agricultural drought forecast WFS-ID-6: Agricultural drought risk zone map
Input-ID-63	ERA5 precipitation	WFS-ID-1: Meteorological drought indicator (Monitoring) WFS-ID-2: Meteorological drought indicator (Forecast) WFS-ID-3: Meteorological drought indicator (calibrated in danger levels) WFS-ID-4: Agricultural drought monitoring (near real-time) WFS-ID-5: Agricultural drought forecast WFS-ID-6: Agricultural drought risk zone map
Input-ID-64	ERA5-Land runoff	WFS-ID-9: Populations at risk or water insecurity
Input-ID-65	ECMWF forecasts	WFS-ID-2: Meteorological drought indicator (Forecast) WFS-ID-5: Agricultural drought forecast UF-ID-2: Forecast of return period
Input-ID-66	Roads & Transport Zaragoza	UF-ID-10: Public services and government support UF-ID-13: Ability to evacuate
Input-ID-67	DH_Ebro	UF-ID-3: High-Resolution urban flood risk maps for various return periods UF-ID-5: Enhanced urban flood damage assessment
Input-ID-68	MHFP CADASTRE	UF-ID-9: Assets and financial resources
Input-ID-69	CHE Oblique aerial mages	UF-ID-3: High-Resolution urban flood risk maps for various return periods

Input data ID	Dataset name	Indicators ID and name
		UF-ID-5: Enhanced Urban Flood Damage Assessment
Input-ID-70	ORTHO PNOA18	UF-ID-3: High-Resolution urban flood risk maps for various return periods UF-ID-5: Enhanced Urban Flood Damage Assessment
Input-ID-71	MDT14 - ARPSI	UF-ID-3: High-Resolution urban flood risk maps for various return periods UF-ID-5: Enhanced Urban Flood Damage Assessment
Input-ID-72	MDT02 - PNOA 2a cobertura	UF-ID-3: High-Resolution urban flood risk maps for various return periods UF-ID-5: Enhanced Urban Flood Damage Assessment
Input-ID-73	LiDAR - PNOA 2a cobertura	UF-ID-3: High-Resolution urban flood risk maps for various return periods UF-ID-5: Enhanced Urban Flood Damage Assessment UF-ID-9: Assets and financial resources UF-ID-10: Public services and government support UF-ID-13: Ability to evacuate
Input-ID-74	CHE Flood mask	UF-ID-3: High-Resolution urban flood risk maps for various return periods UF-ID-5: Enhanced Urban Flood Damage Assessment
Input-ID-75	SNCZI Flood Risk mask T10, T100, T500	UF-ID-3: High-Resolution urban flood risk maps for various return periods UF-ID-5: Enhanced Urban Flood Damage Assessment
Input-ID-76	SNCZI Flood Hazard mask T10, T50, T100, T500	UF-ID-3: High-Resolution urban flood risk maps for various return periods UF-ID-5: Enhanced Urban Flood Damage Assessment
Input-ID-77	Rainfall data for Zaragoza	UF-ID-1: Static map of precipitation associated to return period UF-ID-2: Forecast of return period
Input-ID-78	Event water gauges for Ebro Basin for de analysed event.	UF-ID-3: High-Resolution urban flood risk maps for various return periods UF-ID-5: Enhanced Urban Flood Damage Assessment
Input-ID-79	UNHCR CCCM	WFS-ID-7: IDP camps status indicator
Input-ID-80	Social/Traditional media on food security	WFS-ID-11: Food security
Input-ID-81	Social/Traditional media on economic security	WFS-ID-12: Economic security
Input-ID-82	Social/Traditional media on displaced persons	WFS-ID-13: Displaced persons
Input-ID-83	Social/Traditional media on violent conflict	WFS-ID-14: Violent conflict
Input-ID-84	Social/Traditional media on humanitarian aid	WFS-ID-17: Humanitarian aid
Input-ID-85	Social/Traditional media on climate sensitivity of agri-food systems	WFS-ID-19: Climate sensitivity of agri-food systems

3.2 GEOSPATIAL DATA DOMAIN

3.2.1 Overview

This section provides an overview of the 45 input datasets identified in CENTAUR geospatial domain, which are required for the development of Innovative indicators in the fields of Urban Flood and Water & Food Security. Moreover, the 8 Innovative indicators produced in the geospatial domain are also listed.

This section is divided into the following data groups:

- Urban flood data:
    - Input data: 11 datasets
    - Innovative indicators: 4 datasets

- Agriculture and vegetation data
    - Input data: 10 datasets
    - Innovative indicators: 3 datasets (with 4 intermediate results generated with the input above and in order to provide the final innovative indicators).

- Elevation data (only as input data)
    - Input data: 6 datasets

- Settlements data (only as input data):
    - Input data: 15 datasets

- Other:
    - Input data: 3 datasets
    - Innovative indicator: 1 dataset

3.2.2   Urban Flood Data

3.2.2.1 Input data

Table 8: CENTAUR context of Input Urban flood dataset

Input dataset ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
Input-ID-01	**Flood footprint (from satellite data for past event with the same return period)**	Flood delineation product based on satellite imagery acquired and processed to obtain shape files.	e-GEOS	All the use cases considered in the project: Ebro Basin, German Floods, Mozambique and France, Piedmont	Delineation of the flood mask for the flood map product.	Flood extent
		Flood delineation product based on satellite imagery acquired and ground observations. The flood mask is accessible also from the Copernicus EMS portal, but the national sources will be given priority as they are supported by with ground observations.	ITHACA	Piedmont Use Case		
Input-ID-02a	**Land Use**	Land use layer used for impact assessment and forecast modelling. To date, is freely available Corine Land Cover 2018 (CLC) with 100 m of spatial resolution and CLC+ with 10 m of spatial resolution.	e-GEOS	All the use cases considered in the project: Ebro Basin, German Floods, Mozambique, and France; except Piedmont	Reference maps and inputs from the different models used to generate the indicators.	Land use
Input-ID-02b		Land use layer used for impact assessment and forecast modelling. Land Cover Piemonte dataset in CLC nomenclature is to be used for Piedmont Use Case.	ITHACA	Piedmont Use Case		
Input-ID-03a	**Hydrography**	Hydrographic network representing bodies of water of the area of interest. This layer could be obtained from users, national OS	e-GEOS	All the use cases considered in the		Hydrography, Hydrology

		mapping, OpenStreetMap layer, obtained from CLC+ or even CEMS activations where the OSM layer is sometimes updated		project: Ebro Basin, German Floods, Mozambique, and France; except Piedmont	Cartography and input of models used for the flooding mask delineation.	
Input-ID-03b		Hydrographic network representing bodies of water. This layer is obtained from both regional and municipal datasets for AOI Turin Centre and only from regional dataset for AOI Ceva Centre.	ITHACA	Piedmont Use Case		
Input-ID-04	BD TOPO® v3.3 – (French territory and infrastructures)	BD Topo® is provided by IGN the French cartographic institute and describes the French territory and infrastructures. The dataset is vectorial and includes the following content: administrative units, buildings, hydrography, land cover, activities and services, transportations, and restricted areas.	CLS	French Use case	Reference maps, cartography and inputs of the different models used for the flooding mask delineation and indicators generation.	Hydrography, Hydrology
Input-ID-05	VHR_IMAGE_2021	Reference VHR optical images mosaic provided by Copernicus for the reference year 2021.	CLS	French Use case	Reference maps	Optical VHR
Input-ID-06	PREs and POST event INSAR compatible data	Flood water detection over urban areas using radar and artificial intelligence (FLORIA).	SERTIT/e-GEOS	Global	Flood masks and UF-ID-4: Inferred INSAR urban flood extent.	FLORIA
Input-ID-67	DH_Ebro	Geographic data related to Hydrographic elements (physical waters), both natural and artificial (rivers, canals, ditches, lakes, reservoirs, dams, points of hydrographic interest, etc.), and hydrographic network (nodes, sections)	TRACASA	EbroBasin Use Case	Reference maps	Hydrography, Hydrology
Input-ID-74	CHE Flood mask	Coverage that represents the estimated flood surface from oblique aerial photographs, vertical, mosaics generated from these and aerial filming in manned flights carried out on April 14 -17, 2018 (section of the Ebro axis between Rincón de Soto -La Rioja- and La Zaida -Zaragoza-). The GIS layer was obtained through vector digitization (cartographic restitution) of that information visible in the different documents obtained in the aerial flights over the most current PNOA orthophotos.	TRACASA	EbroBasin Use Case	Flood extent/model validation	Flood extent

Input-ID-75	SNCZI Flood Risk mask T10, T100, T500	Flood risk masks of the National Flood Zone Mapping System (Sistema Nacional de Cartografía de Zonas Inundables, SNCZI) for different return periods.	TRACASA	EbroBasin Use Case	Flood extent/model validation	Flood extent
Input-ID-76	SNCZI Flood Hazard mask T10, T50, T100, T500	Flood hazard masks of the National Flood Zone Mapping System (Sistema Nacional de Cartografía de Zonas Inundables, SNCZI) for different return periods.	TRACASA	EbroBasin Use Case	Flood extent/model validation	Flood extent
Input-ID-78	Event water gauges for Ebro Basin for de analysed event.	Event water gauges For Ebro Basin	TRACASA	EbroBasin Use Case	Measurement of water level gauge for flood modelling	Water gauges

Table 9: Input Urban flood dataset specifications

Input dataset ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
Input-ID-01	Flood footprint (from satellite data for past event with the same return period)	Sentinel-1 and -2 (for InSAR analysis only Sentinel-1 will be used) or other satellite/aerial data delivered within cold/hot case events	SAR/Optical sensors	SAR backscattering amplitude and InSAR coherence. IW and GRD acquisition mode. Sentinel-1 and -2: https://scihub.copernicus.eu/dhus/#/home or other satellite/aerial data delivered within cold/hot case events. e-GEOS and SERTIT (in particular for InSAR analysis) for the flood delineation and Copernicus about Sentinel images, CSCDA/Panda for non-Sentinel imagery	Global (-90° to 90°, -180° to 180°) 1m-100m	Related to sensor of interest	Event duration related	vector layer (.shp, kml)	since 2014
			SAR/Optical sensors and ground observations	Flood footprint data is accessible on the Regional Agency for the Protection of the Environment (ARPA Piemonte), and it is based on field surveys, satellite images and elaborations deriving from the Copernicus and CIMA products, orthophotos of the Piedmont Region, Google Images 2017.	Local scale with flood event related. The scale of the data			vector layer (shp), WMS and WFS	

Input dataset ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
				Data (as WMS) concerning 2016 flood event available on https://webgis.arpa.piemonte.it/ags/services/rischi_naturali/evento_alluvionale_2016/MapServer/WMSServer Data (as WFS) concerning 2020 flood event available on https://webgis.arpa.piemonte.it/ags/services/rischi_naturali/evento_alluvionale_2020/MapServer/WFSServer The same data source contains also the water levels measured in urban settlements during the two flood events.	is 1:10 000.				
Input-ID-02a	Land Use	Sentinel-2 and Landsat-8 for gap filling	Optical sensors	Landsat and Sentinel-2 images from 2017 to 2019. CLC classification can be found at following link: https://land.copernicus.eu/pan-european/clc-plus CLC: https://land.copernicus.eu/pan-european/corine-land-cover CLC+: https://land.copernicus.eu/pan-european/clc-plus GLC30: http://www.globallandcover.com/	Global (-90° to 90°, -180° to 180°) CLC+: 10m CLC: 100m GLC30: 30 m	2017-2018 for CLC and about CLC+ from July 2017 to June 2019 2020 for GLC30	N/A (updates of different land use datasets are variable)	raster layer (.tif) CLC availab le also in vector format (.shp)	2023
Input-ID-02b		Satellite images (Sentinel-2) combined with BDTRE topographic geodatabase data and data from Forest Map, Regional Landscape Plan, Land		Land Cover Piemonte; Data source: Piedmont Region: https://www.geoportale.piemonte.it/geonetwork/srv/ita/catalog.search;jsessionid=1907C77A00157E43A595F9A5DD20956C.clu001node01_tc1-catalogo-gnosreg?node=srv#/metadata/r_piemon:35df8a16-5d89-461f-a0f2-abc2180713d2	Piedmont Region with a topographic scale of 1:10 000.	2021	N/A	Geopackage	Published in 2021 and updated in 2022.

Input dataset ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
		use according to the classification of the Agricultural Census							
Input-ID-03a	Hydrography	OSM or CLC+	Optical sensors	OSM and Sentinel image series (if derived from CLC+). Raw data is the collection of points, ways and relations and their tags as stored in the OSM database. https://www.openstreetmap.org/#map=8/42.423/25.670&layers=C OSM or CLC+, national/user layers, updated OSM in CEMS activations	Global (-90° to 90°, -180° to 180°) 10 m (if derived from CLC+) or NA	N/A	N/A	vector layer (.shp, .kml)	N/A
Input-ID-03b		Open-source municipal and regional topographic data (BDTRE Hydrography from Piedmont Region and Municipality of Turin dataset)	Optical sensors	Data source: Piedmont Region (https://www.geoportale.piemonte.it/geonetwork/srv/ita/catalog.search#/metadata/r_piemon:c992047e-d87f-4f14-9387-3f71a573819d); Municipality of Turin (http://geoportale.comune.torino.it/web/cartografia/cartografia-scarico)	Local scale. Topographic map scale 1:5.000 and 1:10.000	N/A	N/A	vector layer (.shp, gdb)	Hydrography Piedmont Region: first release 2010; update in 2016. Hydrography Municipality of Turin: 2023.
Input-ID-04	BD TOPO® v3.3 – (French territory and infrastructures)	Open-source national dataset (RGE)	Optical VHR aerial or satellite images	BD TOPO V3.3 2023: https://geoservices.ign.fr/bdtopo Documentation here https://geoservices.ign.fr/sites/default/files/2023-01/DC_BDTOPO_3-3.pdf	France 2.5m	N/A	Yearly	Vector layer (.shp)	Last release June 2023

Input dataset ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
Input-ID-05	VHR_IMAGE _2021	Copernicus core dataset	Optical VHR	Dataset information available here https://spacedata.copernicus.eu/optical-vhr-coverage-over-europe-vhr_image_2021-	Pan-European 2m	2020 to 2022 depending on the area	3 years	Raster (geotiff)	2021
Input-ID-06	PREs and POST event INSAR compatible data	Sentinel 1	SAR	InSAR compatible pre and post event Sentinel-1 images	Global (-90° to 90°, -180° to 180°) 20m	Event related	12-days nominal for one satellite, 6 days exact repeat cycle for 2-satellite constellation. This improves to 3 days repeat cycles including ascending & descending	vector layer (.shp, .kml) or raster layer (.tif)	since 2014
Input-ID-67	DH_Ebro	N/A	N/A	http://iber.chebro.es/geoportal/	Spain 1:25000	N/A	N/A	Vector layer (.shp)	2019

Input dataset ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
Input-ID-74	CHE Flood mask	Oblique aerial photographs	Unknown	http://iber.chebro.es/geoportal/	Section of the Ebro axis between Rincón de Soto -La Rioja- and La Zaida - Zaragoza	Flood even April 2018	N/A	Vector layer (.shp)	2018
Input-ID-75	SNCZI Flood Risk mask T10, T100, T500	Model	N/A	"http://iber.chebro.es/geoportal/ https://www.miteco.gob.es/es/cartografia-y-sig/ide/descargas/agua.html"	Spain, areas of high risk of fluvial flooding	N/A	N/A	Vector layer (.shp)	-
Input-ID-76	SNCZI Flood Hazard mask T10, T50, T100, T500	Model	N/A	"http://iber.chebro.es/geoportal/ https://www.miteco.gob.es/es/cartografia-y-sig/ide/descargas/agua.html"	Spain, areas of high risk of fluvial flooding	N/A	N/A	Vector layer (.GDB)	-
Input-ID-78	Event water gauges for Ebro Basin for de analysed event.	Ground weather stations	Various	Nation Meteorology Agency (Agencia Estatal de Meteorología, AEMET)	Spain	Depends on the station	-	Tabular	N/A

3.2.2.2 Innovative indicators

Table 10: CENTAUR context of Innovative indicators for Urban flood dataset

Innovative indicator ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
UF-ID-3	High-Resolution urban flood risk maps for various return periods	Speedy-flood model with precipitation intensity maps based on return period analysis which allows to reconstruct future floods scenarios	ECMWF/e-GEOS	Global	Flood scenarios in urban areas for different return periods	Flood extent, Flood depth, flood forecast
UF-ID-4	Inferred InSAR urban flood extent	Floodwater detection over urban areas using Radar and artificial intelligence (FLORIA)	SERTIT	Global	Flooding mask in urban area	InSAR flood, AI flood
UF-ID-5	Enhanced Urban Flood Damage Assessment	Speedy Flood Tool combined with InSAR coherence analysis for floods maps generation	e-GEOS/SERTIT	Global	Improved damage assessment based on exposure elements to floods risks / flood damage information.	Flood damage assessment, urban flood damage
UF-ID-7	Hazard web sources indicator	Index based on several indicators available on the web that allow to characterize an extreme flood event in an area of interest in terms of hazard.	e-GEOS	Global	Flood hazard characterization	Flood hazard

Table 11: Innovative indicators for Urban flood dataset specifications

Innovative indicator ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
UF-ID-3	High-Resolution urban flood risk maps for various return periods	Precipitation for different return period calculated by ID-2 VHR DTM. Flood footprint (from satellite data for past event with the same return period); Land Use; Social-media markers; Hydrography vector layer.	Please refer to the related input data as described in the rows above	e-GEOS/ECMWF	Global	depending on the use case	Depends on the use case	GeoTIFF	N/A

Innovative indicator ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
UF-ID-4	Inferred InSAR urban flood extent	PRE and POST event INSAR compatible data;	SAR sensors	SERTIT	Global (-90° to 90°, -180° to 180°) 20m	depending on the use case	Depends on the use case	.shp /.GeoJSON	Depending on Use Case and data availability
UF-ID-5	Enhanced Urban Flood Damage Assessment	VHR DTM; Flood Footprint (EO data); UF-ID-4; Flood Delineation Polygon; Land Use; Social/Traditional Media Markers; Hydrography Vector Layer; Ancillary Data for Flood Hazard	Please refer to the related input data as described in the rows above	e-GEOS/SERTIT	Global	depending on the use case	Depends on the use case	.shp /GeoJSON	Depending on Use Case and data availability
UF-ID-7	Hazard web sources indicator	Global Precipitation Measurement (GPM) constellation data referred to the period of interest; GDACS hazard indicator; WSF-Population; GHS-Pop R2023A WSF World Settlement Footprint GHS-Built-S R2023A CEMS RM and/or RRM activations info in terms of affected population and size of the flooded area; Web Sources (facilities and industries present in the context of interest, economic damages estimated; poverty distribution, elements of particular interest hit by flood, etc;)	Please refer to the related input data as described in the rows above	e-GEOS	Global	Depends on the use case	Depends on the use case	xls	Depending on Use Case and data availability

3.2.3 Agriculture and Vegetation Data

3.2.3.1 Input data

Table 12: CENTAUR context of Input Agriculture and Vegetation dataset

Input dataset ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
Input-ID-07	NDVI	The Normalized Difference Vegetation Index (NDVI) is an indicator of vegetation greenness.	VITO/UNISTRA	All CENTAUR WFS use case countries	Crop condition; agricultural drought	NDVI
Input-ID-08	S3-LST	Land surface temperature derived from Sentinel-3.	VITO/UNISTRA	All CENTAUR WFS use case countries	Crop condition; agricultural drought	LST
Input-ID-09	MODIS-LST	Land surface temperature derived from MODIS.	UNISTRA/VITO	All CENTAUR WFS use case countries	Crop condition; agricultural drought	LST
Input-ID-10	GRACE RZSM	Root Zone Soil Moisture derived from gravimetric measurements performed by NASA's GRACE and GRACE-FO satellites.	VITO/UNISTRA	All CENTAUR WFS use case countries	Agricultural drought	Soil Moisture
Input-ID-11	GRACE ground water	Relative indicator of ground water levels as measured through NASA's GRACE and GRACE-FO satellites.	VITO	All CENTAUR WFS use case countries	Agricultural drought	Groundwater availability

Input dataset ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
Input-ID-12	Land Cover	Copernicus global land cover product. Land cover maps represent spatial information on different types (classes) of physical coverage of the Earth's surface, e.g., forests, grasslands, croplands, lakes, wetlands. Dynamic land cover maps include transitions of land cover classes over time and hence captures land cover changes. The yearly moderate-resolution land cover maps do primarily target land cover detection and their changes, although it is not so straightforward to put boundaries between definitions of land cover and land use classes.	VITO/UNISTRA	All CENTAUR WFS use case countries	Agricultural drought	Land Cover
Input-ID-13	FAO WaPOR: Land Cover Classification 2021	This land cover dataset at continental scale is based on the Copernicus Global Land cover map. WaPOR data adds on top of the Copernicus map, the distinction between irrigated and rainfed areas. It is published on a yearly basis.	ADELPHI	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*identifying irrigated areas	Irrigation; agriculture cropland
Input-ID-14	SMAP L4 RZSM	Root zone soil moisture product (L4) derived from SMAP sensor.	UNISTRA/VITO	All CENTAUR WFS use case countries	Agricultural drought	Soil moisture
Input-ID-15	Rangeland land cover change	Land cover transition over rangelands	ADELPHI/GMV	All use cases considered CENTAUR: Mali, Mozambique, Somalia, Sudan	*identifying resource competition and conflict-prone resource appropriation	land use; land use change
Input-ID-16	Livestock heat stress	Anticipated and historic heat stress tailored by livestock type and country, and computed as frequency, degree, or risk.	ADELPHI/GMV	All use cases considered in CENTAUR: Mali, Mozambique, Somalia, Sudan	*climate shock variable alternative to drought indicators	heat stress; livestock

Table 13: Input Agriculture and Vegetation dataset specifications

Input dataset ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication	Version
Input-ID-07	NDVI	SPOT-VEGETATION, PROBA-V, Sentinel-3	Optical (VIS and NIR)	Spectral reflectance of red and NIR band https://land.copernicus.eu/global/products/ndvi VITO remotesensing@vito.be	Global (-90° to 90°, -180° to 180°) 1km-300m	April 1998 - present	Within 3 days after synthesis period	GeoTIFF	Mar-23	2.0.2
Input-ID-08	S3-LST	Sentinel-3	SLSTR	Thermal infrared bands of Sentinel-3. https://terrascope.be/en/satellites/sentinel-3 VITO remotesensing@vito.be	Global (-90° to 90°, -180° to 180°) 1km	2018 - present	Daily	GeoTIFF	2022	N/A
Input-ID-09	MODIS-LST	MODIS	Spectroradiometer	Spectral reflectance bands https://modis.gsfc.nasa.gov/data/	Global (-90° to 90°, -180° to 180°) 250m-1km	2000-present	1-2 days	GeoTIFF	Q2 of 2023	N/A
Input-ID-10	GRACE RZSM	GRACE and GRACE FO	N/A	Computer model that combines measurements of water storage anomalies from GRACE and GRACE-FO with a long-term meteorological dataset to generate a continuous record of soil moisture and groundwater that stretches back to 1948. https://nasagrace.unl.edu/Archive.aspx	Global (-90° to 90°, -180° to 180°) 25km	Jan 2003 to the present	Every 7 days	GeoTIFF	May-22	RL06.1

Input dataset ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication	Version
Input-ID-11	GRACE ground water	GRACE and GRACE FO	N/A	Computer model that combines measurements of water storage anomalies from GRACE and GRACE-FO with a long-term meteorological dataset to generate a continuous record of soil moisture and groundwater that stretches back to 1948. https://nasagrace.unl.edu/Archive.aspx	Global (-90° to 90°, -180° to 180°) 25km	Jan 2003 to the present	Every 7 days	GeoTIFF	May-22	RL06.1
Input-ID-12	Land Cover	PROBA-V	Optical	Features derived from annual time series of optical vegetation indices are used in a Random Forest classification approach to generate the map. https://land.copernicus.eu/global/products/lc VITO remotesensing@vito.be	Global (-90° to 90°, -180° to 180°) 100m	Annual, between 2015 and 2019	Yearly	GeoTIFF	Sep-20	v3
Input-ID-13	FAO Wapor: Land Cover Classification 2021	N/A	N/A	Derived from Copernicus Global Land Cover Map 2015 using additional data on4precipitation (CHIRPS) and evapotranspiration. Compiled by VITO and provided by FAO https://wapor.apps.fao.org/home/WAPOR_2/1	Africa, 250m x 250m	2009-present	yearly	GeoTIFF	Nov-19	2.1

Input dataset ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication	Version
Input-ID-14	SMAP L4 RZSM	GEOS-5, SMAP	Microwave	Based mainly on SMAP brightness measurements combined with detailed land surface model. https://nsidc.org/data/spl4smgp/versions/7#anchor-1	Global (-86° to 86°, -180° to 180°) 9km	Daily	Daily, with lag time of around 3 months	HDF5	Q2 of 2023	v7
Input-ID-15	Rangeland land cover change	C3S Land cover classification gridded maps	AVHRR, SPOT-VGT, PROBA-V and S3 OLCI	LULC map changes classify as LC transitions over rangelands systems	Global, 300m	1992 to present with one year delay	yearly	GeoTIFF	2023	N/A
Input-ID-16	Livestock heat stress	C3S ERA5-Land; CORDEX	NA	Livestock heat stress indicator computed with reanalysis and projected climate data and processed to estimate risk per livestock type	Global, 0.1º (historic); 0.5º (anticipated)	1950-2008	yearly (historic)	GeoTIFF	2023	N/A

3.2.3.2 Innovative indicators

In the table below we list all indicators that will be generated in the domain of agriculture and vegetation monitoring. In a first stage, a number of intermediate indicators will be generated related to vegetation water content and water stress, growing season extent and anomalies in vegetation condition. All these intermediate indicators will then be used to create the final Innovative indicators which will reflect the impact of current and future drought events on agricultural productivity.

Table 14: CENTAUR context of Innovative indicators for Agriculture and Vegetation

Innovative indicator ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
Intermediate input for WFS-ID-4 and 5	NDMI	Normalized Difference Moisture Index	UNISTRA/VITO	All CENTAUR WFS use case countries	Agricultural drought	Vegetation water content
Intermediate input for WFS-ID-4 and 5	Phenology	Indication of start, peak and end of season for up to two seasons per year.	UNISTRA/VITO	All CENTAUR WFS use case countries	Agricultural drought	Growing seasons
Intermediate input for WFS-ID-4 and 5	Thermal drought stress	The difference between land surface temperature and ambient air temperature is a well-established indicator of water stress in crops. When plants are subject to water stress, they tend to close their stomata, thereby halting transpiration. As a result, the leaf surface will heat up relative to the surrounding air.	VITO/UNISTRA	All CENTAUR WFS use case countries	Agricultural drought	Drought stress
Intermediate input for WFS-ID-4 and 5	Drought severity	This indicator identifies hotspots of negative impacts of drought on vegetation condition. It is produced for every dekad (10-day period) at a resolution of 1 km and can be aggregated over the growing season to quantify the total impact of droughts on agricultural production.	VITO/UNISTRA	All CENTAUR WFS use case countries	Agricultural drought	Impact of drought
WFS-ID-4	Agricultural drought monitoring (near real-time)	Combined indicator on current impact of agricultural drought on vegetation production.	VITO/UNISTRA	All CENTAUR WFS use case countries	Agricultural drought	Impact of drought

Innovative indicator ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
WFS-ID-5	Agricultural drought forecast	Combined indicator on expected impact of agricultural drought on vegetation production.	VITO/UNISTRA	All CENTAUR WFS use case countries	Agricultural drought	Impact of drought
WFS-ID-6	Agricultural drought risk zone map	Risk of occurrence of adverse drought impact on agricultural production, expressed using a categorical scale and at different monthly lead times.	VITO/UNISTRA	All CENTAUR WFS use case countries	Agricultural drought	Drought risk

Table 15: Innovative indicators for Agriculture and Vegetation: specifications

Innovative indicator ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication	Version
Intermediate input for WFS-ID-4 and 5	NDMI	MODIS	Optical	primarily NIR, Red and SWIR bands https://scihub.copernicus.eu/ , https://www.usgs.gov/landsat-missions/landsat-data-access, https://modis.gsfc.nasa.gov/data/	Global (-90° to 90°, -180° to 180°) 10m-1km	2000-present	1-15 days	GeoTIFF	Q2 of 2023	N/A
Intermediate input for WFS-ID-4 and 5	Phenology	MODIS, Sentinel-3	Optical	primarily NIR, Red and SWIR bands https://scihub.copernicus.eu/ , https://www.usgs.gov/landsat-missions/landsat-data-access, https://modis.gsfc.nasa.gov/data/	Global (-90° to 90°, -180° to 180°) 10m-1km	2000-present	1-15 days	GeoTIFF	Q2 of 2023	N/A
Intermediate input for WFS-ID-4 and 5	Thermal drought stress	Sentinel-3 LST, ERA5 air temperature	Thermal infrared (SLSTR)	Land surface temperature and air temperature measured at 2m above the ground (ERA5-Land data) Generated by VITO remotesensing@vito.be	Global (-90° to 90°, -180° to 180°) 1km	2018 - present	Daily	Cloud-optimized GeoTIFF	N/A	N/A

Innovative indicator ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication	Version
Intermediate input for WFS-ID-4 and 5	Drought severity	SPOT-VEGETATION, PROBA-V, Sentinel-3	Optical	Determination of deviation of current NDVI values compared to long-term average. Generated by VITO remotesensing@vito.be	Global (-90° to 90°, -180° to 180°) 1km	1999 - present	Dekad	Cloud-optimized GeoTIFF	N/A	N/A
WFS-ID-4	Agricultural drought monitoring (near real-time)	N/A	N/A	Combination of different agricultural drought indicators. Generated by VITO & UNISTRA	Global (-90° to 90°, -180° to 180°) 1km	2018 - present	Dekad	Cloud-optimized GeoTIFF	N/A	N/A
WFS-ID-5	Agricultural drought (forecast)	N/A	N/A	Combination of current agricultural drought indicator with meteorological forecasts produced by ECMWF. Generated by VITO & UNISTRA	Global (-90° to 90°, -180° to 180°) 1km	present - 6 months ahead	Dekad	Cloud-optimized GeoTIFF	N/A	N/A
WFS-ID-6	Agricultural drought risk zone map	N/A	N/A	Combination of current and future agricultural drought indicator. Generated by VITO & UNISTRA	Global (-90° to 90°, -180° to 180°)	present - 6 months ahead	Dekad	GeoPackage	N/A	N/A

3.2.4 Elevation Data

3.2.4.1 Input data

Table 16: CENTAUR context of Input Elevation datasets

Input dataset ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
Input-ID-17	VHR DTM	Very High-Resolution Digital Terrain Model (VHR DTM) of the AoI used as input of forecast and flood modelling.	e-GEOS/SERTIT	All the use cases considered in the project: Ebro Basin, German Floods, Mozambique, and France; except Piedmont	Input of forecast model and flood modelling	DTM
Input-ID-18	VHR DTM (Piedmont)	Very High-Resolution Digital Terrain Model (VHR DTM) of the AoI(s) used as input of forecast and flood modelling.	ITHACA	Piedmont Use Case	Input of forecast model and flood modelling	DTM
Input-ID-19	RGE ALTI® 1m	Very High-Resolution Digital Terrain Model representing the bare earth surface over French territory, with a 2D spatial resolution of 1m.	CLS	France Use case	Input of forecast model and flood modelling	DTM
Input-ID-71	MDT14 - ARPSI	Very High Resolution DTM. Shows artefacts in the Zaragoza city area, maybe not usable.	TRACASA	EbroBasin Use Case	Flood modelling	DTM
Input-ID-72	MDT02 - PNOA 2a cobertura	Very High Resolution DTM	TRACASA	EbroBasin Use Case	Flood modelling	DTM
Input-ID-73	LiDAR - PNOA 2a cobertura	LiDAR coverage	TRACASA	EbroBasin Use Case	Flood modelling, create DSM to model indicators	LiDAR

Table 17: Input Elevation dataset specifications

Input dataset ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
Input-ID-17	VHR DTM	SAR data	SAR	SAR or optical image used for the DTM generation. Commercial / Open Source	AoI correlated with the requested. Depending on the availability (from 1 m if LIDAR data are available to 30 m for the FABDEM product)	N/A	N/A	raster layer (.tif)	N/A, strongly related to the DTM used for the analysis
Input-ID-18	VHR DTM (Piedmont)	LiDAR data + high precision aerial data as complementary if needed.	LIDAR	LIDAR and aerial data used for the DTM generation. The VHR DTMs for Piedmont Use Case will be generated by ITHACA. Concerning the raw data for AOI Turin Centre, Polytechnic University of Turin has the entire data property rights. Complementary data used for the analysis are provided by the Italian Ministry of Environment and Energy Security, Po Basin Authority and Piedmont Region. The raw data to be used for the AOI Ceva Centre is to be acquired under the scope of CENTAUR project.	AoIs correlated with the request in Piedmont Use Case. VHR: The best trade-off for DTM characteristics to be agreed upon based on the hydraulic modelling requirements.	The LiDAR data was acquired by Polytechnic University of Turin over Turin city in January 2022. As per the technical proposal, the data over River Tanaro (AOI Ceva Centre) to be acquired ad-hoc.	N/A	raster layer (.tif)	Strongly related to the DTM used for the analysis. As reported in the Temporal extent column.

Input dataset ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
Input-ID-19	RGE ALTI® 1m	Open-source national dataset (RGE)	Topo laser & Correlation of winter images	RGE alti 1m available here https://geoservices.ign.fr/rgealti Public dataset orgnaized by administrative entity (département) Documentation available here https://geoservices.ign.fr/sites/default/files/2021-07/DC_RGEALTI_2-0.pdf Recommended use scales between 1:3.000 and 1:20.000. Geodetic reference: RGF93, IAG GRS 1980, IGN 1969	France 1m	N/A	N/A	Ascii (.asc)	Last release April 2021
Input-ID-71	MDT14 - ARPSI	LiDAR data	LiDAR	DTM generated from LiDAR data for areas of high risk of fluvial flooding of Spain by the Spanish Ministry for Ecological Transition. This information can be used freely and free of charge.	Spain, areas of high risk of fluvial flooding, 1m	N/A	N/A	Raster(.asc)	2014
Input-ID-72	MDT02 - PNOA 2a cobertura	LiDAR data	LiDAR	DTM generated from LiDAR data for the Spanish territory by CNIG/IGN. This information can be used freely and free of charge.	Spain, 2.5m	N/A	N/A	Raster(.asc)	2016
Input-ID-73	LiDAR - PNOA 2a cobertura	LiDAR data	LiDAR	LIDAR and aerial data used for the DTM/DSM generation, acquired by CNIG/IGN for the Spanish territory. This information can be used freely and free of charge.	Spain, (0.5 - 2 points/m²)	2015 - 2021	N/A	Lidar (.laz)	2016

3.2.5 Settlement data and infrastructures

3.2.5.1 Input data

Table 18: CENTAUR context of Input settlement and infrastructures datasets

Input dataset ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
Input-ID-20	WSF- World Settlement Footprint	The dataset depicts the extent and location of human settlements derived from the analyses of multi-temporal statistics in radar an optical data from Sentinel 1 and Sentinel-2 imagery.	DLR	For Urban Flood use cases	*Settlement identification. *Urban growth analyses.	Settlement layer
Input-ID-21	WSF-Imperviousness	The dataset depicts the percent of impervious surface within the 10m pixels within the identified built-up pixels of the WSF layer. The PIS is derived as the inverse of the NDVI, describing the "level of greenness" within the settlement pixels	DLR	All CENTAUR use cases	*Settlement characterisation. *Urban Heat analyses	Imperviousness layer
Input-ID-22	WSF-3D	The dataset provides quantification of the building height, building area, building fraction, and building volume, within the built-up environment as described by the WSF2019. The units of the dataset are in dm, m, percent, and cubic meters, respectively.	DLR	All CENTAUR use cases for Urban Floods	*Settlement characterisation	Building morphology
Input-ID-23	BDTRE Struttura Aggregata for Piedmont Region and Settlements Municipality of Turin	The BDTRE dataset depicts the extent and location of human settlements derived from the analyses of multi-temporal statistics in satellite images, aerial photo, and topographic datasets.	ITHACA	Complementary data for Piedmont Use Case.	*Settlement identification and characterisation	Settlement layer

Input dataset ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
Input-ID-24	GHS-Built-S R2023A	Global Human Settlement- Built-up surface grid. The dataset depicts the distribution of built-up surfaces, expressed as number of square metres. The data is made by spatial-temporal interpolation of 5 observed collections. Landsat data supports 1975,1990,2000 and 2014 epochs, while S2 supports 2018 epoch.	DLR/JRC	All CENTAUR use cases for Urban Floods	*Settlement identification *Urban growth analyses	Settlement layer
Input-ID-25	GHS-Built-V R2023A	The dataset depicts the distribution of the built-up volumes, express as the number of cubic meters.	DLR/JRC	All CENTAUR use cases for Urban Floods	*Settlement characterisation	Building morphology
Input-ID-26	GHS-Built-C R2023A	The dataset delineates the boundaries of human settlements at 10m spatial resolution and describe their inner characteristics in terms of morphology of the built environment and functional use	DLR/JRC	All CENTAUR use cases for Urban Floods	*Settlement characterisation	Building morphology
Input-ID-27	GHS-SMOD- R2023A	The dataset represents the application of the Degree of Urbanisation stage I methodology.	DLR/JRC	All CENTAUR use cases for Urban Floods	*Degree of Urbanisation	Settlement characterisation
Input-ID-28	GHS-DUC R2023A	The dataset contains the Global Degree of Urbanisation classification of administrative units delineated by the GADM41 according to the application stage II of the Degree of Urbanisation	DLR/JRC	All CENTAUR use cases for Urban Floods	*Degree of Urbanisation	Settlement characterisation

Input dataset ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
Input-ID-29	Open Street Map	Data on roads railways and other relevant features to assess exposure and vulnerability to urban floods	ADELPHI/SERTIT/CLS/TRACASA	All use cases	*Identifying areas particularly exposed or vulnerable to urban floods	Socio-economic vulnerability to urban floods
Input-ID-30	Main roads	Main roads as a proxy measure for public service provision; political marginalisation; ease of access (e.g. for government troops).	ADELPHI/GMV	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Identifying areas with comparably better/worse public service provision *Identifying marginalised areas	Public services and infrastructures
Input-ID-31	BD TOPO® v3.3 (French settlement data)	BD Topo® is provided by IGN the french cartographic institute, and describes the french territory and infrastructures. The dataset is vectorial and includes: - administrative units - buildings - hydrography - land cover - activities and services - transportations - restricted areas	CLS	France Use case	*Identifying areas with comparably better/worse public service provision *Identifying marginalised areas	Public services and infrastructures

Input dataset ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
Input-ID-32	**HOT (Humanitarian OpenStreetMap)**	Humanitarian OpenStreetMap Team (HOT) acts as a bridge between the traditional humanitarian responders and the OpenStreetMap Community. HOT works both remotely and physically in countries to assist the collection of geographic data, usage of that information and training others in OpenStreetMap. For the use cases Mali, Mozambique, Somalia and Sudan, data is available for roads, railways, airports, financial services (e.g. banks, ATMs , post office), ports, waterways (e.g. rivers, streams, canals), buildings, health facilities (e.g. clinics, hospitals), populated places (e.g. villages, isolated dwellings), education facilities (e.g. schools), points of interest (including previous infrastructure types + miscellaneous e.g. marketplace, camp site, tower, water well).	ADELPHI	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Identifying vulnerable areas *Identifying conflict-prone areas *Assessing spatial differences in the distribution of services *Identifying marginalised areas	Public services and infrastructures
Input-ID-66	Roads & Transport Zaragoza	Geographic data related to Road transport networks (urban and interurban roads), by rail, by waterways, by air, by cable and their intermodal connections, with national coverage.	TRACASA	EbroBasin Use Case	*Reference map *Identifying areas with comparably better/worse public service provision	Tranportation
Input-ID-68	MHFP CADASTRE	Cadastre of Spain in the Zaragoza area.	TRACASA	EbroBasin Use Case	*Identifying damaged *Vulnerable buildings to urban floods	Settlement layer

Table 19: Input settlement and infrastructures datasets specifications

Input dataset ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
Input-ID-20	WSF - World Settlement Footprint	Sentinel 1/2	N/A	Generated by DLR	Local. CENTAUR AoIs 10m	2016-present at biannual intervals	Unknown	raster layer (.tif)	2023
Input-ID-21	WSF-Imperviousness	Sentinel 1/2	N/A	Generated by DLR	Local. CENTAUR AoIs 10m	2016-present at biannual intervals	Yearly	raster layer (.tif)	2023
Input-ID-22	WSF-3D	Sentinel2, TerraSAR	N/A	Generated by DLR. https://geoservice.dlr.de/web/maps/eoc:wsf3d	Global (-90° to 90°, -180° to 180°)90m	2012 Potentially up-to-present	Unknown	raster layer (.tif)	2023
Input-ID-23	BDTRE Struttura Aggregata for Piedmont Region and Settlements Municipality of Turin	Initially fed by topographic databases (2016, 2020) and currently updated with Land Registry data	N/A	BDTRE Piedmont Region Settlements: Building Footprints under Cassoni Edilizi: https://www.geoportale.piemonte.it/geonetwork/srv/ita/catalog.search#/metadata/r_piemon:b620d4e1-619a-4b9a-a498-1eb40ee1317b BDTRE Municipality of Turin Settlements: Building Blocks under Maglie Archivio Edilizio http://geoportale.comune.torino.it/web/cartografia/cartografia-scarico	Piedmont Region and Municipality of Turin	BDTRE Piedmont Region Settlements: first release in 2022, and update in 2023 Comune Torino Settlements:2022	N/A	vector layer (.shp)	2023

Input dataset ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
Input-ID-24	GHS-Built-S R2023A	Sentinel 2 (2018), Landsat (1975,199,2000,2014)	N/A	https://ghsl.jrc.ec.europa.eu/ghs_buS2023.php	Global (-90° to 90°, -180° to 180°)2018 (10m) 1975-2030 in five years intervals (100m and 1km)	2018 1975-2020 (5 years intervals) and projections 2025 and 2030	N/A	raster layer (.tif)	Q2 of 2023
Input-ID-25	GHS-Built-V R2023A	ALOS Global Digital Surface Model NASA Shuttle Radar Topographic Mission Data, Sentinel 2	N/A	https://ghsl.jrc.ec.europa.eu/ghs_buV2023.php	Global (-90° to 90°, -180° to 180°)100m, 1km	1975-2020 (5 years intervals) and projections 2025 and 2030	Unknown	raster layer (.tif)	Q2 of 2023
Input-ID-26	GHS-BUILT-C R2023A	GHS-Land-Globe R2022A OSM highways GHS-Built-C-Fun-Globe R2023A GHS-Built-H-Globe R2023A	N/A	https://ghsl.jrc.ec.europa.eu/download.php?ds=builtC	Global (-90° to 90°, -180° to 180°) 10 m	2018	Unknown	raster layer (.tif)	Q2 of 2023
Input-ID-27	GHS-SMOD-R2023A	GHS-Built-S R2023 GHS-Pop R2023	N/A	https://ghsl.jrc.ec.europa.eu/download.php?ds=smod	Global (-90° to 90°, -180° to 180°) 1km	1975-2020 (5 years intervals) and projections 2025 and 2030		raster layer (.tif)	Q2 of 2023

Input dataset ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publica tion
Input-ID-28	GHS-DUC R2023A	GHS-SMOD-Globe R2023A GHS-POP-Globe R2023A	N/A	Global Human Settlement - Download - European Commission (europa.eu)	Global (-90° to 90°, -180° to 180°)	1975-2020 (5 years intervals) and projections 2025 and 2030	Unknown	Shapefile	Q2 of 2023
Input-ID-29	Open Street Map (OSM)	OpenStreetMap	N/A	**Open Street Map (OSM)**	Depending on use cases and data source	Depending on use cases and data source	Depending on use cases and data source	Shapefule	N/A
Input-ID-30	Main roads	Sentinel-1 and Sentinel-2	SAR and Optical	Road model that combines the information from Sentinel-1, Sentinel-2 and machine leaning algorithms to extract the main road transportation network.	Global, 10m	2015-present	yearly	Raster (e.g., GeoTIFF) or Vector (e.g., geopackage, kml, shp)	N/A
Input-ID-31	BD TOPO® v3.3 (French settlement data)	Open-source national dataset (RGE)	Optical VHR aerial or satellite images	BD TOPO V3.3 2023 available here https://geoservices.ign.fr/bdtopo Documentation here https://geoservices.ign.fr/sites/default/files/2023-01/DC_BDTOPO_3-3.pdf	France 2.5m	N/A	Yearly	Vector layer (.shp)	Last release June 2023
Input-ID-32	HOT (Humanitarian OpenStreetMap)	N/A	N/A	https://data.humdata.org/organization/hot	Geo line	2020-present	Monthly	garmin img, geopackage, kml, shp	N/A

Input dataset ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
Input-ID-66	Roads & Transport Zaragoza	N/A	N/A	Geographic data related to Road transport networks provided by CNIG/IGN. http://centrodedescargas.cnig.es/CentroDescargas/index.jsp#	Spain 1:500 to 1:25000	N/A	N/A	Vector layer (.shp)	2023
Input-ID-68	MHFP CADASTRE	N/A	N/A	Settlement layer created by Ministerio de Hacienda y Función Pública	Spain	N/A	N/A	Vector layer (.shp)	Updated

3.2.6 Other type of data

3.2.6.1 Input data

Table 20: CENTAUR context of other type of data input datasets

Input dataset ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case / AOI	Main applications	Tags
Input-ID-33	Global Disaster Alert and Coordination System (GDACS) indicator	Open-source alarm indicator web that allow to characterize an extreme flood event in an area of interest in terms of hazard.	e-GEOS	All the use cases considered in the project: Ebro Basin, German Floods, Piedmont, Mozambique, and France	Natural disasters alarm	Alerts, disasters, cyclones, floods, earthquake, volcano eruption
Input-ID-34	HR-VHR SAR EO	EO SAR imagery to detect changes in an area of interest	e-GEOS	WFS use cases: Mali, Somalia, Mozambique	IDP camps analysis in SEA applications	IDP camps extent change detection
Input-ID-79	UNHCR CCCM	The coordination mechanisms of the CCCM cluster, like other clusters, are mainly relevant in situations of internal displacement and natural disasters.	e-GEOS	WFS use cases	IDP camps analysis in SEA applications	IDP camps/refugees/people movement

Table 21: Other type of input datasets: specifications

Input dataset ID	Dataset name	Raw input data	Sensor	Data source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
Input-ID-33	Global Disaster Alert and Coordination System (GDACS) indicator	TRMM precipitation data, earthquake bulletin deriving from United States Geological Survey (USGS) but also by other institutes around the world that use the Shakemap USGS software, e.g., the National Institution of Geophysics and Volcanology (INGV) of Italy, for tsunami ETOPO30 and NASA, for volcano events a weekly report from the Smithsonian Institute and finally for drought a bulletin deriving from the Global Drought Observatory (GDO).	MW for TRMM	https://www.gdacs.org/	Global (-90° to 90°, -180° to 180°) N/A	2018 – present	sub daily	web portal	since 2018
Input-ID-34	HR-VHR SAR EO data	Copernicus Contributing Missions (Earth observation imagery collected by satellite SAR sensor).	SAR	https://scihub.copernicus.eu	CENTAUR AoIs from 15m to < 4m)	2007-present	N/A (event related)	Raster image	Depending on Use Case and data availability
Input-ID-79	UNHCR CCCM	N/A	N/A	https://data2.unhcr.org/en/situations	Global (-90° to 90°, -180° to 180°) N/A	2011-present	N/A	Report	Since 2011

3.2.6.2 Innovative indicators

Table 22: CENTAUR context of Innovative indicators for other type of data

Innovative indicator ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
WFS-ID-7	IDPs camp status indicator	The output of change detection in the form of a raster map is generated highlighting the points where changes, e.g. different features, in the second image are present with respect to the first reference image.	e-GEOS	All CENTAUR WFS use case countries	IDP camps analysis in SEA applications	IDP camps/refugees/people movement

Table 23: Innovative indicators for other type of data: specifications

Innovative indicator ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication	Version
WFS-ID-7	IDP camps status indicator	HR-VHR SAR data	SAR	https://scihub.copernicus.eu	The spatial resolution is constrained by the input spatial resolution; depends on data temporal availability	2007-present	Event related	GeoTiff	N/A	N/A

3.3 OPEN-SOURCE DATA DOMAIN

3.3.1 Overview

This section provides an overview of input datasets and indicators under the open-source socio-economic domain, as well as the corresponding output innovative indicators. Input datasets and indicators include both external sources as well as those developed internally within CENTAUR. The datasets and indicators cover social and traditional media, population estimates, and specific socio-economic and political variables (e.g. food security, access to services and infrastructure, conflict and violence). Output innovative indicators under the open-source socio-economic data domain are a combination of the above-mentioned datasets and indicators, as well as other datasets and indicators from other domains.

This section is divided into the following groups:

- Social and traditional media
  - o Input data: 17 datasets
  - o Innovative indicators: 1 dataset
- Population estimates
  - o Input data: 4 datasets
- Socio-economic and political variables
  - o Input data: 9 datasets
  - o Innovative indicators: 19 datasets

3.3.2 Social and traditional media

3.3.2.1 Input data

Table 24: CENTAUR context for input Social and traditional media data

Input dataset ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
Input-ID-35	Social/Traditional media on assets and financial resources	Indicator based on mentions of lack of financial means (or insurance) to cope/prepare for floods	ADELPHI/HENSOLDT	France, Mozambique, Spain* (for validation)	identifying areas particularly vulnerable to urban floods	assets and financial resources
Input-ID-36	Social/Traditional media on public services and government support	Indicator based on mentions of poor/lacking services, response by government/first responders, tec.	ADELPHI/HENSOLDT	France, Mozambique, Spain* (for validation)	identifying areas particularly vulnerable to urban floods	Public services and government support
Input-ID-37	Social/Traditional media indicator on ability to evacuate	Measure of people's abilities to move out of harm's way, based on mentions of entrapment and inability to move; mentions of difficulties for vulnerable groups to move away (e.g. children, elderly, disabled persons, etc.); Information about (damage to) infrastructure, blocked evacuation routes etc.	ADELPHI/HENSOLDT	France, Mozambique, Spain* (for validation)	*Identifying areas particularly vulnerable to urban floods	Ability to evacuate
Input-ID-38	Social/Traditional media data on economic impacts of floods	Visual evidence of flood damages (e.g. images, videos) to improve or verify damage estimations.	ADELPHI/HENSOLDT	France, Mozambique, Spain* (for validation)	*Assessing economic impact of urban floods	Flood damages
Input-ID-39	Social/Traditional media data on radicalisation and polarisation	Mentions of sentiment towards the government and other public figures; sentiment towards other social groups (ethnicity, religion, party affiliation, etc.); hate and dangerous/inflammatory speech by influential persons; support/sympathy for radical organisations.	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique,	*Assessing risk of violent escalation	Radicalisation and polarisation

Input dataset ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
				Somalia, Sudan.		
Input-ID-40	Social/Traditional media indicator on resource capture	Indicator based on mentions of "land grabbing" and the like; encroachment of fields onto pastoralist transhumance routes; unequal distribution of land; restricted access to wells and water points for pastoralists; etc.	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan.	*Identifying resource competition and conflict-prone resource appropriation	Resource capture
Input-ID-41	Social/Traditional media data on public services and infrastructure	Mentions of poor services (e.g. health, infrastructure maintenance); difficulties in accessing essential services; corruption related to service provision; sentiment towards public authorities responsible for service provision.	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan.	*Identifying vulnerable areas *Identifying conflict-prone areas *Assessing spatial differences in the distribution of services *Identifying marginalised areas	Public services and infrastructures
Input-ID-42	Social/Traditional media data on state-citizen relations	Mentions of distrust of government officials; incompetence; corruption; lack of concern for citizens; election-rigging; sentiment towards government officials.	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan.	*Identifying conflict-prone areas	State-citizen relations
Input-ID-43	Social/Traditional media data on	Mentions of dysfunctional courts; ineffective enforcement of laws; contradictory rules; sentiment	ADELPHI/HENSOLDT	All use cases considered in the project:	*Identifying conflict-prone areas	Dispute resolution mechanisms

Input dataset ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
	dispute resolution mechanisms	(trust) in courts and legal system; informal dispute resolution bodies (e.g. village council, elders); etc.		Mali, Mozambique, Somalia, Sudan.		
Input-ID-44	Social/Traditional media data on social cohesion and trust	Mentions of social inequalities; (perceived) discriminations (in particular with regards to access to land, subsidies, food aid); sentiment (trust) in neighbours, members of other ethnic/religious communities, etc.; attitudes towards migrants and minority/marginalised groups.	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan.	*Identifying vulnerable areas *Identifying conflict-prone areas	Social cohesion and trust
Input-ID-45	Social and traditional media related to a flooding event	Images of scenes related to floods, depicting objects and scenes which may be used to calibrate/adjust estimates of flood levels and/or extents.	HENSOLDT	All flood-related use cases considered in the project	Identification of objects/scenes which may be used for estimate calibration	Flood damages
Input-ID-80	Social/Traditional media on food security	Mentions of hunger; acute food insecurity; difficulties in accessing/buying food; food price inflation; delay/disruption in food aid; supply chains, storage, and transportation; strikes; boycotts; embargos; information about suppliers (e.g., bankruptcies); etc.	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan.	Identifying vulnerable areas	Food security
Input-ID-81	Social/Traditional media on economic security	Mentions of lost incomes and livelihoods; unemployment; inflation; economic difficulties more generally (e.g., lack of money, difficulties to provide for one's family and oneself); sentiment towards general economic performance and one's own economic prospects; information about strikes,	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique,	Identifying vulnerable areas	Economic security

Input dataset ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
		embargos, shortages, riots, finance, banking, and politics, etc.		Somalia, Sudan.		
Input-ID-82	Social/Traditional media on displaced persons	Mentions of displacement; violence; smuggling; trafficking activities; refugees; refugee camps; border incidents; etc.	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan.	Identifying vulnerable areas	Displaced persons
Input-ID-83	Social/Traditional media on violent conflict	Mentions of violence, violent events/protests/riots, crime; changes in other illicit activities; police and law enforcement (counter-)activities, etc.	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan.	Identifying vulnerable areas	Violent conflict
Input-ID-84	Social/Traditional media on humanitarian aid	Mentions of relief aid or absence thereof; ease of access and fair distribution of aid; sentiment towards performance of main aid organisations in the context of the specific case study.	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan.	Identifying vulnerable areas	Humanitarian aid
Input-ID-85	Social/Traditional media on climate sensitivity of agri-food systems	Mentions of dysfunctional boreholes; dry wells; lack of irrigation; diseases; pests; etc.	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique,	Identifying vulnerable areas	Climate sensitivity of agri-food systems

Input dataset ID	Dataset name	Description			CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
						Somalia, Sudan.		

Table 25 Input Social and traditional media dataset specifications

Input dataset ID	Dataset name	Raw input data	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Language(s)	Modality
Input-ID-35	Social/Traditional media on assets and financial resources	Open-source data	Open-source providers	Depending on data source availability (GPS data or extracted location info at various granularity, e.g. point, region, country)	Depending on the use case	Depending on the use case	Text, images, videos, audio	Depending on AOIs and Use Cases	Text, images, videos, audio
Input-ID-36	Social/Traditional media on public services and government support	Open-source data	Open-source providers	Depending on data source availability (GPS data or extracted location info at various granularity, e.g. point, region, country)	Depending on the use case	Depending on the use case	Text, images, videos, audio	Depending on AOIs and Use Cases	Text, images, videos, audio

Input dataset ID	Dataset name	Raw input data	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Language(s)	Modality
Input-ID-37	Social/Traditional media indicator on ability to evacuate	Open-source data	Open-source providers	Depending on data source availability (GPS data or extracted location info at various granularity, e.g. point, region, country)	Depending on the use case	Depending on the use case	Text, images, videos, audio	Depending on AOIs and Use Cases	Text, images, videos, audio
Input-ID-38	Social/Traditional media data on economic impacts of floods	Open-source data	Open-source providers	Depending on data source availability (GPS data or extracted location info at various granularity, e.g. point, region, country)	Depending on the use case	Depending on the use case	Text, images, videos, audio	Depending on AOIs and Use Cases	Text, images, videos, audio
Input-ID-39	Social/Traditional media data on radicalisation and polarisation	Open-source data	Open-source providers	Depending on data source availability (GPS data or extracted location info at various granularity, e.g. point, region, country)	Depending on the use case	Depending on the use case	Text, images, videos, audio	Depending on AOIs and Use Cases	Text, images, videos, audio
Input-ID-40	Social/Traditional media indicator on resource capture	Open-source data	Open-source providers	Depending on data source availability (GPS	Depending on the use case	Depending on the use case	Text, images, videos, audio	Depending on AOIs and Use Cases	Text, images,

Input dataset ID	Dataset name	Raw input data	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Language(s)	Modality
				data or extracted location info at various granularity, e.g. point, region, country)					videos, audio
Input-ID-41	Social/Traditional media data on public services and infrastructure	Open-source data	Open-source providers	Depending on data source availability (GPS data or extracted location info at various granularity, e.g. point, region, country)	Depending on the use case	Depending on the use case	Text, images, videos, audio	Depending on AOIs and Use Cases	Text, images, videos, audio
Input-ID-42	Social/Traditional media data on state-citizen relations	Open-source data	Open-source providers	Depending on data source availability (GPS data or extracted location info at various granularity, e.g. point, region, country)	Depending on the use case	Depending on the use case	Text, images, videos, audio	Depending on AOIs and Use Cases	Text, images, videos, audio
Input-ID-43	Social/Traditional media data on dispute resolution mechanisms	Open-source data	Open-source providers	Depending on data source availability (GPS data or extracted location info at various	Depending on the use case	Depending on the use case	Text, images, videos, audio	Depending on AOIs and Use Cases	Text, images, videos, audio

Input dataset ID	Dataset name	Raw input data	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Language(s)	Modality
				granularity, e.g. point, region, country)					
Input-ID-44	Social/Traditional media data on social cohesion and trust	Open-source data	Open-source providers	Depending on data source availability (GPS data or extracted location info at various granularity, e.g. point, region, country)	Depending on the use case	Depending on the use case	Text, images, videos, audio	Depending on AOIs and Use Cases	Text, images, videos, audio
Input-ID-45	Social and traditional media related to a flooding event	Open-source data	Open-source providers	Depending on data source availability (GPS data or extracted location info at various granularity, e.g. point, region, country)	Depending on the use case	Depending on the use case	Text, images, videos, audio	Depending on AOIs and Use Cases	Images, videos
Input-ID-80	Social/Traditional media on food security	Open-source data	Open-source providers	Depending on data source availability (GPS data or extracted location info at various granularity, e.g., point, region, country)	Depending on the use case	Depending on the use case	Text, images, videos, audio	Depending on AOIs and Use Cases	Text, images, videos, audio

Input dataset ID	Dataset name	Raw input data	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Language(s)	Modality
Input-ID-81	Social/Traditional media on economic security	Open-source data	Open-source providers	Depending on data source availability (GPS data or extracted location info at various granularity, e.g., point, region, country)	Depending on the use case	Depending on the use case	Text, images, videos, audio	Depending on AOIs and Use Cases	Text, images, videos, audio
Inpupt-ID-82	Social/Traditional media on displaced persons	Open-source data	Open-source providers	Depending on data source availability (GPS data or extracted location info at various granularity, e.g., point, region, country)	Depending on the use case	Depending on the use case	Text, images, videos, audio	Depending on AOIs and Use Cases	Text, images, videos, audio
Input-ID-83	Social/Traditional media on violent conflict	Open-source data	Open-source providers	Depending on data source availability (GPS data or extracted location info at various granularity, e.g., point, region, country)	Depending on the use case	Depending on the use case	Text, images, videos, audio	Depending on AOIs and Use Cases	Text, images, videos, audio
Input-ID-84	Social/Traditional media on humanitarian aid	Open-source data	Open-source providers	Depending on data source availability (GPS	Depending on the use case	Depending on the use case	Text, images, videos, audio	Depending on AOIs and Use Cases	Text, images,

Input dataset ID	Dataset name	Raw input data	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Language(s)	Modality
				data or extracted location info at various granularity, e.g., point, region, country)					videos, audio
Input-ID-85	Social/Traditional media on climate sensitivity of agri-food systems	Open-source data	Open-source providers	Depending on data source availability (GPS data or extracted location info at various granularity, e.g., point, region, country)	Depending on the use case	Depending on the use case	Text, images, videos, audio	Depending on AOIs and Use Cases	Text, images, videos, audio

3.3.2.2 Innovative indicators

Table 26: CENTAUR context of Innovative indicators for social and traditional media

Innovative indicator ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
UF-ID-6	Social/Traditional media indicators for Urban Flooding Map	Social and traditional media emerged during all the days of the extreme event over the AoI; UF-ID-4 output.	Please refer to the related input data as described in the rows above	e-GEOS/HENSOLDT	Global	Depending on the use case	Depending on the use case	GeoTIFF	N/A

3.3.3 Population estimates

3.3.3.1 Input data

Table 27: CENTAUR context of input population estimates

Input dataset ID	Dataset name	Description	CENTAUR Team / Product Owner	CENTAUR Use Case / AOI	Main applications	Tags
Input-ID-46	WSF-Population	Residential population estimates derived from CIESIN GPW4.11 are disaggregated from census or administrative units to grid cells, informed by the distribution, height and functional use of settlements derived from the WSF-datasets.	DLR	All CENTAUR Use Cases (countries), with potential surrounding countries	*Vulnerability and Exposure	Gridded Population distribution estimates
Input-ID-47	GHS-Pop R2023A	Residential population estimates between 1975 and 2020 in 5-year intervals and projections to 2025 and 2030 derived from CIESIN GPWv4.11 were disaggregated from census or administrative units to grid cells, informed by the distribution, volume, and classification of built-up as mapped in the Global Human Settlement Layer (GHSL) global layer per corresponding epoch	DLR/JRC	Global	*Vulnerability and Exposure	Gridded Population distribution estimates
Input-ID-48	Resident Population by Municipality of Turin and Italian National Institute of Statistics (ISTAT)	Resident population distribution by sections. The Municipality of Turin dataset contains the polygons representing the census sections and population distribution. ISTAT data is not georeferenced but only tabular.	ITHACA	Complementary data for Piedmont Use Case	*Vulnerability and Exposure	Census data; Population distribution
Input-ID-49	INSEE census	Statistic information at several geographic levels are made available by INSEE. At communal level, the following themes can be retrieved: - Population in 2020 and evolution since 2014, from RP2020 and RP2014 - Natality and mortality in 2021	CLS	France Use Case	Identifying areas particularly vulnerable to urban floods	assets and financial resources

Input dataset ID	Dataset name	Description	CENTAUR Team / Product Owner	CENTAUR Use Case / AOI	Main applications	Tags
		- Housing in 2020, from RP2020 - Revenus in 2020 - Employment in 2020				

Table 28: Input population estimates dataset specifications

Input dataset ID	Dataset name	Raw input data	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
Input-ID-46	WSF-Population	GPW4.11, WSF layers	Generated by DLR	Local. CENTAUR AoIs 10m	2016-present; yearly	N/A	raster layer (.tif)	2023
Input-ID-47	GHS-Pop R2023A	GPW4.11; GHS-Built-S - Residential vs Non-residential use; GHS-Built-V	Joint Research Center (JRC): https://ghsl.jrc.ec.europa.eu/ghs_pop2023.php	Global (-90° to 90°, 180° to 180°) 100m, 1km, 3 arcsec, 30 arcsec	1975-2020 (5 years intervals) and projections 2025 and 2030	N/A	raster layer (.tif)	Q2 of 2023
Input-ID-48	Resident Population by Municipality of Turin and Italian National Institute of Statistics (ISTAT)	Municipal level demographic statistics.	Municipality of Turin: http://geoportale.comune.torino.it/geocatalogocoto/?sezione=catalogo under Azzonamenti Statistici - Sezioni di censimento ISTAT (Turin & Ceva): http://dati.istat.it/Index.aspx?DataSetCode=DCIS_POPRES1	Municipal level	Dataset dependent	Municipality of Turin dataset is updated every three months. ISTAT: N/A	M. Turin: vector (.shp file) ISTAT data: Tabular (xls)	M. Turin: First release in 2017 and last update in 30.06.2023.
Input-ID-49	INSEE census	Open-source national dataset (RGE)	Database and documentation available here: https://www.insee.fr/fr/statistiques/2521169	France	Latest data available	N/A	Table (.xsl, .csv)	Last publication: 27/06/2023

3.3.4 Socio-economic and political variables

3.3.4.1 Input data

Table 29: CENTAUR context of input data on socio-economic and political variables

Input dataset ID	Dataset name	Description	CENTAUR Team / Product Owner	CENTAUR Use Case / AOI	Main applications	Tags
Input-ID-50	EOG Nighttime Light	Data on global nighttime light, provided by the Visible and Infrared Imaging Suite (VIIRS) Day Night Band (DNB) on board of the Joint Polar-orbiting Satellite System (JPSS).	ADELPHI	All use cases considered in the project: Ebro Basin, German Floods, Piedmont, France, Mali, Mozambique, Somalia, Sudan	*Identifying areas particularly vulnerable to urban floods *Identifying areas with lower economic activity *Identifying areas with poor access to electricity *Identifying areas structurally neglected in terms of infrastructure provision	Economic development Public infrastructure and services
Input-ID-51	FEWS NET	Data on acute food insecurity, based on IPC3.0 and considers first level outcomes (food consumption levels, energy intake, livelihood change), second level outcomes (nutritional status, mortality), and contributing factors (food availability, access, utilisation, stability, hazards, vulnerability). More information: https://www.ipcinfo.org/ipcinfo-website/ipc-overview-and-classification-system/ipc-acute-food-insecurity-classification/en/.	ADELPHI	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Assessing food insecurity	Food security
Input-ID-52	FAO DIEM (Data in Emergencies Monitoring)	DIEM survey data is aggregated at the first administrative level and organized into four thematic areas: (1) Incomes, Shocks	ADELPHI	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Assessing food insecurity *Assessing humanitarian aid *Assessing economic insecurity	Food security Food consumption

Input dataset ID	Dataset name	Description	CENTAUR Team / Product Owner	CENTAUR Use Case / AOI	Main applications	Tags
		and Needs; (2) Crop production; (3) Livestock production; (4) Food Security. Specifically, it includes survey data on: • Income shock, i.e. type/magnitude of income change (agricultural and non-agricultural), shocks that likely affect household capacity to produce food or generate income; • Food insecurity experience scale (FIES), Household Dietary Diversity Score (HDDS) and Livelihood-based Coping Strategies Index (LCSI) scores. • Crop module focuses on difficulties encountered by crop producers and their impacts on production and sales. They may include constrained access to crop inputs and marketing challenges. Production is appraised as relative change in the area planted and harvested (achieved or projected) compared to a recent typical year. • Livestock module focuses on difficulties encountered by livestock breeders and their effects on production and sales. These can include a lack of access to feed and other inputs, or veterinary services, as well as marketing issues. Production is measured as relative change in herd or				Agriculture Livestock aid

Input dataset ID	Dataset name	Description	CENTAUR Team / Product Owner	CENTAUR Use Case / AOI	Main applications	Tags
		flock size compared to the same time in the previous year. • Needs for short- to mid-term assistance in relation to agricultural livelihoods. They also provide information about food security and livelihoods assistance received during the recall period.				
Input-ID-53	Afrobarometer	This sub nationally geocoded dataset covers Rounds 1-6 of Afrobarometer's surveys in 37 African countries between 1999 and 2015. It provides hyperlocal, time-varying information about the priorities, preferences, experiences, and opinions of more than 200,000 African citizens in 28,000 localities. More specifically, it provides village- and town-level data on: (1) the most important problems that citizens would like to see their governments address; (2) the perceived performance of local and national institutions in solving specific problems, such as the provision of basic education and health services; (3) access to information via newspapers, radios, televisions, and mobile phones; (4) levels of civic engagement and political participation; (5) engagement with and confidence in local and central government institutions; (6) the physical presence or absence of state institutions (e.g. police	ADELPHI	All use cases considered in the project: Mali, Mozambique, Sudan, except Somalia	* several, refer to different WFS-IDs	food security public infrastructure and services social relations state-citizen relations political

Input dataset ID	Dataset name	Description	CENTAUR Team / Product Owner	CENTAUR Use Case / AOI	Main applications	Tags
		stations, health clinics, schools, water and sanitation systems); (7) the reported quality of local public services; and (8) local perceptions of and experiences with various forms of corruption.				
Input-ID-54	IOM DTM Flow monitoring	Quantitative estimates of flow of individuals.	ADELPHI	Somalia	*Assessing displacement trends	Displaced persons
Input-ID-55	IOM DTM Mobility tracking	Quantifies the presence of population categories of interest, reasons for displacement, length of displacement and needs within defined geographical areas and locations, with a frequency that captures mobility dynamics.	ADELPHI	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Assessing displacement trends	Displaced persons
Input-ID-56	ACLED	ACLED collects reported information on the type, agents, location, date, and other characteristics of political violence events, demonstration events, and other select non-violent, politically relevant developments in every country and territory in the world. ACLED focuses on tracking a range of violent and non-violent actions by or affecting political agents, including governments, rebels, militias, identity groups, political parties, external forces, rioters, protesters, and civilians. The ACLED Conflict Alert System (CAST) is a new conflict forecasting tool that predicts political violence events up to six months in the future for every country in the world. Updated predictions are released each	ADELPHI/SATCEN	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Assessing conflict risk *Assessing effect of conflict on other indicators	Conflict security

Input dataset ID	Dataset name	Description	CENTAUR Team / Product Owner	CENTAUR Use Case / AOI	Main applications	Tags
		month for the following six months, alongside accuracy metrics for previous forecasts.				
Input-ID-57	DHS (Demographic and Health Surveys)	The DHS Program has collected, analysed, and disseminated accurate and representative data on population, health, HIV, and nutrition through more than 400 surveys in over 90 countries.	ADELPHI	All use cases considered in the project: Mali, Mozambique, Sudan, except Somalia	*Identifying vulnerable areas	Public services and infrastructure
Input-ID-58	Restaurant prices	Raster layer based on interpolated restaurant prices from google maps as proxy for wealth disparities between neighbourhoods.	ADELPHI/SERTIT	France, Mozambique*	*Identifying areas particularly vulnerable to urban floods	Socio-economic vulnerability to urban floods

Table 30 Input data on socio-economic and political variables: dataset specifications

Input dataset ID	Dataset name	Raw input data	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format
Input-ID-50	EOG Nighttime Light	VIIRS DNB (Visible and Infrared Imaging Suite, Day Night Band)	N/A	Global, 500m x 500m	2012-2021	monthly	GeoTIFF
Input-ID-51	FEWS NET	N/A	N/A	Global, admin 1-2	2009-present (including projections up to 4 months)	monthly	shapefiles, Geojson
Input-ID-52	FAO DIEM (Data in Emergencies Monitoring)	N/A	N/A	Global, admin 1	2020/2021-present (Mali, Mozambique, Somalia) 2022-present (Sudan)	3-4 months	xlsx
Input-ID-53	Afrobarometer	N/A	N/A	Africa, admin 1-2	2001-2021 (Mali)	multiple years	sav

Input dataset ID	Dataset name	Raw input data	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format
					2002-2022 (Mozambique) 2003-2022 (Sudan)		
Input-ID-54	IOM DTM Flow monitoring	N/A	N/A	Global, admin-displacement site	2016-2019	monthly	xlsx
Input-ID-55	IOM DTM Mobility tracking	N/A	N/A	Global, admin-displacement site	2014/2015/2016/2017-present (Mali/Mozambique/Somalia/Sudan)	monthly	xlsx
Input-ID-56	ACLED	N/A	N/A	Global, point (admin 1 for ACLED CAST)	1997-present, with projections up to 6 months for ACLED CAST	daily (monthly for ACLED CAST)	TBD
Input-ID-57	DHS (Demographic and Health Surveys)	N/A	N/A	Global, admin 1	1987-2024 (Mali) 1997-2023 (Mozambique) Sudan (1989-1990)	5-10 years (for Mali and Mozambique)	Hierarchical CSPro file, ascii, stata, spss, sas, dbf, mdb
Input-ID-58	Restaurant prices	Google maps	Google	Global, NA	Present situation	daily	GeoTIFF

3.3.4.2 Innovative indicators

Table 31: CENTAUR context of Innovative indicators for socio-economic and political variables

Innovative indicator ID	Dataset name	Description	CENTAUR Team / Product Owner	CENTAUR Use Case / AOI	Main applications	Tags
WFS-ID-8	Populations at risk of food insecurity	Compound-indicator that estimates the total number (proportion or percentage) of people at risk of food insecurity derived from level or status of food security within a given area.	DLR	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Vulnerability assessment and exposure to food insecurity related to climate change	Food (in)security

Innovative indicator ID	Dataset name	Description	CENTAUR Team / Product Owner	CENTAUR Use Case / AOI	Main applications	Tags
WFS-ID-9	Populations at risk of water insecurity	Compound-indicator that measures the potentially available physical water per person, allowing to derive the degree of water (in) sufficiency, and estimate the total number (proportion or percentage) of people at risk of water insecurity.	DLR	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Vulnerability assessment and exposure to water insecurity related to climate change	Water (in)security
WFS-ID-10	Number of people living in conflict-affected areas	Compound-indicator that estimates the total number (proportion or percentage) of people living in (or in the proximity of) conflict-affected areas.	DLR	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Vulnerability assessment and exposure to conflict related to climate change	Conflict
WFS-ID-11	Food security	Scale for level of food security of the population in a given area. Can contain several components (e.g. available/produced food, food prices, ease of access, etc.). Disaggregating by groups (e.g. IDPs, vulnerable groups) would be useful.	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Identifying areas affected by food insecurity	Food security
WFS-ID-12	Economic security	Scale for level of economic and livelihood security of the population in a given area. Can contain several components (e.g. job and other economic opportunities, incomes).	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Identifying areas affected by economic insecurity	economic security
WFS-ID-13	Displaced persons	Estimate of the number of persons displaced, including IDP and refugees in neighbouring countries.	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Assessing number and growth of IDP/refugee population in an area.	displaced persons
WFS-ID-14	Violent conflict	Number/frequency of violent conflict events, including crimes and other illicit activities, that are indicative of maladaptive practices and susceptible to conflict escalation (e.g., cattle theft leading to communal clashes)	ADELPHI/SATCEN/HENSOLDT	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Identifying conflict-prone areas	violent conflict

Innovative indicator ID	Dataset name	Description	CENTAUR Team / Product Owner	CENTAUR Use Case / AOI	Main applications	Tags
		or to provide financial opportunities to armed groups (e.g., drug trade, human trafficking).				
WFS-ID-15	Radicalisation and polarisation	Scale for level of radicalisation, polarisation, and animosity in the population that is conducive to periodic outbursts of violence (e.g. riots, clashes) and/or recruitment into armed groups. If necessary, possibility to distinguish sub-tensions, ideological/religious radicalisation, etc.	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Assessing risk of violent escalation in an area	radicalisation and polarisation
WFS-ID-17	Humanitarian aid	Aid provided by national and international actors (e.g. government, international organisations, NGOs) to cushion the effect of extreme climatic conditions. Relevant for modelling food and economic security.	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Identifying areas vulnerable to food insecurity	humanitarian aid
WFS-ID-18	Resource capture	Appropriation of natural resources essential for food production and/or sustaining agricultural and pastoralist livelihoods by powerful actors (e.g. land grabbing by large companies) or specific groups (e.g. communal groups).	ADELPHI/HENSOLDT/GMV	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Assessing risk of violent escalation in an areas	resource capture
WFS-ID-19	Climate sensitivity of agri-food systems	Degree to which rural livelihoods and food production are sensitive to erratic climatic conditions.	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Identifying areas vulnerable to drought	Climate sensitivity of agri-food systems
WFS-ID-21	Public services and infrastructures	Degree to which the government effectively and inclusively delivers services that are essential for withstanding extreme climatic conditions.	ADELPHI/HENSOLDT/GMV	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Identifying vulnerable areas *Identifying conflict-prone areas *Assessing spatial differences in the	Public services and infrastructures

Innovative indicator ID	Dataset name	Description	CENTAUR Team / Product Owner	CENTAUR Use Case / AOI	Main applications	Tags
					distribution of services *Identifying marginalised areas	
WFS-ID-23	State-citizen relations	Degree to which citizens trust public officials and feel included in political decision making. High levels of trust and inclusion are expected to motivate people to seek non-violent means of addressing concerns and grievances.	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Identifying conflict-prone areas	State-citizen relations
WFS-ID-24	Dispute resolution mechanisms	Presence of trusted formal and informal mechanisms (e.g. legal recourse, inter-and intra-community dialogue) to address disputes, for e.g. over access to and usage of resources.	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Identifying conflict-prone areas	Dispute resolution mechanisms
WFS-ID-25	Social cohesion and trust	Degree to which people feel connected and eager to stick together in the face of major challenges. (Perceived) social inequality might be a sub-component or a separate indicator.	ADELPHI/HENSOLDT	All use cases considered in the project: Mali, Mozambique, Somalia, Sudan	*Identifying vulnerable areas *Identifying conflict-prone areas	Social cohesion and trust
UF-ID-9	Assets and financial resources	This group includes indicators of household wealth/poverty (which can be proxied by population density, as well-off neighbourhoods tend to be less dense in terms of population and built structure, although this assumption may not apply in all regions/contexts), house ownership, housing prices, job opportunities/unemployment, and access to insurance, credit, and community safety nets.	ADELPHI/SERTIT/CLS/TRACASA/HENSOLDT	France, Mozambique, Spain* (for validation)	*Identifying areas particularly vulnerable to urban floods	Assets and financial resources
UF-ID-10	Public services and government support	This group includes indicators of access to basic health and other emergency response services, as well as the general capacity and predisposition of responsible actors	ADELPHI/SERTIT/CLS/TRACASA/HENSOLDT	France, Mozambique, Spain* (for validation)	*Identifying areas particularly vulnerable to urban floods	Public services and government support

Innovative indicator ID	Dataset name	Description	CENTAUR Team / Product Owner	CENTAUR Use Case / AOI	Main applications	Tags
		to protect people against the detrimental effects of floods.				
UF-ID-13	Ability to evacuate	This group includes indicators that measure people's abilities to move out of harm's way, in terms of available infrastructure, physical conditions, and social context (e.g. presence of vulnerable and dependent groups such as children, elderly, and disabled persons, population density, access to highways, higher land).	ADELPHI/SERTIT/CLS/TRACASA/HENSOLDT	France, Mozambique, Spain* (for validation)	*Identifying areas particularly vulnerable to urban floods	Ability to evacuate
UF-ID-14	Economic impact of floods	Estimate of economic impact of flooding based on an interpolation of building layers (i.e. residential, non-residential) and road layers with flood depth. Estimate based on (parts of) UF-ID-3 and UF-ID-5 respectively for pre- and post-event impact assessment. Vector layer with damage classes, for each building footprint and road layer.	ADELPHI/e-GEOS/HENSOLDT	All use cases considered in the project: Ebro Basin, German Floods, Piedmont, France, Mozambique	*Assessing economic impact of urban floods	Flood damages

Table 32 Innovative indicators for socio-economic and political variables: dataset specifications

Innovative Indicator ID	Dataset name	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
WFS-ID-8	Populations at risk of food insecurity	Gridded Population data: WSF and GHSL Food security indicator WFS-ID-11	Admin level	2018-present	Depends on the update frequency of input data WFS-ID-9	Shapefile (polygon)	TBD depending on forthcoming publication where data are described in further detail

Innovative Indicator ID	Dataset name	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
WFS-ID-9	Populations at risk of water insecurity	Gridded population data: WSF and GHSL. ERA5-Land monthly average run-off dataset pre-processed for the calculation of m3day-1	AOI defined by used with country extent. Raster resolution dependent on ERA5-Land data	2016-present	Annual or monthly. Following the update frequency of ERA5-Land Data	Raster, Shapefile and tabular	TBD depending on forthcoming publication where data are described in further detail
WFS-ID-10	Number of people living in conflict-affected areas	Gridded population data: WSF and GHSL. Data on crime and illicit activities from indicator WSF-ID-14	Admin Level	2018-present	Monthly. Following the update frequency of indicator WSF-ID-14	Shapefile or tabular	TBD depending on forthcoming publication where data are described in further detail
WFS-ID-11	Food security	Afrobarometer. FAO DIEM (Data in Emergencies Monitoring). FEWS NET. Social/Traditional media on food security.	Admin level	2018-present	according to update frequency of input data	Shapefile (polygon)	TBD depending on forthcoming publication where data are described in further detail
WFS-ID-12	Economic security	Afrobarometer. FAO DIEM (Data in Emergencies Monitoring). Livestock heat stress. Social/Traditional media on economic security.	Admin level	2018-present	according to update frequency of input data	Shapefile (polygon)	TBD depending on forthcoming publication where data are described in further detail
WFS-ID-13	Displaced persons	Social/Traditional media on displaced persons.	Admin level	2018-present	Monthly	Shapefile (polygon)	TBD depending on forthcoming publication where

Innovative Indicator ID	Dataset name	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
							data are described in further details
WFS-ID-14	Violent conflict	ACLED Social/Traditional media on food security. Social/Traditional media on violent conflict.	Admin level	2018-present	Daily/Monthly	Shapefile (polygon)	TBD depending on forthcoming publication where data are described in further details
WFS-ID-15	Radicalisation and polarisation	Social/Traditional media data on radicalisation and polarisation.	Admin level	2018-present	Ideally monthly	Shapefile (polygon)	TBD depending on forthcoming publication where data are described in further details
WFS-ID-17	Humanitarian aid	FAO DIEM (Data in Emergencies Monitoring). Social/Traditional media on humanitarian aid.	Admin level	2018-present	3-4 months period	Shapefile (polygon)	TBD depending on forthcoming publication where data are described in further details
WFS-ID-18	Resource capture	Rangeland land cover change. Social/Traditional media indicator on resource capture.	admin level	2018-present	Ideally monthly	Shapefile (polygon)	TBD depending on forthcoming publication where data are described in further details
WFS-ID-19	Climate sensitivity of agri-food systems	FAO Wapor: Land Cover Classification 2021 Social/Traditional media on sensitivity of agri-food systems.	admin level	2018-present	Yearly	Shapefile (polygon)	TBD depending on forthcoming publication where data are described in further details

Innovative Indicator ID	Dataset name	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
WFS-ID-21	Public services and infrastructures	Afrobarometer. DHS (Demographic and Health Surveys). EOG Nighttime Light. Main roads. HOTOSM roads (backup). Social/Traditional media data on public services and infrastructure	admin level	2018-present	Yearly	Shapefile (polygon)	TBD depending on forthcoming publication where data are described in further details
WFS-ID-23	State-citizen relations	Afrobarometer. Social/Traditional. media data on state-citizen relations.	admin level	2018-present	Ideally monthly	Shapefile (polygon)	TBD depending on forthcoming publication where data are described in further details
WFS-ID-24	Dispute resolution mechanisms	Afrobarometer Social/Traditional media data on dispute resolution mechanisms	admin level	2018-present	Ideally monthly	Shapefile (polygon)	TBD depending on forthcoming publication where data are described in further details
WFS-ID-25	Social cohesion and trust	Afrobarometer. DHS (Demographic and Health Surveys). Social/Traditional media data on social cohesion and trust.	admin level	2018-present	Ideally monthly	Shapefile (polygon)	TBD depending on forthcoming publication where data are described in further details
UF-ID-9	Assets and financial resources	Population; Building volume. Imperviousness.	AoI, 10-100m	Depends on use cases; ideally data	Depends on use cases	GeoTIFF	TBD depending on forthcoming

Innovative Indicator ID	Dataset name	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
		Travel time and access to infrastructure and services. Restaurant prices		that is close to reference period and test/observation period			publication where data are described in further details
UF-ID-14	Economic impact of floods	UF-ID-3 (EG) UF-ID-5 (EG) Social/Traditional media data on economic impacts of floods	AoI, N/A	Event based	Depends on use cases	Vector layer	TBD depending on forthcoming publication where data are described in further details
UF-ID-13	Ability to evacuate	Travel time and access to infrastructure and services Social/Traditional media indicator on ability to evacuate	AoI, 10-100m	Depends on use cases; ideally data that is close to reference period and test/observation period	Depends on use cases	GeoTIFF	TBD depending on forthcoming publication where data are described in further details
UF-ID-10	Public services and government support	Travel time and access to infrastructure and services	AoI, 10-100m	Depends on use cases; ideally data that is close to reference period and test/observation period	Depends on use cases	GeoTIFF	TBD depending on forthcoming publication where data are described in further details

3.4 METEOROLOGICAL DATA AND MODELLING

3.4.1 Overview

This section provides details for all input and output data from the meteorological data domain as used in CENTAUR. Most datasets refer to precipitation and temperature, which are key drivers of natural disasters, such as floods and meteorological droughts; with the latter often triggering agricultural drought and water and food insecurity.

In regions with sparse observational networks, and where observational products remain highly uncertain, atmospheric reanalyses are used. Through data assimilation, a reanalysis is a blend of numerical weather prediction models, observations and its outcome present the best, observation-based and physically consistent state of the atmosphere. Reanalyses provide an alternative source of observation-based data, as they are often produced globally and consistent in time. Here, the state-of-the-art reanalysis ERA5 from ECMWF is used where observations are scarce. In addition, high-resolution forecasts from ECMWF are used to predict to precipitation extremes in both the urban flood and drought contexts. Both, re-analysis and forecasts are used for applications, such as monitoring and predicting meteorological and agricultural droughts.

This section is structured as follows:

- High-resolution precipitation for flood detection over urban areas
  - Input data: 4 datasets
  - Innovative indicators: 2 datasets
- Weather-related indices for water- and food security
  - Input data: 4 datasets
  - Innovative indicators: 3 datasets

3.4.2 High-resolution precipitation for flood detection over urban areas

3.4.2.1 Input data

Table 33: CENTAUR context for Input High-resolution precipitation for flood detection over urban areas dataset

Input dataset ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
Input-ID-59	European Meteorological Observations (EMO)	EMO (European Meteorological Observations) is a European high-resolution, (sub-)daily, multi-variable gridded meteorological data set built on historical and real-time observations. EMO is a Copernicus Emergency Management Service product and includes at daily resolution: total precipitation, temperatures (minimum and maximum), wind speed, solar radiation and water vapour pressure. In addition, EMO also makes available 6-hourly precipitation and mean temperature. The raw observations from the ground weather stations underwent a set of quality controls, before SPHEREMAP and Yamamoto interpolation methods were applied in order to estimate for each grid cell the variable value and its affiliated uncertainty, respectively. EMO-1 provides grids with a spatial resolution of 1arcmin x 1arcmin (approx. 1.5km) and covers the time period from 1990-2022.	ECMWF/e-GEOS	Europe	Inundation maps connected to return periods for a more efficient workflow	Meteorological data
Input-ID-60	Global Precipitation Measurement (GPM) constellation data referred to the period of interest	The GPM (Global Precipitation Measurement) Mission is an international US/Japanese multi-satellite constellation with the prime agencies being NASA (National Aeronautics and Space Administration) and JAXA (Japanese Aerospace Exploration Agency). The constellation's primary spacecraft, GPM Core Observatory (built by NASA) joining a collaboration of 12 GPM satellites, aiming to study global precipitation, evaporation, and the water cycle.	e-GEOS	All the use cases considered in the project: Ebro Basin, German Floods, Piedmont, Mozambique and France	The Global Precipitation Measurement (GPM) mission is an international network of satellites that provides next-generation global observations of rain and snow.	Precipitation and snow data

Input dataset ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
Input-ID-61	E-OBS daily gridded meteorological data for Europe	E-OBS is a daily gridded land-only observational dataset over Europe. The blended time series from the station network of the European Climate Assessment & Dataset (ECA&D) project form the basis for the E-OBS gridded dataset. All station data are sourced directly from the European National Meteorological and Hydrological Services (NMHSs) or other data holding institutions. For a considerable number of countries, the number of stations used is the complete national network and therefore much denser than the station network that is routinely shared among NMHSs (which is the basis of other gridded datasets). The density of stations gradually increases through collaborations with NMHSs within European research contracts.	ECMWF	Europe	Urban Floods	Meteorological data, precipitation data
Input-ID-77	Rainfall data for Zaragoza	Meteorological daily precipitation data over Zaragoza	TRACASA	Spain	Urban Floods	Meteorological data, precipitation data

Table 34: Input High-resolution precipitation for flood detection over urban areas dataset specifications

Input dataset ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication	Version
Input-ID-59	European Meteorological Observations (EMO)	Ground weather stations	N/A	Observations from the ground weather stations. https://jeodpp.jrc.ec.europa.eu/ftp/jrc-opendata/CEMS-EFAS/meteorological_forcings/EMO-1arcmin/	Europe (22.75° to 72.24°, -25.24° to 50.24°) 1.5 km	1990-2022	Yearly	GeoTIFF	EMO-1 from 1990 to 2022; EMO-5 from 1990 to 2019	EMO-1 from 1990 to 2022; EMO-5 from 1990 to 2019
Input-ID-60	Global Precipitation Measurement (GPM) constellation data referred to the period of interest	GPM Constellations of Satellites of NASA e JAXA Mission Agencies	The GPM Core Observatory carries the first space-borne Ku/Ka-band Dual-frequency Precipitation Radar (DPR) and a multi-channel GPM Microwave Imager (GMI) and provides three-dimensional measurements of precipitation structure and characteristics.	Historical and real-time observations https://giovanni.gsfc.nasa.gov/giovanni/	Global (-90° to 90°, -180° to 180°) 0.1° x 0.1°	2014-present	Daily	ASCII (txt), raster layer (.tif), NetCDF	launched in February 2014	N/A

Input dataset ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication	Version
Input-ID-61	E-OBS daily gridded meteorological data for Europe	Ground weather stations	A mix of sensors is used to measure precipitation and temperature at more than 23000 ground weather stations in Europe; for details the reader is referred to the technical description of E-OBS and the references therein.	https://surfobs.climate.copernicus.eu/dataaccess/access_eobs.php#datafiles https://cds.climate.copernicus.eu/cdsapp#!/dataset/10.24381/cds.151d3ec6?tab=overview	Europe (25.0° to 71.5°, -25° to 45°) 0.1° x 0.1° and 0.25° x 0.25°	January 1950 to present	New versions added every 6 months	NetCDF-4	October 2022 (26.0e) and April 2023 (27.0e)	26.0e and 27.0e, new versions released regularly
Input-ID-77	Rainfall data for Zaragoza	Ground weather stations	Various	Nation Meteorology Agency (Agencia Estatal de Meteorología, AEMET)	Spain	Depends on the station		Tabular	N/A	N/A

3.4.2.2 Innovative indicators

Table 35: CENTAUR context for innovative indicators for High-resolution precipitation for flood detection over urban areas dataset

Innovative Indicator ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case/AOI	Main applications	Tags
UF-ID-1	Static map of precipitation associated to return period	Maps of expected precipitation associated to return period. The calculation will be generated using different dataset of observed precipitation as available to convert return period into precipitation	ECMWF	Global	Urban Floods	Urban Floods
UF-ID-2	Forecast of return period	Forecast of return period provided 48 hours before event	ECMWF	Global	Urban Floods	Urban Floods

Table 36: Innovative indicators for High-resolution precipitation for flood detection over urban areas dataset specifications

Innovative Indicator ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Publication
UF-ID-1	Static map of precipitation associated to return period	EMO-1 and E-OBS data set	N/A	EMO-1 and E-OBS Generated by ECMWF	Global (-90° to 90°, -180° to 180°) 10/1km	1950 – present (E-OBS)	Static	Grib / NetCDF	N/A
UF-ID-2	Forecast of return period	Atmospheric predictors	N/A	ECMWF forecasts of wind, precipitation, CAPE, CIN, pressure, temperature, potential vorticity, geopotential, specific humidity, total column water vapour, total column rainwater, cloud cover. Generated by ECMWF	Global (-90° to 90°, -180° to 180°) 10/1km	present – 48 hours	Daily	Grib / NetCDF	N/A

3.4.3 Weather-related indices for water- and food security

3.4.3.1 Input data

Table 37: CENTAUR context of Weather-related indices for water- and food security

Input dataset ID	Dataset name	Description	CENTAUR Team/Product Owner	CENTAUR Use Case / AOI	Main applications	Tags
Input-ID-62	ERA5 air temperature	Air temperature at 2m above the ground surface from ERA5 reanalysis data.	ECMWF/VITO/UNISTRA	All WFS use case countries	Meteorological drought; agricultural drought	Temperature
Input-ID-63	ERA5 precipitation	Daily aggregated precipitation from ERA5.	ECMWF/VITO	All WFS use case countries	Meteorological drought; agricultural drought	Precipitation
Input-ID-64	ERA5-Land runoff	ERA5-Land monthly averaged total runoff data.	ECMWF/VITO	All WFS use case countries	Total physical freshwater availability	Runoff
Input-ID-65	ECMWF forecasts	Forecasts of atmospheric variables from ECMWF forecast products	ECMWF	All WFS use case countries	Meteorological drought; agricultural drought	TemperaturePrecipitationEvaporation, Radiation

Table 38: Weather-related indices for water- and food security: specifications

Input dataset ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Published (date)	Version
Input-ID-62	ERA5 air temperature	ECMWF ERA5	N/A	Atmospheric modelling combined with weather station data. https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-single-levels?tab=overview	Global (-90° to 90°, -180° to 180°) 25km	January 1940 - present	Daily	NetCDF	6/14/2018	6/14/2023
Input-ID-63	ERA5 precipitation	ECMWF ERA5	N/A	Atmospheric modelling combined with weather station data. https://cds.climate.copernicus.eu/cdsapp#!/dataset/sis-agrometeorological-indicators?tab=overview	Global (-90° to 90°, -180° to 180°)	1979 - present	Daily	NetCDF	30/01/2020	30/01/2020

Input dataset ID	Dataset name	Raw input data	Sensor	Data-source & Provider	Spatial coverage and resolution	Temporal extent	Update frequency	Format	Published (date)	Version
					10 km					
Input-ID-64	ERA5-Land runoff	ECMWF ERA5	N/A	Atmospheric modelling combined with weather station data. https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-land-monthly-means?tab=overview	Global (-90° to 90°, -180° to 180°) 10 km	1950 - present	Monthly	NetCDF	12/07/2019	12/07/2019
Input-ID-65	ECMWF forecasts	ECMWF	N/A	Atmospheric modelling products produced by ECMWF https://www.ecmwf.int/en/forecasts	Global (-90° to 90°, -180° to 180°) variable spatial resolution, from 9 km to 36 km	1950–present	Daily	Grib/ NetCDF	27/06/2023	27/06/2023

3.4.3.2 Innovative indicators

Table 39: CENTAUR context of Weather-related Innovative indicators for water- and food security

Innovative Indicator ID	Dataset name	Description	CENTAUR Team / Product Owner	CENTAUR Use Case / AOI	Main applications	Tags
WFS-ID-1	**Meteorological drought (monitoring product)**	Indicator to monitor current meteorological drought conditions expressed as precipitation deficits	ECMWF	Global	Meteorological drought	Meteorological drought
WFS-ID-2	**Meteorological drought (forecast)**	Indicator to forecast meteorological drought conditions expressed as precipitation deficits	ECMWF	Global	Meteorological drought	Meteorological drought
WFS-ID-3	**Meteorological drought (danger levels)**	Indicator that evaluates the meteorological drought forecast in relation to the monitoring status to derive	ECMWF	Global	Meteorological drought	Meteorological drought

Innovative Indicator ID	Dataset name	Description	CENTAUR Team / Product Owner	CENTAUR Use Case / AOI	Main applications	Tags
		simplified and able warning levels; indicator evaluates the intensification of drought events.				

Table 40: Weather-related Innovative indicators for water- and food security specifications

Innovative indicator ID	Dataset name	Raw input data	Data-source & Provider	Spatial coverage	Spatial resolution	Temporal extent	Update frequency	Format
WFS-ID-1	Meteorological drought (monitoring product)	Precipitation from ECMWF reanalysis (ERA5) and/or from a gridded observational product (GPCC)	ECMWF reanalysis ERA5 Generated by ECMWF	Global (-90° to 90°, -180° to 180°)	~25 km (0.25°)	1940 – present	Weekly / Monthly	Grib / NetCDF
WFS-ID-2	Meteorological drought (forecast)	Precipitation from three ECMWF forecasts: ensemble forecast (ENS), extended-range ensemble forecast (ENS–ER) and seasonal forecasts (SEA)	ECMWF forecasts: ensemble forecast (ENS), extended-range ensemble forecast (ENS–ER) and seasonal forecasts (SEA) Generated by ECMWF	Global (-90° to 90°, -180° to 180°)	variable (9 km (ENS), 36 km (ENS–ER), 35 km (SEA)); maybe interpolated to communal resolution)	present – 6 months ahead	Weekly / Monthly	Grib / NetCDF
WFS-ID-3	Meteorological drought (danger levels)	WFS-ID-1 WFS-ID-2	Generated by ECMWF	Global (-90° to 90°, -180° to 180°)	variable; maybe interpolated to communal resolution	present – 6 months ahead	Weekly / Monthly	Grib / NetCDF

4 DATA COPYRIGHT AND LICENSES

Table 41: List of copyright and license of each input data

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Input-ID-01	**Flood footprint (from satellite data for past event with the same return period)**	Any user may only use the Copernicus Trademarks to make reference to Copernicus in the course of its commercial or non-commercial activities related to Copernicus	The Users shall submit to the European Commission the Registration Form made available by clicking on the 'I accept' box appearing at the end of this licence. The Registration Form requests information from the User to allow the use of the Copernicus Trademarks, to gather and archive information on use and market definition. The Registration Form constitutes an integral part of the present Licence.
		Regarding the flood footprint and water level data accessible on the Regional Agency for the Protection of the Environment (ARPA Piemonte), the data source should be attributed, and the use of the data (together with any modified versions) should be communicated to the data provider. http://www.arpa.piemonte.it/note-legali	Licence associated to the dataset: Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0)l (https://creativecommons.org/licenses/by-nc-sa/4.0/it/legalcode)
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Input data ID	Dataset name	Copyright	License
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Input-ID-03a/03b	**Hydrography**	Regarding the BDTRE Hydrography, the Piedmont Region does not impose any limitation to public access. Regarding the Municipality of Turin dataset, the data source should be attributed, and the use of the data (together with any modified versions) should be communicated to the data provider. http://geoportale.comune.torino.it/web/cartografia/licenze-duso	Licence associated to the BDTRE dataset: Creative Commons (CC BY 4.0) https://creativecommons.org/licenses/by/4.0/deed.itc Licence associated to the Turin Municipality dataset: Creative Commons Public Licence Attribution 4.0 - Italy https://creativecommons.org/licenses/by/4.0/legalcode.it
Input-ID-04	BD TOPO® v3.3 – (French territory and infrastructures)	IGN France	Etalab Open Licence 2.0 See details available at: https://www.data.gouv.fr/fr/datasets/referentiel-a-grande-echelle-rge/#/information
Input-ID-05	VHR_IMAGE_2021	Copernicus / ESA	Access to the data depending on registered users' category. As Non-Space EU-funded project, CENTAUR is entitled to view, discovery and download rights. See details available at: https://spacedata.copernicus.eu/optical-vhr-coverage-over-europe-vhr_image_2021-

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Input-ID-16	Livestock heat stress	©GMV	©GMV
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Input-ID-18	VHR DTM (Piedmont)	For the AOI in Turin Centre in the proximity of River Po in Piedmont Use Case: Polytechnic University of Turin holds the proprietary rights to the LIDAR data and very high-resolution aerial data acquired with photogrammetric cameras over Turin. The entire data package (both raw, in metadata, and in further elaborated formats) cannot be shared with the partners involved without designated consent from Polytechnic University of Turin and ITHACA. The complementary data (LiDAR and DTM) for this analysis were provided by Italian Ministry of Environment and Energy Security to ITHACA under the license 'Attribuzione - Condividi allo stesso modo 3.0 Italia (CC BY-SA 3.0 IT)'. Additional DTM data provided by Po Basin Authority (Autorità di Bacino Distrettuale del Fiume Po) is freely accessible. https://www.adbpo.it/note-legali/ The high precision elevation points were provided by Piedmont Region under BDTRE - Punto quotato dataset with no limitations to public access. For the AOI Ceva Centre the data is to be acquired ad-hoc for the scope of CENTAUR project. The copyrights shall be discussed at a later stage.	As per the Copyrights column, no open access to the input data.

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Input-ID-30	**Main roads**	©GMV	©GMV
Input-ID-31	BD TOPO® v3.3 - (French settlement data)	IGN France	Etalab Open Licence 2.0 See details available at: https://www.data.gouv.fr/fr/datasets/referentiel-a-grande-echelle-rge/#/information

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Input data ID	Dataset name	Copyright	License
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Input-ID-40	Social/Traditional media indicator on resource capture	Copyrights and licences to be discussed further with ADE/HEN as input dataset is developed.	Copyrights and licences to be discussed further with ADE/HEN as input dataset is developed.
Input-ID-41	Social/Traditional media data on public services and infrastructure	Copyrights and licences to be discussed further with ADE/HEN as input dataset is developed.	Copyrights and licences to be discussed further with ADE/HEN as input dataset is developed.
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Input-ID-45	Social and traditional media related to a flooding event	Copyrights and licences to be discussed further with ADE/HEN as input dataset is developed.	Copyrights and licences to be discussed further with ADE/HEN as input dataset is developed.
Input-ID-46	WSF-Population	DLR © 2023	Not open for public release: Only available for the purposes of the CENTAUR project.

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Input-ID-49	INSEE census	INSEE	Etalab Open Licence 2.0 See details available at: https://www.data.gouv.fr/fr/datasets/bases-de-donnees-et-fichiers-details-du-recensement-de-la-population/#/resources
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Input-ID-58	**Restaurant prices**	©Google	See licence information available at: https://cloud.google.com/maps-platform/terms
Input-ID-59	**European Meteorological Observations (EMO)**	Creative Commons Attribution 4.0 International for EMO-1, European Commission Reuse and Copyright Notice for EMO-5	Anybody can directly and anonymously access the data, without being required to register or authenticate.
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Input-ID-61	E-OBS daily gridded meteorological data for Europe	ECA&D	The ECA&D data policy applies. These observational data are strictly for use in non-commercial research and non-commercial education projects only. Scientific results based on these data must be submitted for publication in the open literature without any delay linked to commercial objectives.

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Input-ID-63	ERA5 precipitation	ECMWF/Copernicus	See license information available at: https://cds.climate.copernicus.eu/cdsapp#!/dataset/sis-agrometeorological-indicators?tab=overview
Input-ID-64	ERA5-Land runoff	ECMWF/Copernicus	See license information available at: https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-land-monthly-means?tab=overview
Input-ID-65	ECMWF forecasts	ECMWF	ECMWF data license
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Input-ID-72	MDT02 - PNOA 2a cobertura	© CNIG/IGN	"Can be downloaded free of charge, as long as these the files are accessible and reusable as established in Order FOM/2807/2015, of December 18 (BOE of December 26, 2015), https://centrodedescargas.cnig.es/CentroDescargas/index.jsp#"
Input-ID-73	LiDAR - PNOA 2a cobertura	© CNIG/IGN	"Can be downloaded free of charge, as long as these the files are accessible and reusable as established in Order FOM/2807/2015, of December 18 (BOE of December 26, 2015), https://centrodedescargas.cnig.es/CentroDescargas/index.jsp#"
Input-ID-74	CHE Flood mask	©CHE	The Ebro Hydrographic Confederation thanks all users of our coverage, please cite the source of the graphic information in your work.
Input-ID-75	SNCZI Flood Risk mask T10, T100, T500	© Ministry for Ecological Transition	This information can be used freely and free of charge as long as the Ministry for the Ecological Transition and the Demographic Challenge is mentioned as the author and owner of the information as follows: Source: Ministry for the Ecological
Input-ID-76	SNCZI Flood Hazard mask T10, T50, T100, T500	©Ministry for Ecological Transition	This information can be used freely and free of charge as long as the Ministry for the Ecological Transition and the Demographic Challenge is mentioned as the author and owner of the information as follows: Source: Ministry for the Ecological

Input data ID	Dataset name	Copyright	License
Input-ID-77	Rainfall data for Zaragoza	©AEMET	Creative commons
Input-ID-78	Event water gauges for Ebro Basin for de analysed event.	©SAIH EBRO	"The Ebro Hydrographic Confederation thanks all users of our coverage, please cite the source of the graphic information in your work."
Input-ID-79	UNHCR CCCM	UNHCR reserves all copyrights on material on its web pages, including photographs, video or audio materials and graphic designs, unless otherwise stated.	Free to: - Share: copy and redistribute the material in any medium or format. - Adapt remix, transform, and build upon the material for any purpose, even commercially. https://creativecommons.org/licenses/by/3.0/igo/legalcode
Input-ID-80	Social/Traditional media on food security	Copyrights and licences to be discussed further with ADE/HEN as input dataset is developed.	Copyrights and licences to be discussed further with ADE/HEN as input dataset is developed.
Input-ID-81	Social/Traditional media on economic security	Copyrights and licences to be discussed further with ADE/HEN as input dataset is developed.	Copyrights and licences to be discussed further with ADE/HEN as input dataset is developed.
Input-ID-82	Social/Traditional media on displaced persons	Copyrights and licences to be discussed further with ADE/HEN as input dataset is developed.	Copyrights and licences to be discussed further with ADE/HEN as input dataset is developed.
Input-ID-83	Social/Traditional media on violent conflict	Copyrights and licences to be discussed further with ADE/HEN as input dataset is developed.	Copyrights and licences to be discussed further with ADE/HEN as input dataset is developed.
Input-ID-84	Social/Traditional media on humanitarian aid	Copyrights and licences to be discussed further with ADE/HEN as input dataset is developed.	Copyrights and licences to be discussed further with ADE/HEN as input dataset is developed.
Input-ID-85	Social/Traditional media on climate sensitivity of agri-food systems	Copyrights and licences to be discussed further with ADE/HEN as input dataset is developed.	Copyrights and licences to be discussed further with ADE/HEN as input dataset is developed.

Table 42: List of copyright and license of each innovative indicator – Urban flood and related socio-economic

Indicator ID	Dataset name	Copyright	License
UF-ID-1	Static map of precipitation associated to return period	ECMWF / Copernicus	Copernicus license
UF-ID-2	Forecast of return period	ECMWF	ECMWF data license

Indicator ID	Dataset name	Copyright	License
UF-ID-3	High-Resolution urban flood risk maps for various return periods	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator
UF-ID-4	Inferred InSAR urban flood extent	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator
UF-ID-5	Enhanced Urban Flood Damage Assessment	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator
UF-ID-6	Social/Traditional media indicators for Urban Flooding Map	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator
UF-ID-7	**Hazard web sources indicator**	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator
UF-ID-9	Assets and financial resources	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator
UF-ID-10	Public services and government support	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator
UF-ID-13	Ability to evacuate	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator
UF-ID-14	Economic impact of floods	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator

Table 43: List of copyright and license of each innovative indicator – Water & Food security and related socio-economic

Indicator ID	Dataset name	Copyright	License
WFS-ID-1	Meteorological drought (monitoring product)	ECMWF/Copernicus	Copernicus license
WFS-ID-2	Meteorological drought (forecast)	ECMWF/Copernicus	Copernicus license
WFS-ID-3	Meteorological drought (danger levels)	ECMWF/Copernicus	Copernicus license
Intermediate input for WFS-ID-4 and 5	NDMI	USGS	Under this policy, users are granted the right to use, reproduce, distribute, and modify the MODIS data, if they acknowledge the data source and comply with certain conditions. These conditions include properly citing the data, not implying endorsement by NASA, and not redistributing the data to third parties without ensuring they also comply with the Data Use Policy.
Intermediate input for WFS-ID-4 and 5	Phenology	UNISTRA/VITO	https://creativecommons.org/licenses/by/4.0/deed.en
Intermediate input for WFS-ID-4 and 5	Thermal drought stress	VITO	https://creativecommons.org/licenses/by/4.0/deed.en
Intermediate input for WFS-ID-4 and 5	Drought severity	VITO	https://creativecommons.org/licenses/by/4.0/deed.en
WFS-ID-4	Agricultural drought monitoring (near real-time)	VITO/UNISTRA	https://creativecommons.org/licenses/by/4.0/deed.en
WFS-ID-5	Agricultural drought forecast	VITO/UNISTRA	https://creativecommons.org/licenses/by/4.0/deed.en
WFS-ID-6	Agricultural drought risk zone map	VITO/UNISTRA	https://creativecommons.org/licenses/by/4.0/deed.en
WFS-ID-7	IDP Camps status indicator	e-GEOS	Licence to be determined based on progress in integrating input datasets and developing the innovative indicator.
WFS-ID-8	Populations at risk of food insecurity	DLR © 2023	Licence to be determined based on progress in integrating input datasets and developing the innovative indicator.
WFS-ID-9	Populations at risk of water insecurity	DLR © 2023	Licence to be determined based on progress in integrating input datasets and developing the innovative indicator.

Indicator ID	Dataset name	Copyright	License
WFS-ID-10	Number of people living in conflict-affected areas	DLR © 2023	Licence to be determined based on progress in integrating input datasets and developing the innovative indicator.
WFS-ID-11	Food security	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.
WFS-ID-12	Economic security	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.
WFS-ID-13	Displaced persons	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.
WFS-ID-14	Violent conflict	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.
WFS-ID-15	Radicalisation and polarisation	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.
WFS-ID-17	Humanitarian aid	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.
WFS-ID-18	Resource capture	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.
WFS-ID-19	Climate sensitivity of agri-food systems	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.

Indicator ID	Dataset name	Copyright	License
WFS-ID-21	Public services and infrastructures (output data)	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.
WFS-ID-23	State-citizen relations (output data)	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.
WFS-ID-24	Dispute resolution mechanisms (output data)	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.
WFS-ID-25	Social cohesion and trust (output data)	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.	Copyrights and licences to be determined based on progress in integrating input datasets and developing the innovative indicator.

5 DATA HARVESTING

The input data required for the generation of various indicators has been identified, downloaded, and organized into specific folders on the project's FTP. The input data, which varies in nature, has been categorized as follows:

1. Hot cases

2. Cold cases

Within each of these folders, subfolders have been created to identify the nature of the two themes of interest: urban flood and water & food security.

For the Urban Flood theme, the areas of interest for both cold and hot cases are specified as follows:

* Spain

* Italy

* Germany

* France

* Mozambique

For each of these folders, the relevant information necessary as input for generating the indicators is provided. Specifically, the following categories are included:

1. AOI (Area of Interest): Shapefiles or KMZ files representing the selected case study areas for generating the indicators.

2. Crisis ancillary: Layers essential as input for algorithms producing various indicators, including DTM (Digital Terrain Model), weather data, hydraulic data, damage assessment data, and flood masks.

3. Crisis imagery: Images utilized for generating indices based on entirely EO (Earth Observation) data. An example of this is ID-4, which is based on InSAR technology and satellite data analysis related to the extreme event of interest.

4. Reference ancillary: Information related to orthophoto images, aerial surveys, vector layers of buildings, transportation, hydrography, land use, population distribution, and hydraulic risk. This information will be utilized in both the generation and validation phases of the various indicators.

5. Reference imagery: Images that will serve as reference points for indicator generation and especially for the validation phase. These images will be used as a baseline to observe changes caused by the extreme flood event of interest and to validate the outputs of the various generated indicators.

For the Water and Food Security theme, both for cold and hot cases the ftp data storage is organized as follows:

* /FEWSNET_Admin_boundaries contains global admin-1 and admin-2 level administrative boundaries in shapefile format. They will be require for WFS result aggregation both for hot and cold cases.
* Each cold case country of interest has a dedicated subfolder:
  o /WG6_Mozambique
  o /WG7_Mali
  o /WG8_Somalia
  o Each AOI subfolder is organized as follows:
    ▪ /AOI contains a geojson file with admin level-0 boundaries of the cold case country
    ▪ /example_input_id each input for WFS-indicator generation is stored in a subfolder named after the following convention:

All input features are stored in separate folders named after the following convention:

"input-id"_"FullName". Both "input_id" and "FullName" are to be recovered from the present document.

Example: Input-ID-09_MODIS-LST

- /Additional_AOIs contains interesting areas of interest, not integrated in the official cold cases for the project. The data provision for those is on a voluntary basis. Some of them could reveal to be interesting hot cases.

6 CONCLUSIONS

CENTAUR data catalogue service represents one of the components that CENTAUR platform is putting in place, allocated in a central node, which represents the entry point for the end-user to access the information generated by the platform. In this component, the relevant information will be stored. The end-user will have access to this information through a Viewer component (website design) to have a friendly view. The components allocated in the local nodes also will have access to the catalogue for acquiring information as their input ([RD05]).

The catalogue includes the following datasets:

i) The input datasets that will be used to generate the CENTAUR innovate indicators, which are grouped in the following three domains geospatial (Chapter 3.2), open-source (Chapter 3.3) and meteorological data (Chapter 3.4).

ii) The output datasets produced (i.e. the innovative indicators) for the project domains: Urban Flood (UF), Water and Food Security (WFS) and socio-economic/political related matters to both the two above.

Regarding the input datasets, 45 input datasets were identified in CENTAUR geospatial domain, which are required for the development of 8 Innovative indicators in the fields of Urban Flood and Water & Food Security; 30 input datasets were identified in the CENTAUR open-source data domain (social/traditional media, socio-economic and political), which are needed for the development of related 20 innovative indicators; lastly, 8 input datasets were identified in the CENTAUR meteorological data and modelling domain, for the development of related 5 innovative indicators.

This document will serve as a reference document to undertake Task 2.4 - Social, economic & political indicators - design and implementation, Task 2.5 - Urban Flood indicators - design and implementation and Task 2.6 - Water & Food security indicators - design and implementation activities which will run in parallel starting from M10. In addition, the document serves as the foundation for WP3 – Service deployment, that will put in place an intuitive platform to visualise/analyse data and indicators.