Flooding "like an earthquake"

The case of Emilia Romagna, Italy May 2023

Data on the ‘evidence of disaster’ and the challenges for the NSO

Giovanna Tagliacozzo
Angela Ferruzza
Davide Fardelli
“The floods are the latest in a series of extreme weather events that have slammed Italy over the past year, as once exceptional disasters become a regular part of life.”

“The same area of Emilia-Romagna was battered by extreme weather at the beginning of May, with at least two people dying during storms.”

“If there is a lesson learned....it is that any emergency calls for prompt and rapid reconstruction”...

"Nothing will stop", the governor told reporters, referring to business, tourism and other activities in the wealthy northern region.”

Heavy rains followed months of drought which had dried out the land, reducing its capacity to absorb water, meteorologists said.”

Istat, Giovanna Tagliacozzo. 8 June 2023, UNCC, Bangkok, Thailand
Lesson learned... How about prevention?

Statistical information available... before--->

Elements at Risk

P – People
H – Housing
BS – Basic services
CI – Critical infrastructure
EA – Economic activity
Ec – Ecosystems
F – Food security and agriculture
W – Water security
En – Energy security
He – Health care
CH – Cultural heritage
2022 SDGs REPORT - STATISTICAL INFORMATION FOR 2030 AGENDA IN ITALY

• SDG DB since 2016
• SDG Report since 2018

371 ‘statistical measures’ to ‘cover’ 138 UN-IAEG-SDGs indicators

108 identical
132 proxy or partial
113 national context specific

istat.it/en/well-being-and-sustainability
istat.it/it/files//2023/05/2022-SDGS-Report_Inglese.pdf

Istat, Giovanna Tagliacozzo. 8 June 2023, UNCC, Bangkok, Thailand
Relevant information under SDGs

The statistical measures released by Istat for Goal 13 are 21 and refer to three UN-IAEG-SDGs indicators.

<table>
<thead>
<tr>
<th>TARGET</th>
<th>STATISTICAL MEASURES</th>
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<tbody>
<tr>
<td>13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.</td>
<td>Identical</td>
</tr>
<tr>
<td>13.2 Integrate climate change measures into national policies, strategies and planning.</td>
<td>(Floods, Landslides, Forest Fires, earthquakes)</td>
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<tr>
<td>13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.</td>
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Istat, Giovanna Tagliacozzo. 8 June 2023, UNCC, Bangkok, Thailand
Relevant information under SDGs

Population at risk of floods and landslides by regions and municipalities

The risk of floods involved more than half of the population of Emilia-Romagna (62.5%).

Istat, Giovanna Tagliacozzo. 8 June 2023, UNCC, Bangkok, Thailand
High Risk of Floods and Landslides

Population at risk of flood (%, 2020, Ispra)

Territorial data:
3 cities of Emilia Romagna with 100% population at risk of floods
62.5% in the region
11.5% in Italy

Ispra: environmental agency in Italy,
National Statistical System

Available statistical information ‘before’

Istat, Giovanna Tagliacozzo. 8 June 2023, UNCC, Bangkok, Thailand
44.4% of the Italian territory high or very high degree of fragmentation in 2020

“such to substantially limiting, or completely preventing, the performance of the ecological functions proper to natural or semi-natural environments”
**SDG 15.1.2 - Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type**

21.7% of Protected Natural Area of the Italian territory in 2021

Istat, Giovanna Tagliacozzo. 8 June 2023, UNCC, Bangkok, Thailand
Contextual information under SDGs

Set of Socio-Economic data (also) under SDGs

Emilia Romagna one of the "richest and most advanced" region in Italy...

Many elements at risk: human lives as well as economic and environmental assets
High EXPOSURE and VULNERABILITY -→ HIGH LOSSES AND DAMAGES

Istat, Giovanna Tagliacozzo. 8 June 2023, UNCC, Bangkok, Thailand
Contextual information under SDGs

(ref Goal 13.3.1)
Concern for climate change (%2021)
(Istat, Household survey on Quality of life)

- Emilia Romagna: 68.2
- Italy: 66.5

Istat, Giovanna Tagliacozzo. 8 June 2023, UNCC, Bangkok, Thailand
Available information “during” emergency phase?
Main elements at risk include human lives as well as economic and environmental assets.

The ‘real time’ info from the Press

**Bad weather, 200 mm of rain fell in 24 hours in Emilia-Romagna**

May 17, 2023

27,000 without electricity in Emilia Romagna

700 technicians at work to restore power - Enel

Over 10,000 people are unable to access their homes and around 27,000 do not have electricity.

“Housing emergency, people without food and water”

Emilia-Romagna flood death toll climbs to 14

Region remains on red alert due to extreme weather

虽然洪水导致了很多损失，但是专家表示，陆地滑坡的危险仍然很高。
Official website **Region Emilia-Romagna**

Regione Emilia-Romagna

Mercoledì, 17 maggio 2023

Maltempo: 23 fiumi esondati, 41 comuni coinvolti, 280 frane, oltre 400 strade interrotte

23 rivers flooded, also in multiple locations (50 floods)

Another 13 watercourses with exceedances of level 3 (alarm) hydrometric threshold at some of the survey stations

41 municipalities affected

280 landslides

more than 400 roads disrupted

over 10,000 displaced people

More than 1,200 volunteers in the field/day to bring relief to the people: This brings the number of man-days put in place by civil defense volunteers to more than 7,500 since May 2, when the bad weather began

Istat, Giovanna Tagliacozzo. 8 June 2023, UNCC, Bangkok, Thailand
Info from Google maps – Transport and Mobility - Agriculture

Emilia Romagna GP cancelled amid heavy flooding in northern Italy

Emilia Romagna flood, agriculture on its knees: damages for over 1.5 billion

Bad weather, Coldiretti’s alarm: five thousand farms under water

There is the risk of sending an entire supply chain made up of agriculture and fruit and vegetable processing companies into crisis
Info from satellite images processed by Copernicus

“The progress of the flooding in Emilia-Romagna can be followed hour by hour thanks to images from the Cosmo-SkyMed satellite and processed by Copernicus, the European environmental protection service through images from Space.”

“Image acquired at 4:55 p.m. on Thursday 18 by the 2/HR radar aboard the satellite, developed by the Italian Space Agency (Asi) in cooperation with the Ministry of Defense, processed and released by Copernicus Rapid Mapping at 1:30 p.m. on Friday 19.

In blue the flooded areas (which have expanded considerably in the last two days)

Zoom in on the map to get down to very detailed detail, following the flooded areas virtually field by field, street by street.

One more tool at the disposal of relief and civil defense workers of disaster areas”
During emergency: priority

Save people: all people in safety

“After... 10 days”:
• disaster still ongoing
• losses and damage first estimations

ALL THE ELEMENTS AT RISK INVOLVED
✓ P – People
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RELATED RISKS / LONG TERM IMPACTS
After 10 days: areas of municipalities still under water
- Health risks for polluted water
- Territorial cascade risks (landslides)
- Housing and people still evacuated
- Many schools still not accessible
- Agriculture, ‘Made in Italy’, Exports...
- Historical municipalities, ‘Art cities’, ...
- ‘Flood’ waters entering into the sea pollute bathing waters

DIRECT / INDIRECT? COMPOUNDING CASCADING MULTIHAZARD

After 3 weeks, mud has solidified in the countryside, drone images. Soils no longer cultivable for years

Copernicus: consequences of floods after 3 weeks

Istat, Giovanna Tagliacozzo. 8 June 2023, UNCC, Bangkok, Thailand
Italy PM announces two billion euros flood package

Italian Prime Minister Giorgia Meloni announced Tuesday a package worth over two €2 billion for the northeast Emilia Romagna region after devastating floods which left 14 people dead.

Issued on: 23/05/2023 - 17:32  
2 min

25 May 2023: 15 people died

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Istat, Giovanna Tagliacozzo. 8 June 2023, UNCC, Bangkok, Thailand
Lesson learned, role of Official Statistics
Challenges for NSOs

• Increase **awareness at all levels** on importance of Prevention and Protection
• Build Institutional Relationship
• Classification: Hazard **driven by climate change** because of intensity and frequency of events (?)
• Much material but need to systematize:
  • **Transform ‘ALL’ Data -----→ Official Statistics**
  • Assess relevant and effective statistical information necessary before/during/after...
  • Assess methodology: use statistical information for risk assessment/risk reduction, prevention...
• Produce additional relevant statistical information: role of territorial and geospatial data *(the contribution of the NSO)*

Istat, Giovanna Tagliacozzo. 8 June 2023, UNCC, Bangkok, Thailand
Istat is changing its production processes aiming to an Integrated System of Statistical Registers: at the very heart of it lies the Register of Places (RSBL).

The integration of geographical statistical information from RSBL with other Registers socio-demographic or economics has an increasing potential related to Disaster Risk.

The components of RSBL:
- **Administrative territorial units and functional areas** (7904 municipalities and LLMA, FUA, DEGURBA …)
- **Enumeration areas**: many different archives of geographic data for 800,000 georeferenced enumeration areas and 1,1 million microzones (infrastructures, green areas, ….)
- **Addresses and geographic coordinates**: administrative archives of data for 30 millions CUI Unique Identification Code of addresses geographic coordination XY of CUI, Quality indicators.
- **Buildings and dwellings**: administrative archives Real Estate Registry from Cadastral agency, from geographic agencies and open sources. Buildings are georefered. 29 millions Buildings of which 14.4 millions are residential building

The integration process has seen different methods applied to different entities in order to reach the highest quality possible result.
Geography Coordinates and Enumeration Areas

Tipology of Geographic Coordinates

- Point Addresses
- Interpolated
- Approximated

Census Block
Population Grids: from local to global

**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 and the environment. They are particularly useful for analysing phenomena, and their causes, which are independent of administrative boundaries, such as flooding, commuting and urban sprawl, air pollution …

320,000 cells
400mila polygons in EAs2011
700mila polygons in EAs2021
Population Grids on Gistat
Thank you!

Giovanna Tagliacozzo
Istat