4th Global Expert Forum for Producers and Users of Disaster Related Statistics
28 October - 1 November, 2024
United Nations Conference Center, Economic Commission for Africa, Addis Ababa, Ethiopia

Statistical information considering micro-territory for hazardous events? A challenge for NSO

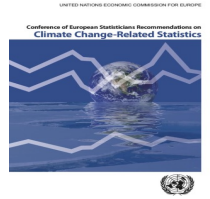
Angela Ferruzza

Istat

Which goals and which statistical measures ?

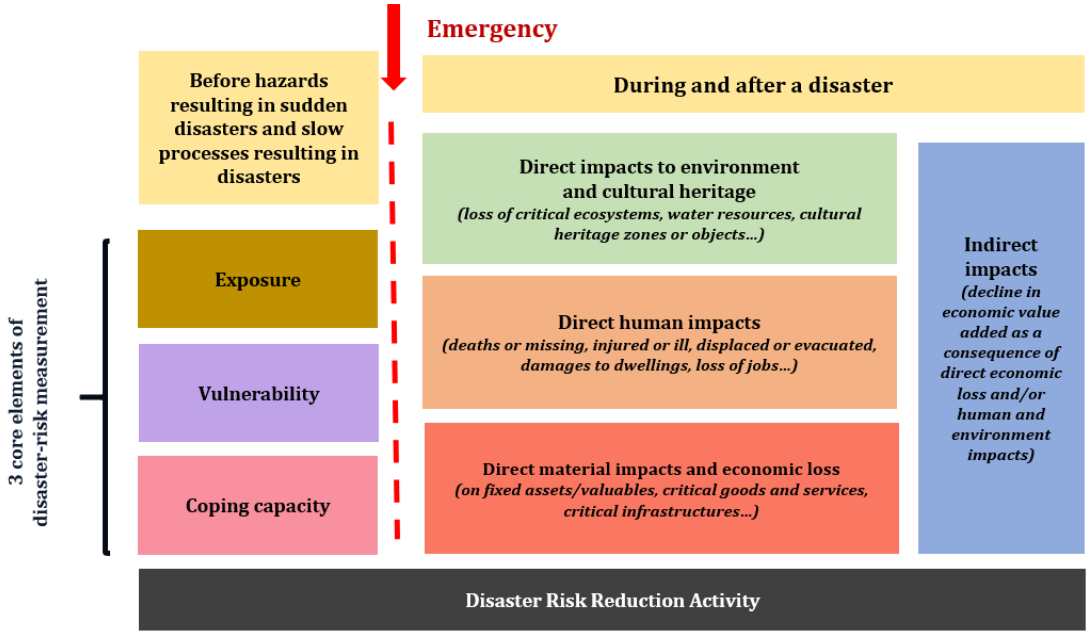
- *UNECE Guidelines for **Climate Change (CC)** 2020 UNECE CC **Core indicators (44)**, 2022 **UN FDES Indicators (130)***
- *UNECE Guidelines related to (2019) **Measuring Hazardous Events and Disasters (MHED)** and **55 Core indicators** (2023)*
- *UN-IAEG **SDGs Indicators**: **231 indicators***

The proposal revolution of all these **frameworks**: the economic, social, environmental and institutional goals have to be developed considering an **integrated approach from global to local to leave no one behind**



Common language and common geographies are necessary

- **Statistical measures for a common language** and is crucial to consider
- **Common geographies for a common language and for integration among domains**
- **Different phases**
- **Microterritory and Hazardous Events**



From administrative (dirty) data to statistical data: a big challenge

- **The effectiveness of indicators** and of data depends not only on the statistical design of the data, but also on an adequate **geographical disaggregation** that can demonstrate geographical variations of phenomena**.** This involves the creation of a **spatial data infrastructure** enabling standardized location references **for mapping spatial location to statistical data units**.

- **Considering Hazardous events and Disasters** it is recommended that the statistical data are **referenced to the finest geographical scale possible, down to a geographic coordinate.**
- **The assignment of a unique identifier to each location area allows linking with other statistical and geospatial data associated with the same geographic space and also with "dirty" data**
- The provision of these **common geographies** allow the generation of statistical data in a consistent manner, through **cartographic grids or units with administrative or statistical boundaries**. These allow statistical data to be aggregated/disaggregated at different levels for the purpose of their integration.

Common geographies for a common language, for integration among different domains and other dirty data

Essential for Measuring Hazardous Events and Disasters

Statistical Register of Places (RSBL)

- Istat is changing its production processes and aiming to an Integrated System of Statistical Registers: at the **very heart** of it lies the **Statistical Register of Places (RSBL) that** can be integrated with **Register of Population,** used also in Population and housing censuses and considering **Economic registers.**
- The geographical statistical information of **Statistical Register of Places** has an **increasing potential** to consider statistical measures related to hazardous events and disasters

Statistical Register of Places: which components ?

- **Administrative territorial units and functional areas** (7904 municipalities and LLMA, FUA, DEGURBA …)
- **Enumeration areas**
- **Addresses and geographic coordinates**
- **Buildings and basic property units**

The **integration process** has seen **different methods** applied to different entities in order to reach the **highest quality** possible result.

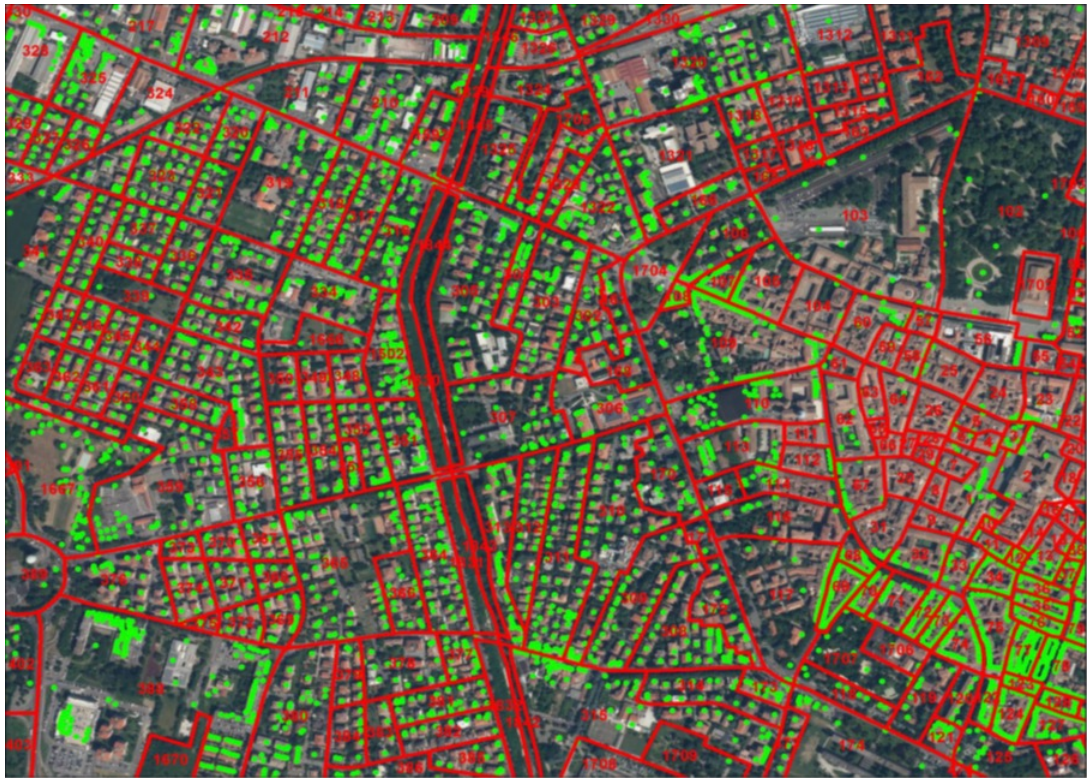
RSBL Enumeration Area: an example of land classification

It is a geo-referenced archive based on many different archives of geographic data in which the territory of all 7,904 Italian municipalities is divided into enumeration areas and and 1,1 milion microzones (infrastructures, green areas, ….) based on land cover (built-up, natural, infrastructure, water, etc.) georeferenced enumeration areas

Final results (July 2024):

from 402thousands to 756thousands microareas

Enumeration areas

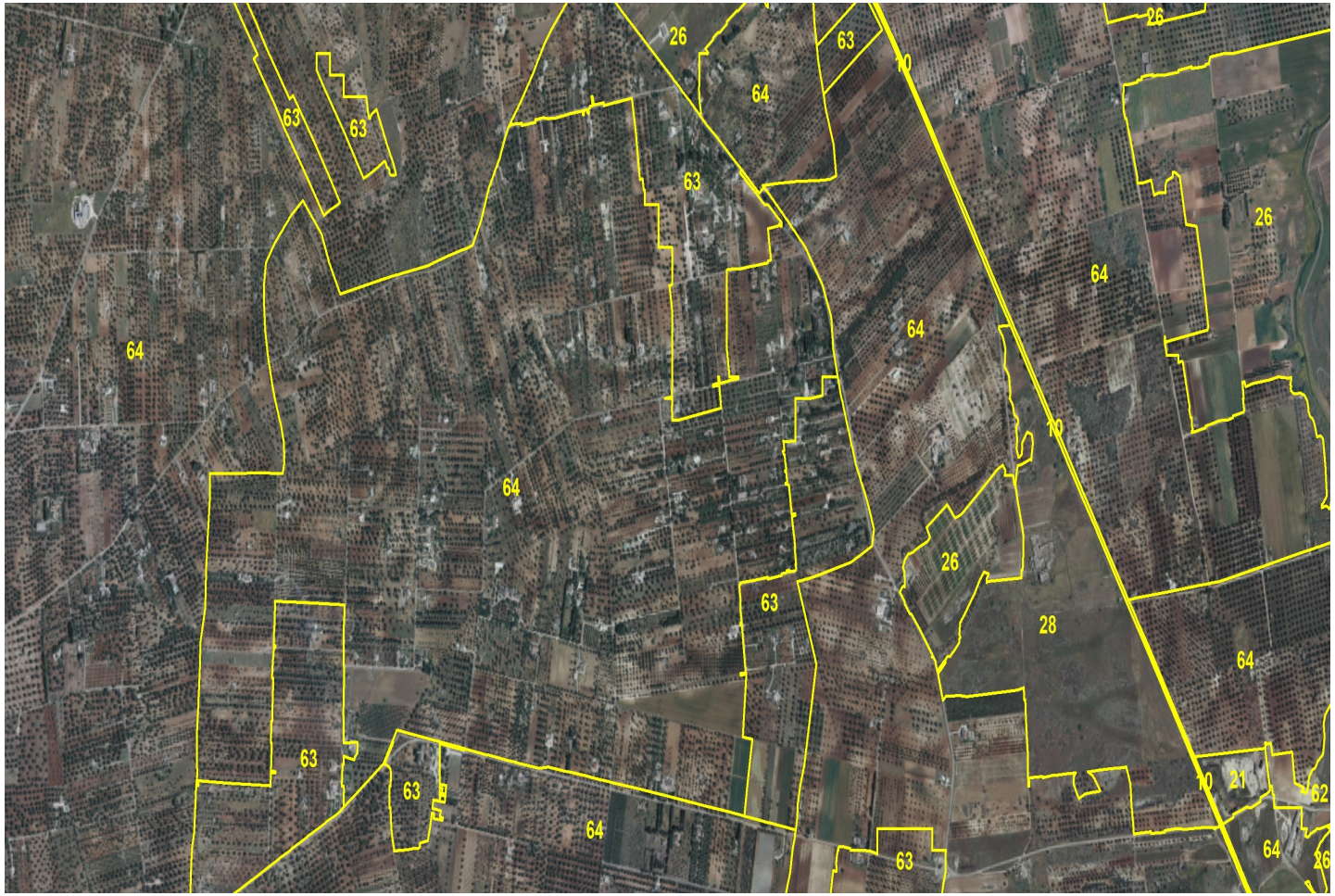


RSBL Enumeration Area: an example of land classification

- Area or building for residential use
- Urban park
- Port area
- Military barracks
- Hospital, care institute,
- Rail and railway infrastructure
- Productive activities
- Sports facility
- Temporary detention centres for foreigners
- Woodland
- Penal institutions
- Hotel, campsites, ecc.
- Agricultural area
- Lighthouse
- Communal house
- Museum area
- Community services: schools, telecommunications etc.
- Potabilizers
- Shopping centers

- 1
- 5
- 6
- 8
- 9
- 10
- 12
- 16
- 19
- 22
- 24
- 25
- 26
- 27
- 29
- 31
- 37
- 50
- 55

RSBL Enumeration Area: an example of land classification



- 64 Olive trees
- 63 Fruit trees
- 26 Cropland
- 28 Sparsely vegetated areas
- 21 Quarries

RSBL Enumeration Area: Infrastructures

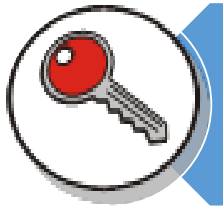
RSBL - Addresses

[CUI]: 31 mln

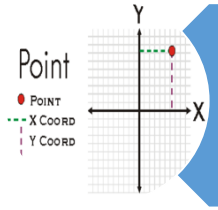
[CUI-EAs]: 27,8 mln (95%)

[CUI-XY]: 24,1 mln (80%)

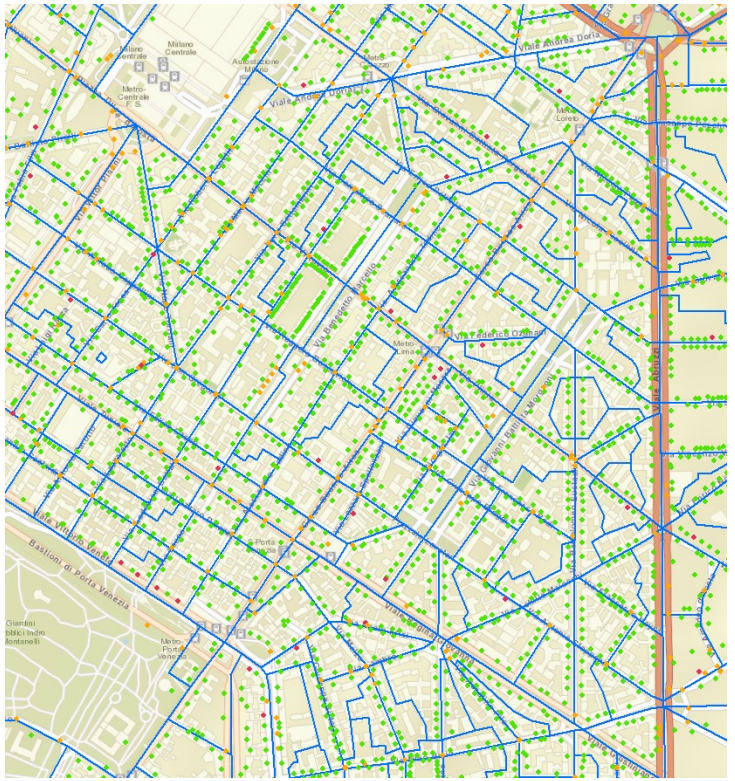
Based on many administrative archives of data



CUI: Unique identification code of address



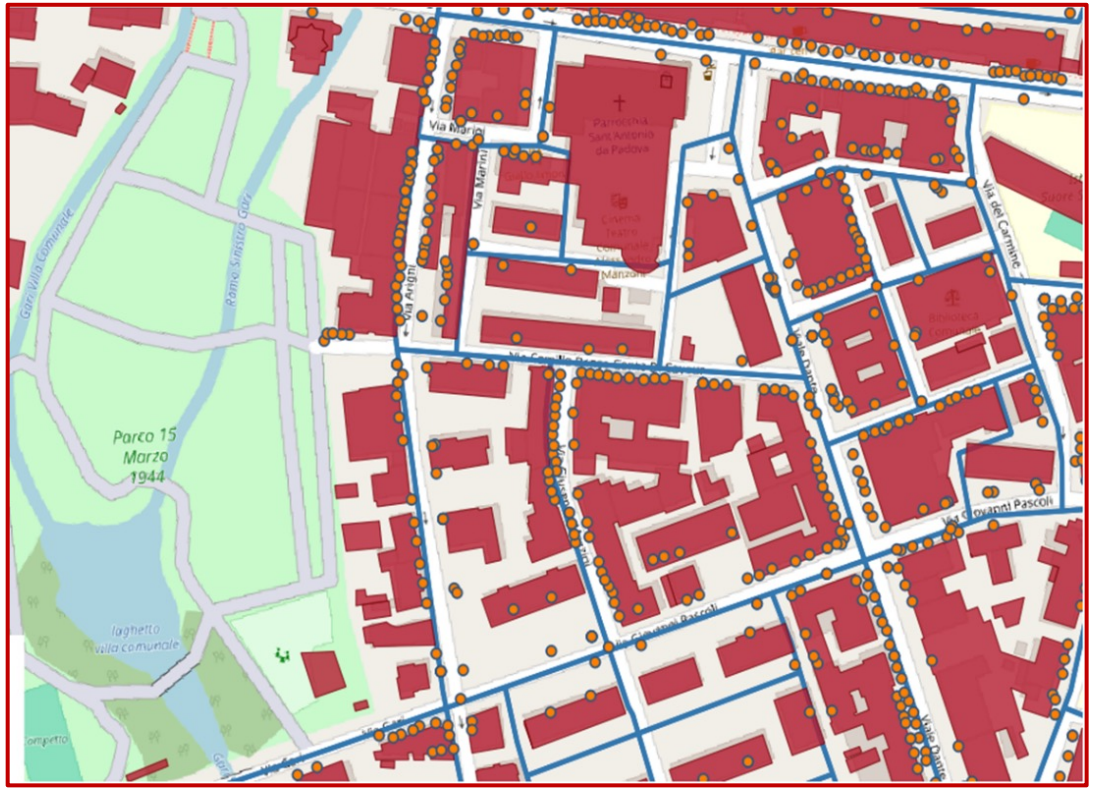
Geographic Coordinates



RSBL: Buildings and Basic property units Register

- The main administrative source is the Cadastral Administrative Archive, which registers any Real Estate unit, therefore not only residential buildings. Other sources are considered: Regional Cartography, National Geoportal, Open Street Maps
- **Buildings have been georeferenced**. The information of the geographical center of gravity is used to improve the quality of the georeferencing of the statistical units. The addresses of the buildings and of the dwellings are considered.
- Integration process on residential buildings, dwellings, addresses, enumeration areas.
- Results: In 2021 **29** millions Buildings of which **14.4** millions are residential
- Dissemination of dwellings May 2023.

Buildings

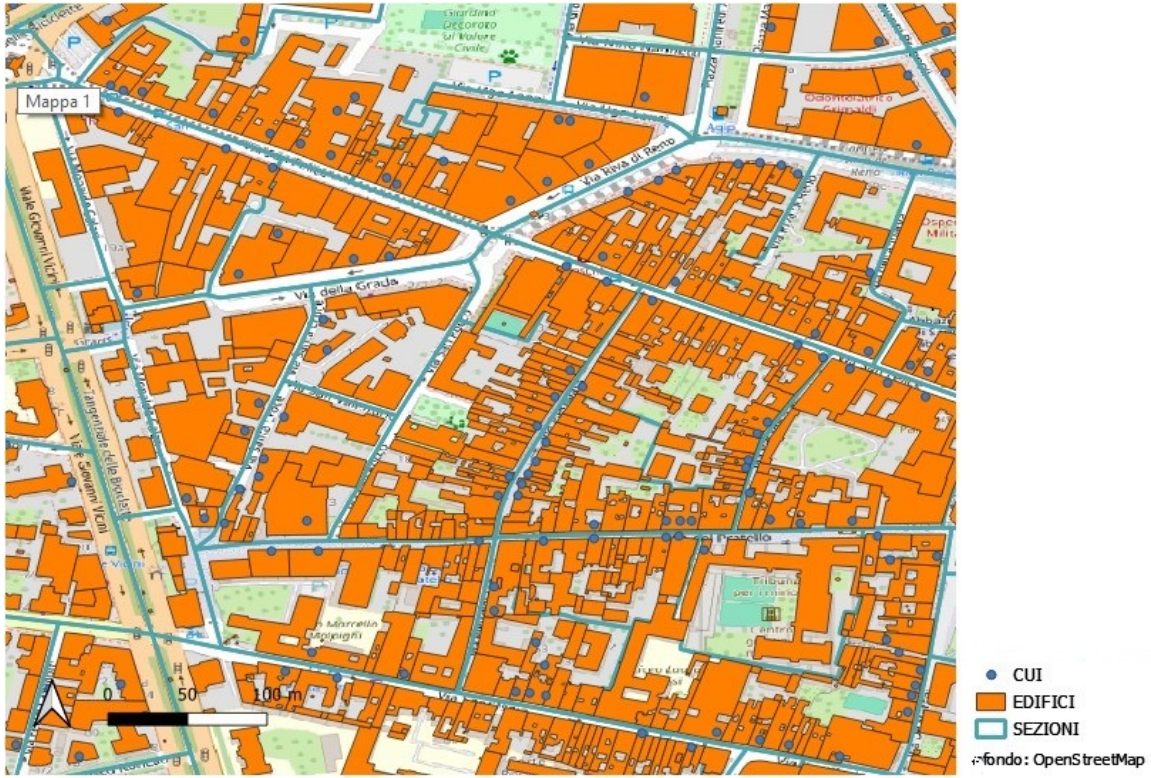


From administrative dirty data to statistical data, a big challenge: Statistical Register of Places (RSBL)

Statistical register of places

RSBL: a **complex system** with **several components**

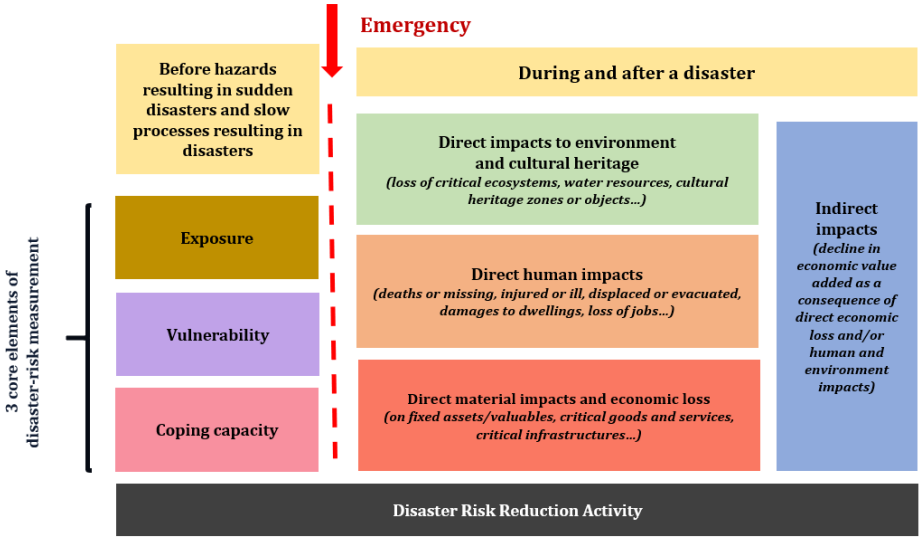
- For **each register component**, variables are being built detailing several characteristics of the entity under study and information on their **quality, in general, administrative data could be dirty**
- The **challenge** is the production of spatial information able to respond to the heightened need of detail statistical data integrating the different component
- The **goal** is **to have a detailed geography for the statistical units of all the other social and economic statistical register,** of some surveys and in some case of dirty data to improve statistical analyses
- The **construction process of RSBL** is **complex** and faces several issues:
- the **very high number of objects** involved and
- Innovative methodological approaches for the **integration** of components stemming from different sources independent from each other
- The potential use of **Dirty Data** to integrate and to add other information even if they are not "official" **using coordinates …**



Hazards in Italy

Italy is subject to geological hydrogeological meteoclimatic hazards: **earthquakes - landslides - floods - droughts - heat waves - heavy rains - forest fires…**

- **Interrelated hazards elements under risk** are multiple (population, territories, dwelling, basic services and infrastructure, economies, agriculture, ecosystems, …)
- **Integrated approach** has to be considered
- Need to ‘act’ in the perspective of **prevention: tool kit and geostatistic analyses**
- Strong overlap with **CC Adaptation**



RSBL: potential use for hazardous events and disasters

The geographical statistical information of **Statistical Register of Places** has an **increasing potential** to consider geostatistical measures related to hazardous events and disasters

- Production of **tool-set** of **ready** statistical indicators (**756thousand enumeration areas and population grid)**,
- Ex-ante analysis of areas presenting high risks of fires, flood, or earthquake, ….
- Ex-post analyses of areas hit by natural disasters,
- Disaster Prevention: Building at less than a specified distance from rivers, lakes, sea …Buildings next to industries, Buildings in contaminated toxic areas
- Disaster Recovery: Building in areas hit by earthquakes, landslides, flouds, extreme weather conditions, caught on fires …
- Building involved in severe heatwave in large municipalities
- Air pollution analysed considering very detailed territorial area and linked with exposed population

RSBL: population grids from local to global, common geographies for every kind of data

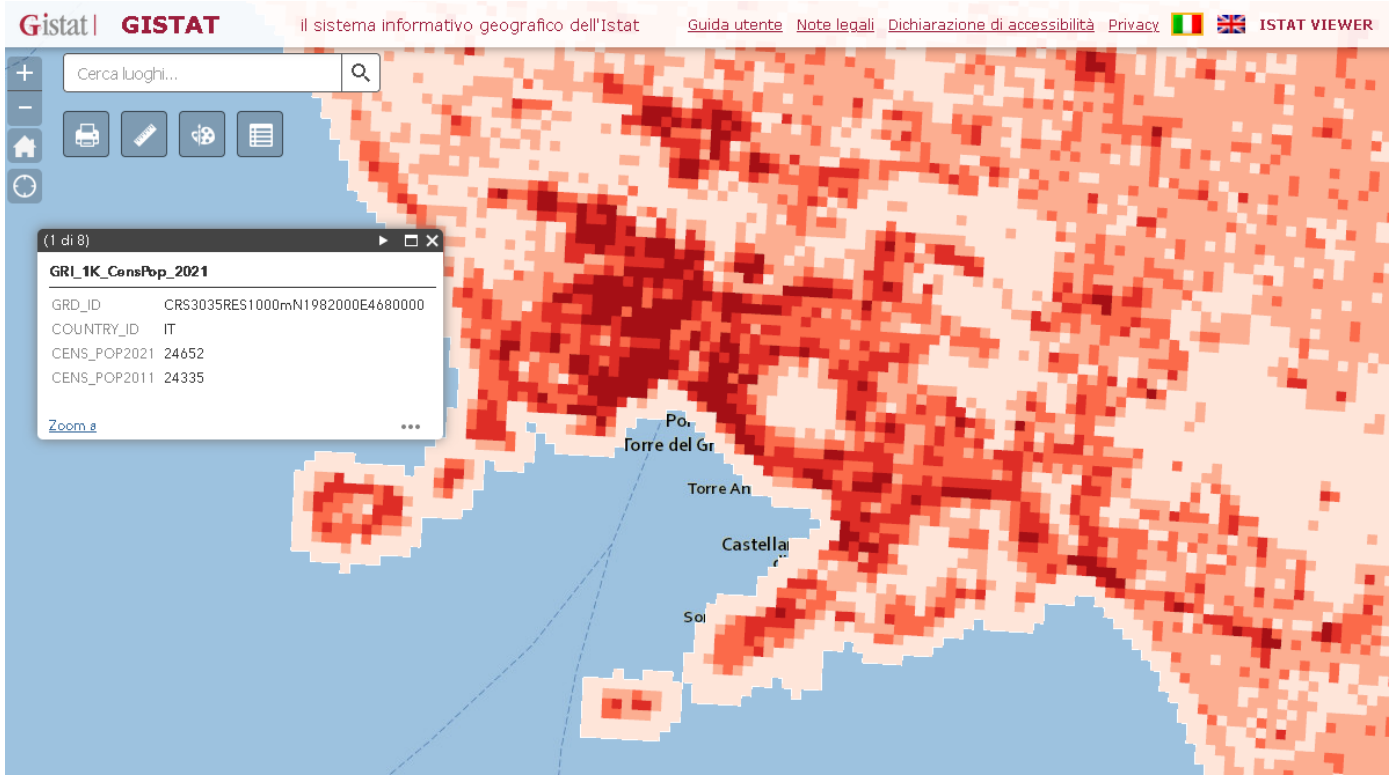
Population grid 1km area is one of the product of RSBL

Population grid statistics as an alternative to population statistics for administrative areas.

Population grids are a **powerful tool to describe our society and to study the interrelationships between human activities, economic activities and the environment.** They are particularly useful for analyzing phenomena, and their causes, which are **independent** of administrative boundaries, such as, fires, flooding, commuting and urban sprawl, air pollution …

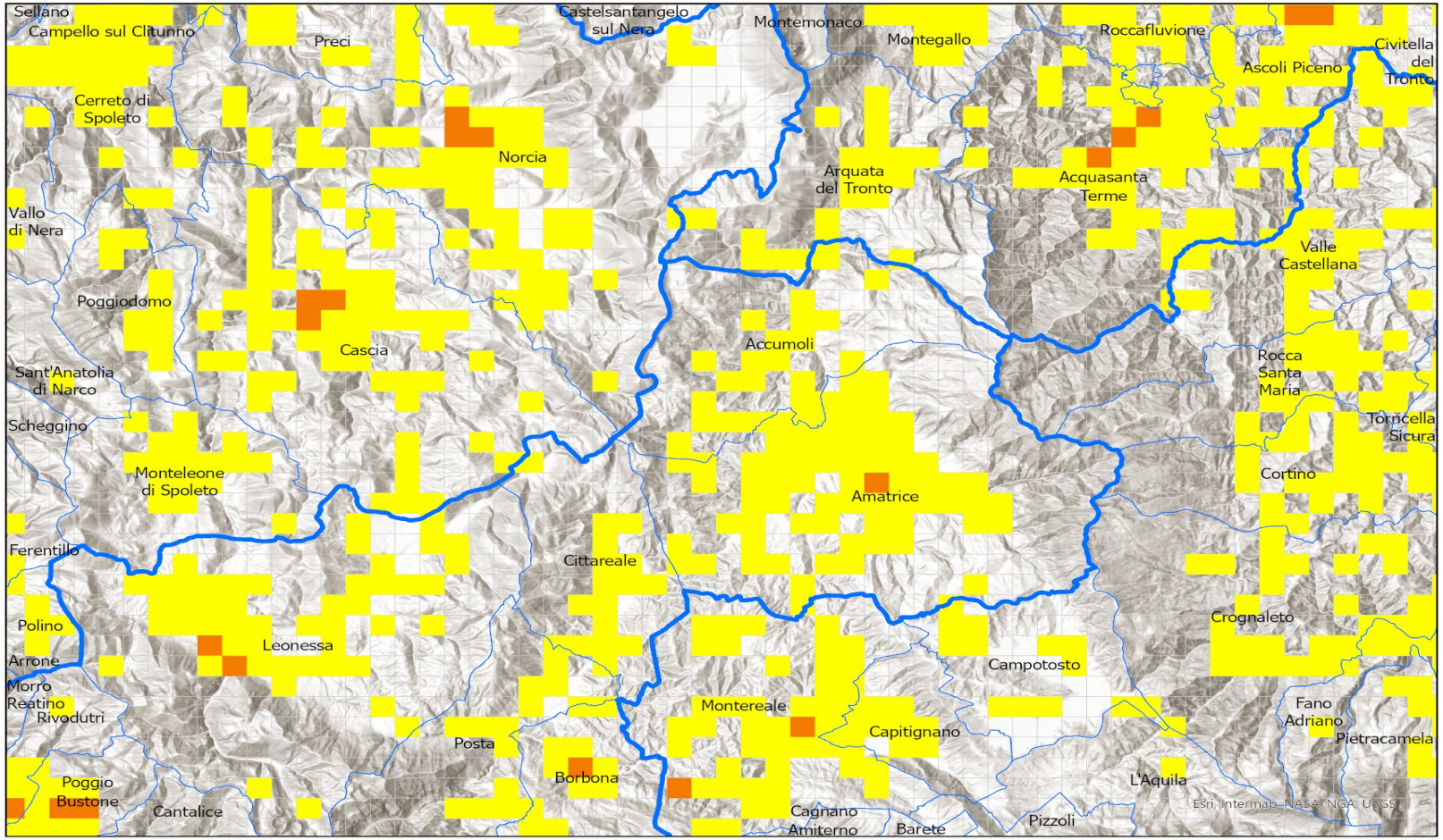
RSBL: population grids, Naples and Vulcan Areas

Before Hazard : prepare statistical information on population grid ready to be used in Vulcan Areas to add other information



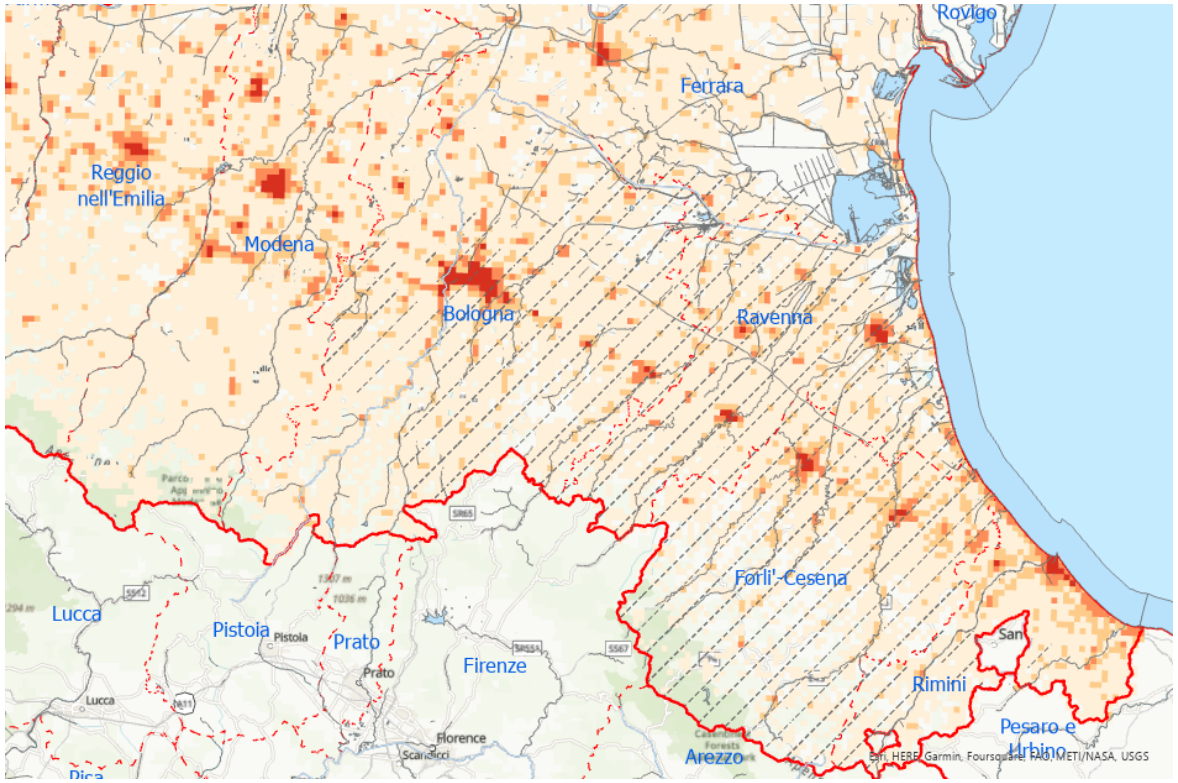
RSBL: population grids, 2016 Abbruzzo earthquakes areas

After the hazard: providing statistical data and mapping



RSBL: population grids, flood in Emilia Romagna 2023 and 2024 floods areas

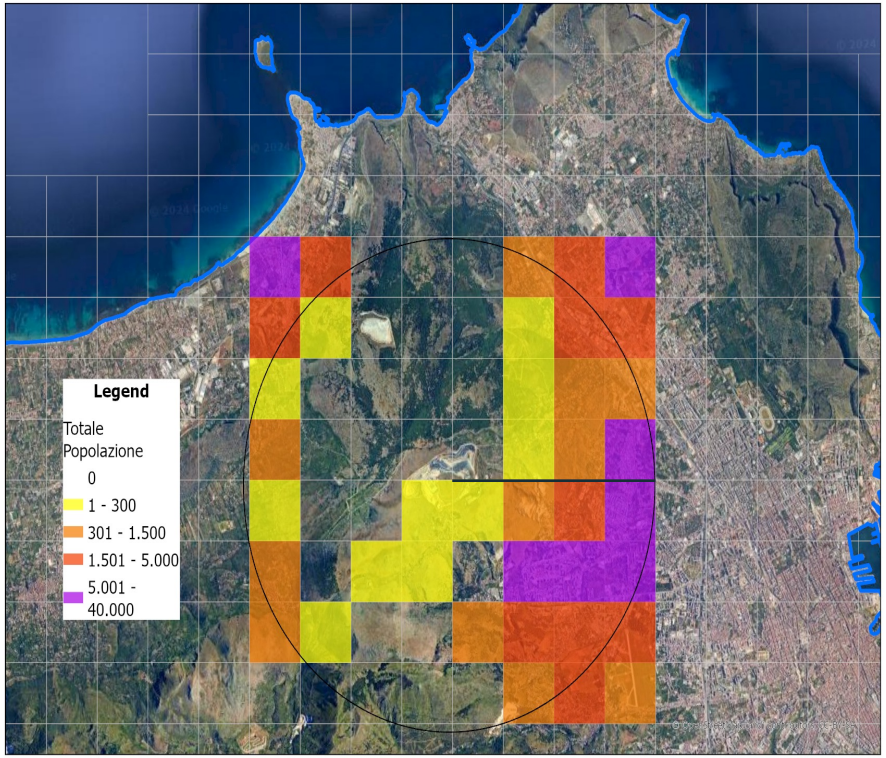
During and after the hazard



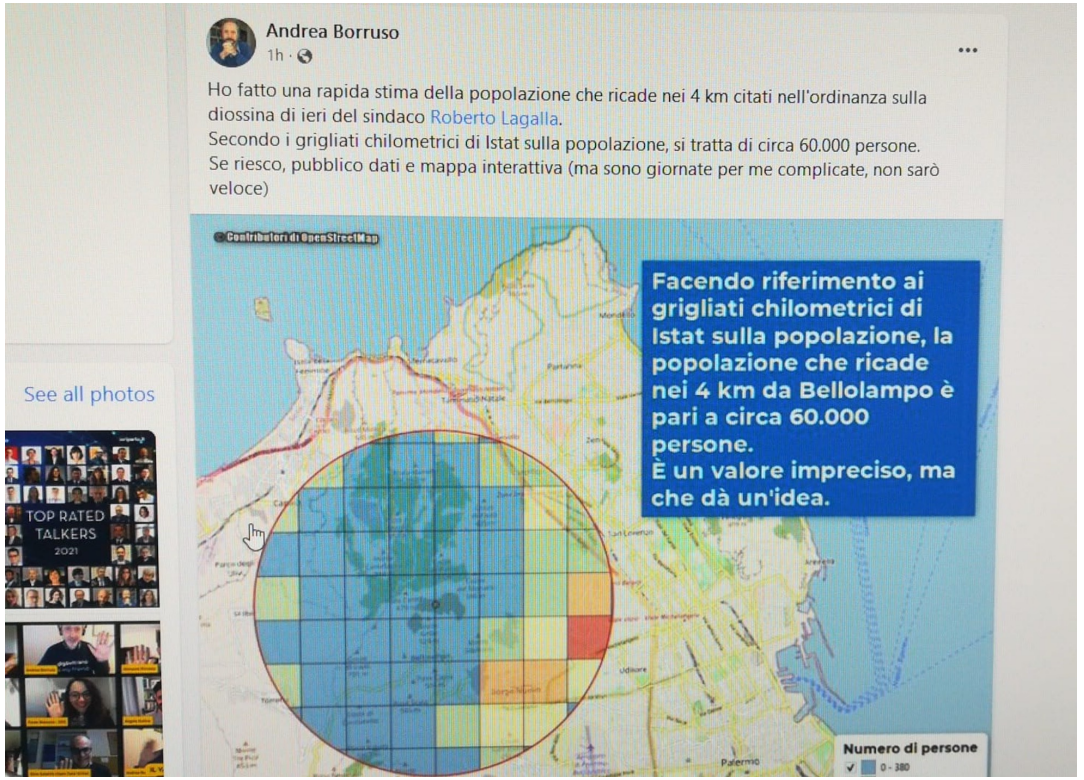
3 cities of Emilia Romagna with 100% population at risk of floods
62.5% in the region
11.5% in Italy
Providing immediately statistical data

RSBL: population grids, fires in Palermo (waste release) and airpollution

After the hazard



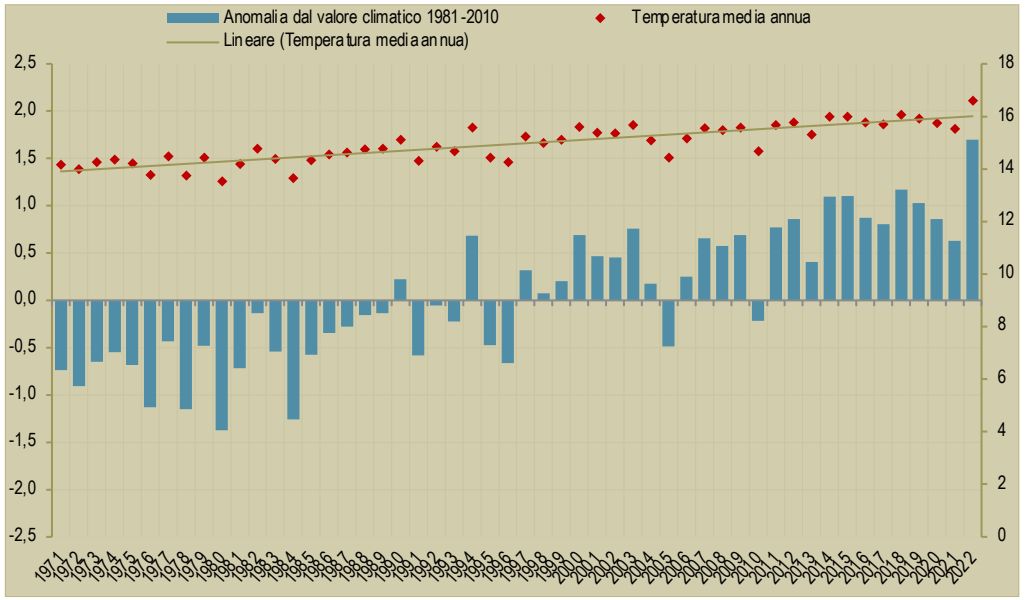
The use to connect other data (dirty ?)



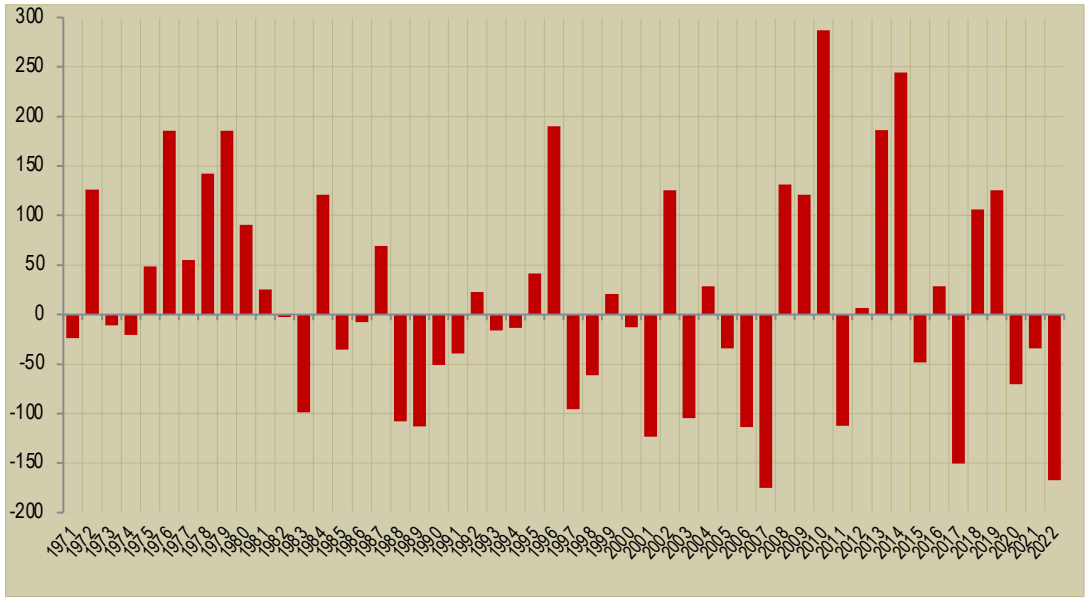
To raise Awareness: Statistical Report on Climate Change adaptation (october 2024)

https://www.istat.it/wp-content/uploads/2024/10/Statistica-focus-METEOCLIMA_Anno-2022.pdf

Anomalies in temperature

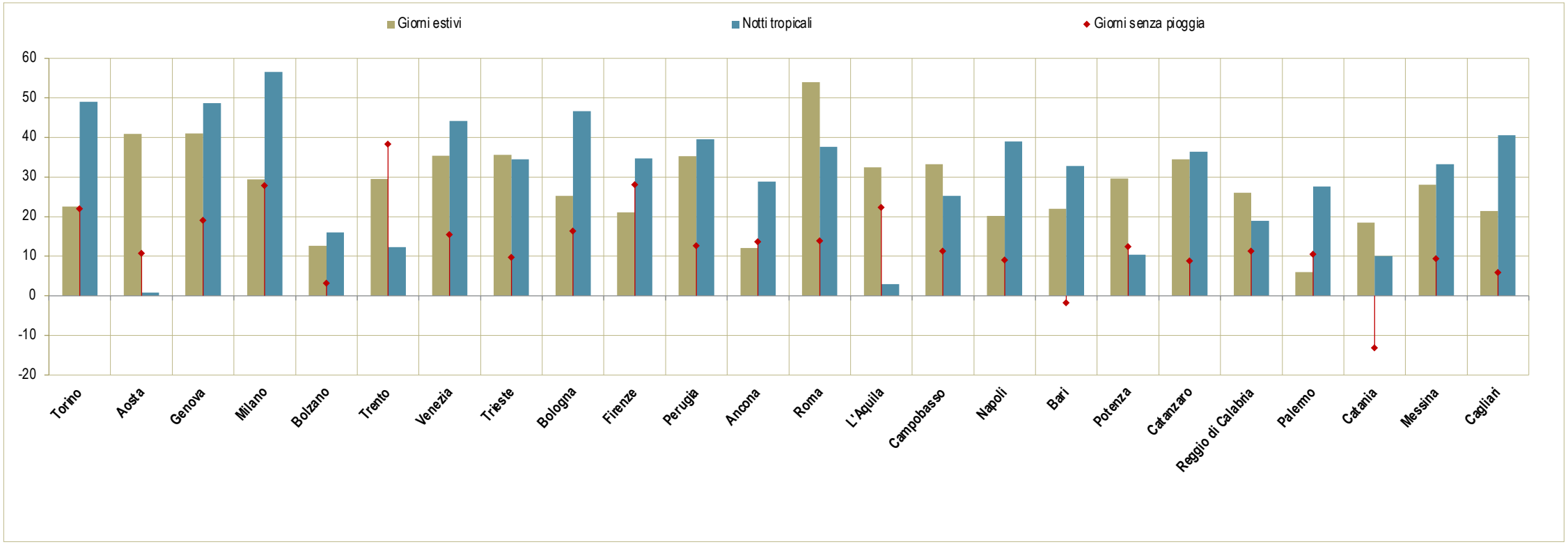


Anomalies in precipitation



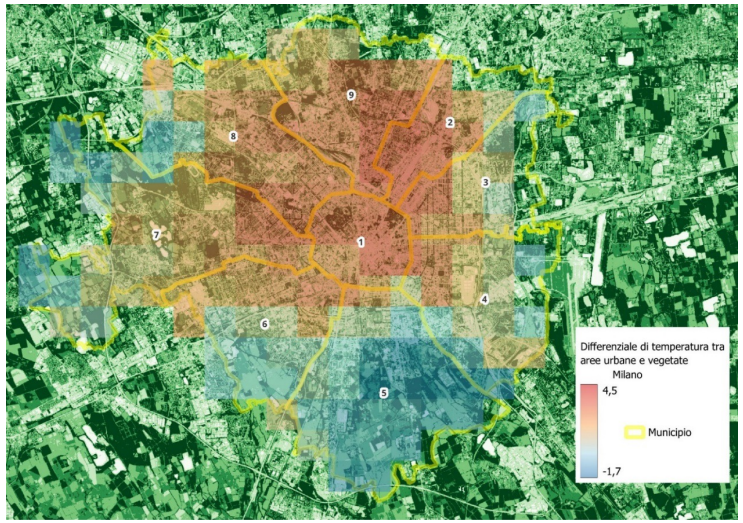
To raise Awareness: Statistical Report on Climate Change adaptation (october 2024)

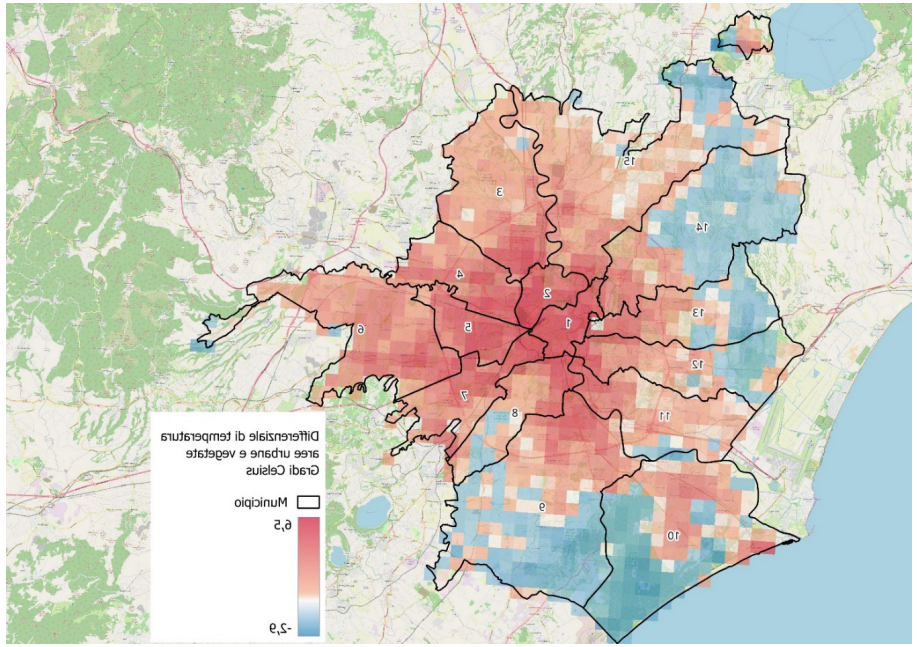
ANOMALIES SUMMER DAY AND TROPICAL NIGHTS IN THE BIG TOWNS ON CLINO 1981-2010. **2022. 113 summer days (more than 25°) 113 and 49 tropical night (not less then 20°)**

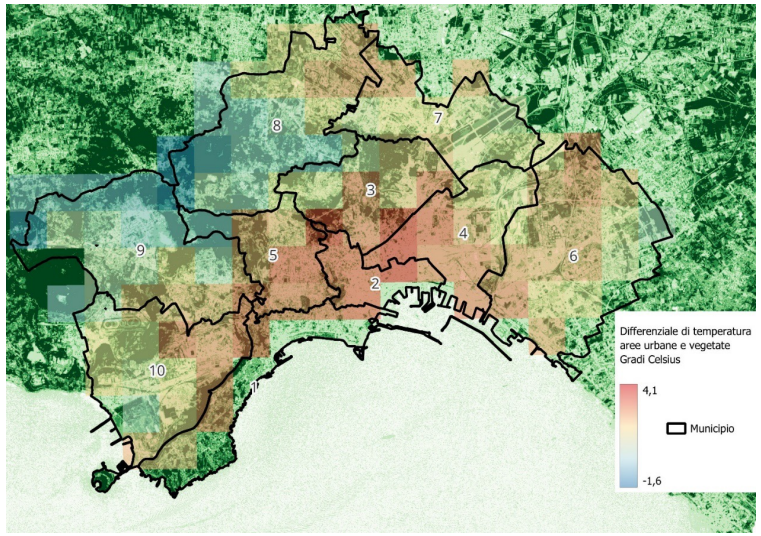


To raise Awareness: Statistical Report on Climate Change adaptation (october 2024)

Temperature differentials among green and not green areas in Rome (+6.5° - 2.9°), Milan (+4.5° - 1.7°) e Naples (+4.1° -1.6°)

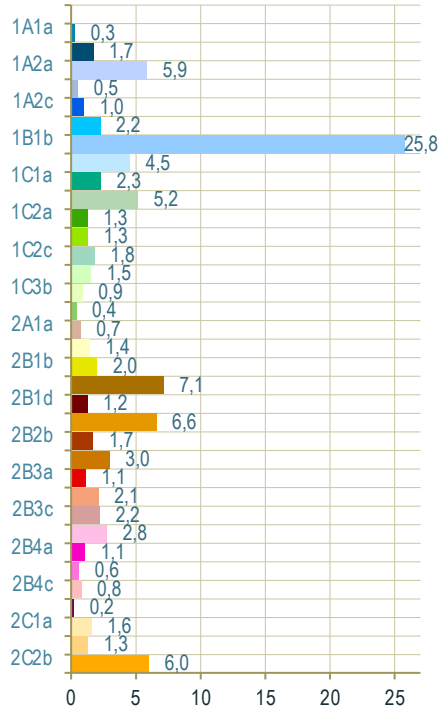


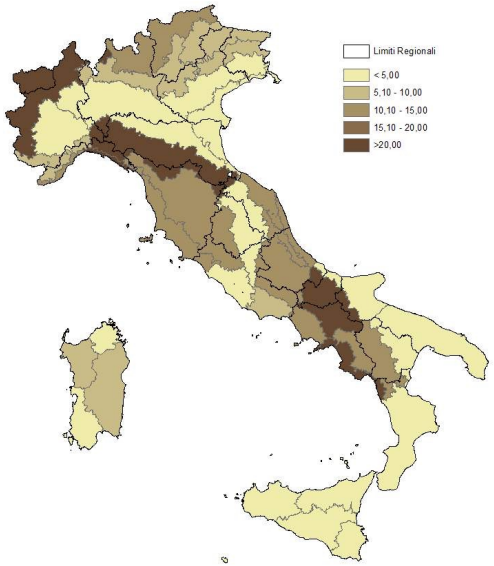


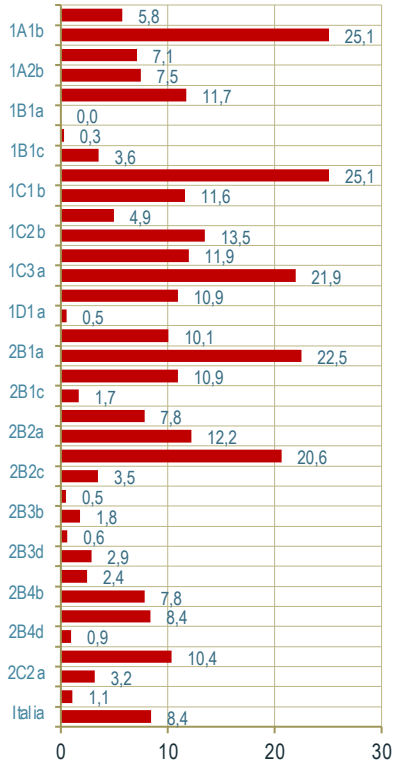


Statistical Report on Climate Change adaptation: october 2024

Ecoregions, population, at risk flood

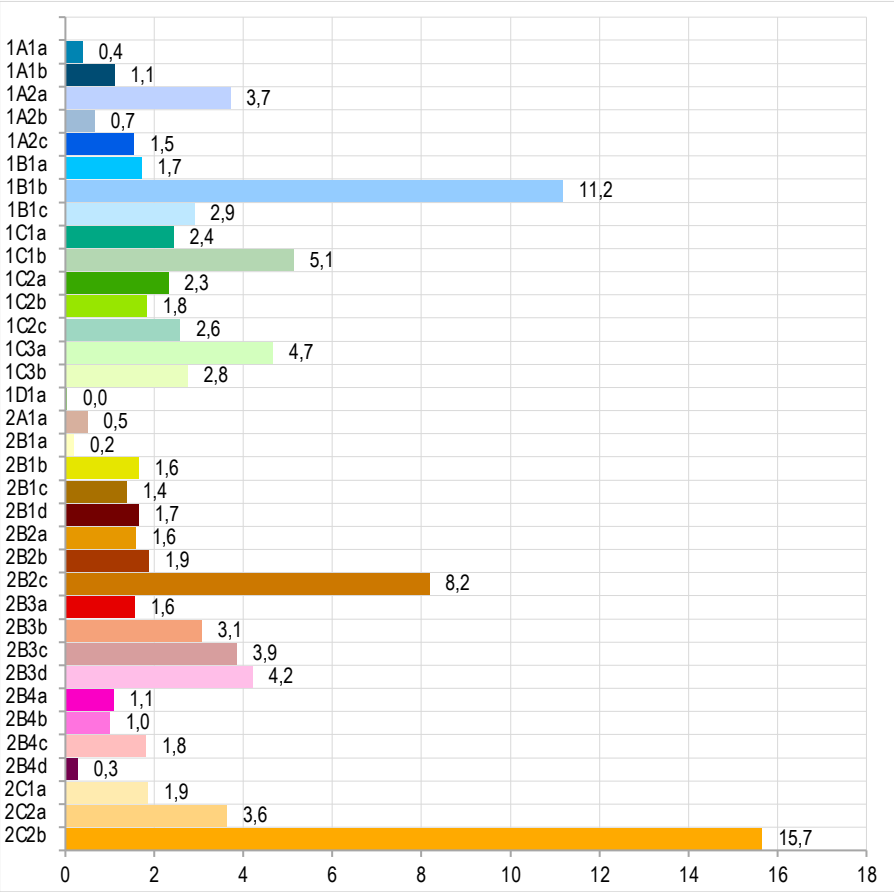


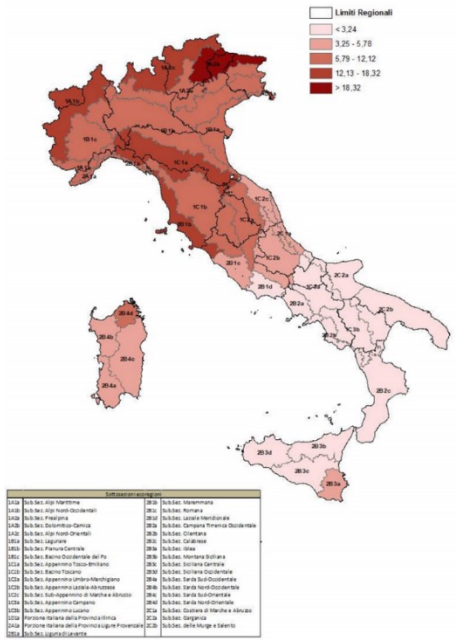


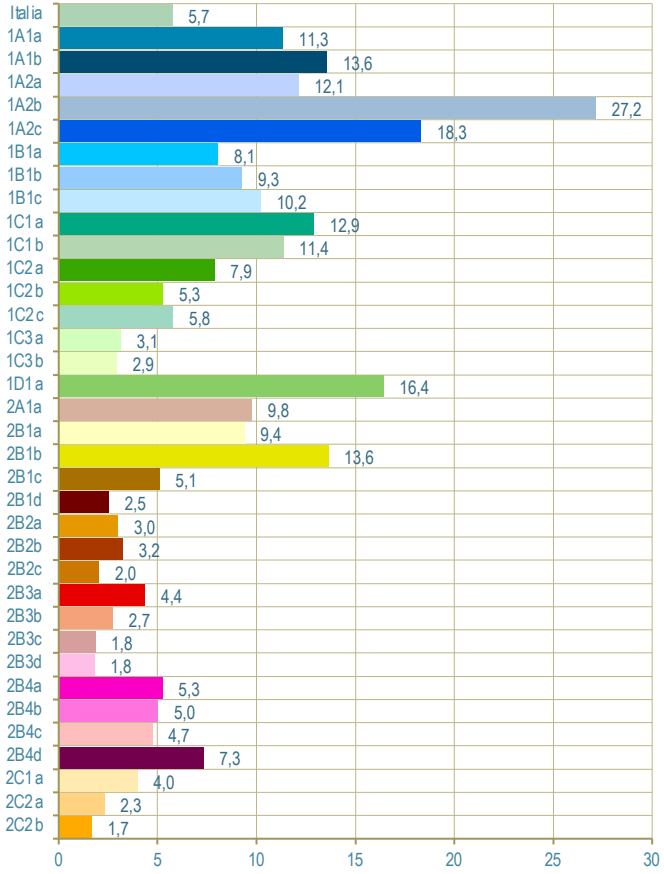


Statistical Report on Climate Change adaptation: october 2024

Agricolture enterprise in ecoregions, agriculture and tourism service







Disaster and Hazardous events: geo-statistics to not leave behind are necessary and possible

Main lessons learned from this experience, what recommendations could be given to produce better data in different phases of disaster response and to raise awareness that different phases of disaster response

- Much has been done but much more needs to be done: **step by step and Systemic thinking approach needed**
- NSOs **active role participating at the international network of experts**, to build **common language** and then define: priorities set, core set of relevant/feasible indicators, methodologies to increase comparability, strategies for dissemination and communication.
- **Strengthen cooperation in the National Statistical System** (all the producers of official statistics: institutional stakeholders, environmental agency, etc..) for an **intersectional approach**
- Considering the huge amount of statistical information required, **strengthen the use of existing statistics in NSO**
- **Transform 'ALL' Data -----> Official Statistics:** New data sources / methodologies (**administrative data, citizen data, dirty data ecc**) Necessity to systematize administrative data and other kinds of data: **Integration of data and sources** needed, but also **dirty data can be integrated and overlapped**
- **Statistical register are key factors**
- **Geostatistical and territorial analyses are integration factors to have disaster interraled statistical data** because **in territory** the **integration** among economic, social, environmental, institutional domains improve looking forward to Climate change, hazardous events

Disaster and Hazardous events: geo-statistics to not leave behind are necessary and possible

A richer statistical mosaic to integrate the different dimensions promoting improvements in the production of statistical measures : **from Global to local and from local to global for a common language**

Important to share knowledge , awareness, best practises at all levels, inside and outside NSO and NSS and globally to increase collaboration and synergies between institutions among NSO and NDMA

Dissemination of statistical report, geographic data, statistical tools ready before the hazards events and useful after the events

- to increase awareness of citizen and stakeholders
- to give practical tools to face all the phases of events
- To provide statistical integrated data at very detailed territorial level (756thousand enumeration areas and grids): ready tool kit

- Gis tool for Population Grid and for enumeration areas
- Final Population Grid 2021 september 2024
- Final enumeration areas considering Population and dwellings, july 2024
- Climate Change report october 2024
- Register of places e-book november 2024
- SDGs Report from 2018 to 2024

Thanks for your attention Ferruzza@istat.it