

Tsunami risk perception in the 1908 area

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Risk perception and knowledge sources

Knowledge and understanding of natural hazards are linked to the channels used to gather, process and make sense of ambiguous, unfamiliar and possibly frightening information and signals

Local knowledge

It is based on cultural codification of past events, conveyed by word of mouth and shared as socially memories through myths, ceremonies and rituals (e.g.: Cult of the Madonna del Flagello in Soriano Calabro)

Scientific and Institutional knowledge

It is based on scientific research and made available through scientific communication, schools, institutions (e.g. Civil protect) but it is affected by language and channels limitations

Media knowledge

It is based on media representations and depends on their languages, stereotypes and frames: media offer a partial knowledge of phenomena, insisting of redundant images of single events(e.g. Myako for the Tohoku tsunami of 2011)



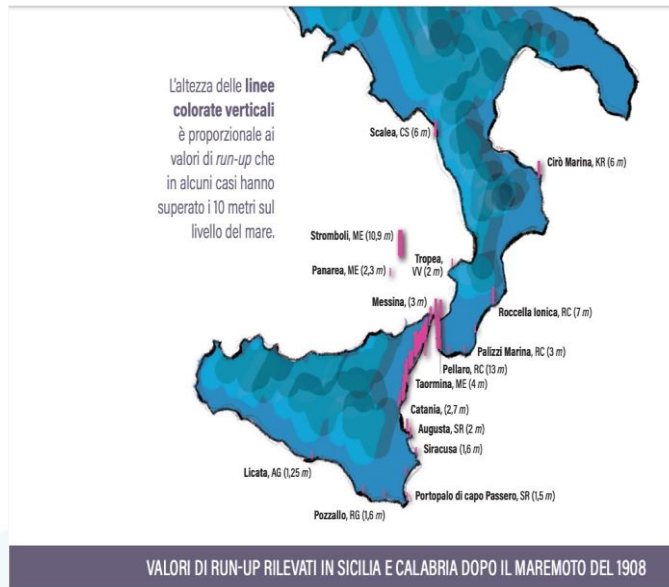
Tsunami as an elusive risk

Compared to other natural hazards, tsunamis appear to be particularly elusive for some relevant reasons:

- **Low frequency** of larger events, smaller events are not always easy to be recognized / understood
- **Multiple causes** (earthquakes, eruptions, landslides, atmospheric events)
- **Variability of effects** due to source type, coastal profile and bathymetry
- **Non-linear effects** often associated with cascade disasters
- **Unusual and ambiguous premonitory signals**, difficulty to recognize and properly act in response (e.g. self-evacuation)
- **High uncertainty** in scientific hazard assessment



The 1908 event



- December 29th 1908: a 7.8 magnitude earthquake razed Reggio and Messina to the ground and triggered a tsunami with waves of up to 13 mt at Pellaro and Sant'Alessio (Reggio Calabria and Messina)

- Out of 80000 casualties, 2000 are attributed to tsunami: it was one of the first natural disasters having an extensive instrumental data collection
- RQ: after more than a century, does the memory of the event result into a different perception of risk in the affected areas?**
- The goal of such a research was to understand how different sources of knowledge (historical, scientific and cultural) might be used to improve communication effectiveness

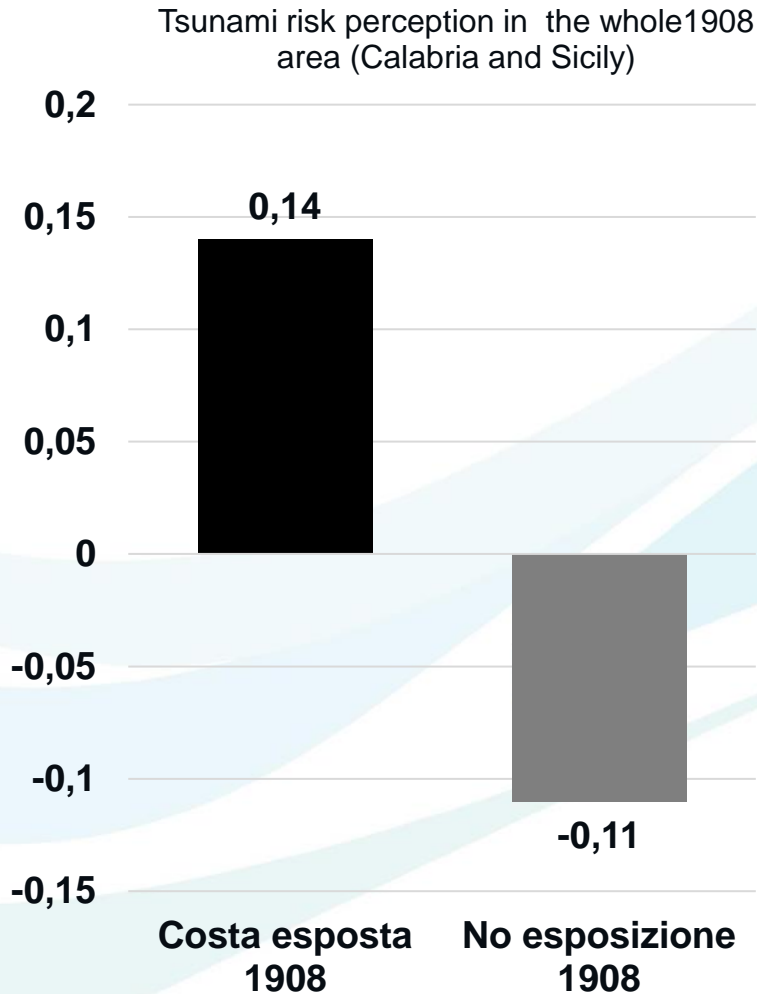
The 1908 sub-sample

Coastal areas	N
Not exposed, no observed impacts (non 1908 area)	385
Exposed, with observed impacts (1908 area)	1614
Total	1999

- Out of the 5842 interviews, 1999 came from Calabria and Sicily, both of which were affected by the Reggio Messina tsunami of December 28th 1908.
- The sub-sample was splitted into two areas: the one that was actually exposed (impacts of tsunami were observed and recorded) while the other was not.
- This subdivision was based on data from the ITED catalogue, which reports observations of event-related phenomena based on direct measurements of geophysical data or historical sources (e.g. Baratta, 1910).



Tsunami risk perception



The mean values of the tsunami risk perception index in coastal areas are obtained from 14 questions in the questionnaire through optimal scaling procedure. The most significant values are associated with the variables evoking damage, destruction and danger to people and their lives.

Region	Mean	N	σ
Calabria	0,63	404	0,827
Apulia	0,49	617	0,874
Molise	0,41	100	0,985
Basilicata	0,21	140	0,933
Sicily	-0,04	1595	0,897
Campania	-0,13	1170	0,864
Sardinia	-0,23	782	0,936
Latium	-0,23	1034	0,986
Total	0	5842	0,949

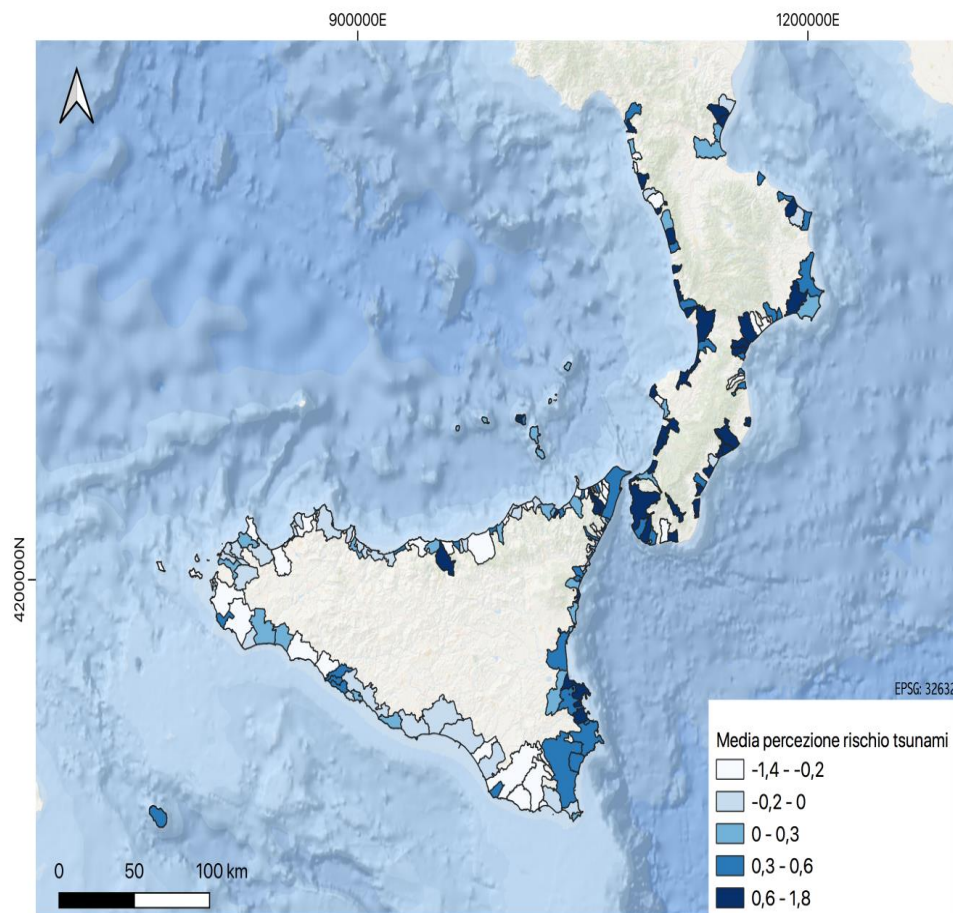
Tsunami risk perception in Calabria and Sicily

	Sicily			Calabria		
	Mean	N	σ	Mean	N	σ
Non 1908 area	-0,18	340	0,881	0,41	45	0,988
1908	0,00	1255	0,898	0,66	359	0,801
Total	-0,04	1595	0,897	0,63	404	0,827

- Despite Sicily and Calabria have very different levels of risk perception, it is a considerably higher in the areas hit by the 1908 event
- The higher levels of risk perception in Calabria – among other factors - could be hypothetically related to the higher level of human losses and destruction of 1908 event on Calabrian shores, particularly in Reggio and its surroundings
- Such an hypothesis should be carefully stressed by both quantitative and qualitative data



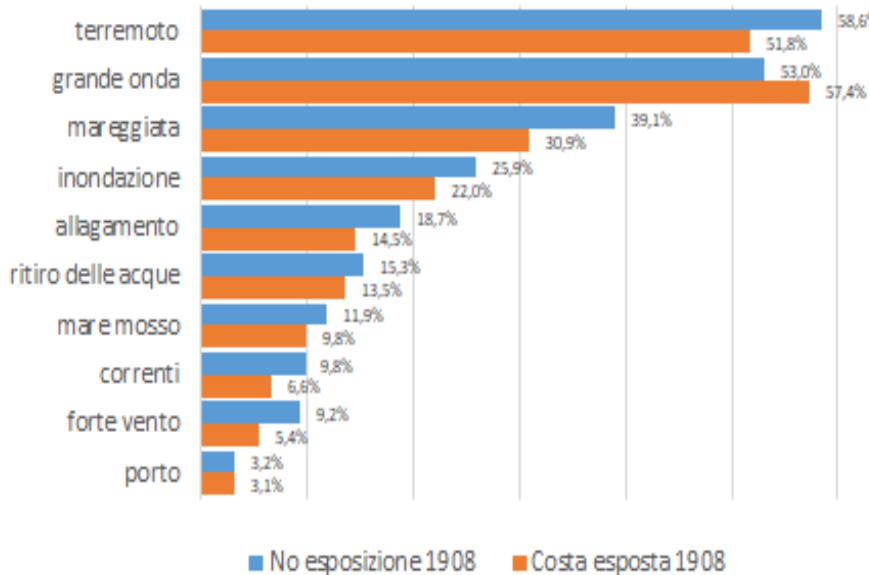
Spacial distribution of perceived risk



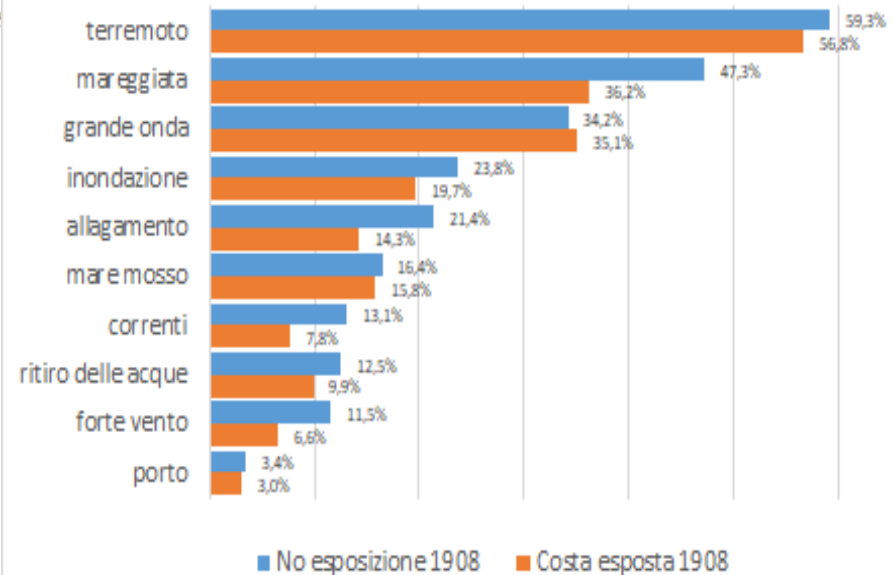
- The areas most affected by the effects of the 1908 tsunami and those with the highest risk perception are highly overlapped
- This is particularly evident for Calabria (also in Tyrrhenian coast) and a little bit less in Sicily (except on Ionian coasts)
- It is possible that risk perception is affected by an unknown factor to be further investigated (e.g. media coverage of a possible eruption on Mt. Marsili)

Tsunami or maremoto?

Attributi parola "tsunami"



Attributi parola "maremoto"



The spaces of attributes for “maremoto” and “tsunami” are differently configured, also in the two considered areas. The link between tsunami and earthquake is quite clear in both areas, but people living in 1908 tsunami area, are more likely to associate “tsunami” with ‘Big Wave’, while in non-1908 areas “maremoto” is more likely to be associated with “storm surge”



Sources of knowledge

Coastal areas	1908 area		Non 1908 area		Total
	N	V%	N	V%	N
Tv news	1318	84,2	290	79,7	1608
Newspapers	526	33,6	114	31,3	640
Internet	282	18	87	<u>23,9</u>	369
Science on TV (documentaries)	320	20,4	84	23,1	404
Books	332	<u>21,2</u>	66	18,1	398
Movies	170	10,9	64	<u>17,6</u>	234
Radio	147	9,4	24	6,6	171
Relatives and friends	158	<u>10,1</u>	12	3,3	170
Other combinations (< 3%)	114	8,3	9	2,4	123

- Tv news are the most relevant source of information (evidence is consistent with ISTAT / CENSIS data on media consumption in Italy)
- In 1908 area we found higher percentages of people relying on interpersonal sources (old tales of *maremoto* from grandparents are often cited)
- Scientific and institutional sources play a residual role, as they are unable to effectively reach ordinary and less educated people



Source combinations and risk perception

<i>Sources of knowledge</i>	<i>1908 area</i>			<i>Non 1908 area</i>		
	Mean	N	σ	Mean	N	σ
Media only	0,01	864	0,939	-0,19	222	0,940
Media and scientific sources	0,31	443	0,887	0,04	108	0,916
Scientific sources only	0,43	88	0,798	0,04	21	0,686
No specified source	-0,34	59	0,844	-0,22	22	0,820
Media and interpersonal sources	0,28	63	0,825	-0,45	3	0,275
Other combinations (N < 50)	0,39	48	0,853	-0,52	7	0,571
Media, scientific, and interpersonal source	0,59	49	0,677	1,11	2	0,344
Total	0,14	1614	0,920	-0,11	385	0,913

- Those who rely only on media have a biased understanding of tsunami risk and in turn, low risk perception (*narcotizing dysfunction* see: Lazarsfeld and Merton, 1948)
- In 1908 area, higher levels of risk perception are related to combinations including scientific and interpersonal sources, while people who do not mention source have the lower levels of risk perception
- In non-1908 areas average levels of risk perception are lower, the relatively higher values are related to people who include scientific sources (low number of cases, not statistically relevant)



Quality meets quantity

- Sample surveys rely on questionnaires to elicit interviewees' perceptions and measure opinions about the issues selected by research, in order to find regularities.
- Qualitative methods such as in-depth interviews, focus groups and ethnography can throw light on the way local population perceive and understand risks and the ways knowledge is conveyed
- Mixed methods approaches allow to simultaneously address values distribution of relevant variables and to understand social and cultural processes by which social actors construct phenomena as socially shared realities.
- «Mixed methods may bring in more robust evidence than either qualitative or quantitative approaches provide when they are used separately” (Alam, 2006).
- Marta Morini included has interviewed people living in 1908 area to better address the role of local knowledge in hers' graduate thesis.



In-depth interviews

- “[W]hen there was the earthquake tremor, which was very strong, it knocked down many houses. [...] At that point all the frightened people poured onto the beaches, being unable to understand, clearly at the time they could never have imagined that at some point from the south these (waves) came... the sea split in two and poured one part towards Messina and one part towards Reggio; and nothing, there was just a massacre” (Mr. L., 64, Villa San Giovanni, second-hand report).
- «[They] told me that they lowered down children from a window tied up in sheets. They used to tie these children to themselves with sheets because the sea would rip them out of their arms. When I was a little girl, they used to tell these stories of the *maremoto* coming up and then one tied the children to each other and passed them around with sheets (Mrs. P. 54, Villa San Giovanni, reporting old tales of her childhood).
- «[...] I believe that in case of an event like the one of 1908 there is no possibility of being able to prepare for the event; therefore, if an event of that size happens I think we should just resign ourselves to what the event is, because there is no time to prepare for it'.” (Mr S., 50, Messina).

Interviews excerpts from Marta Morini's degree thesis



Conclusions

- In the area affected by the 1908 event, tsunami risk perception is both quantitatively and qualitatively different than in non-exposed areas of the same regions.
- People who know about tsunamis exclusively through the media are more likely to downplay tsunami related risks, while combining different sources results in higher levels of risk perception.
- In the area exposed to the 1908 event interpersonal communication sources play a stronger role, also testifying the relevance of the oral memory of past events (open-ended questions often recall grandparents' stories).
- Sources of knowledge are differently handled: this does not depend on sample characteristics but on the sedimentation of the memory of the event
- Apparently, the memory of the 1908 event also fosters further examination through media (TV, newspapers, radio) and scientific and institutional sources (universities and research Institutions, Civil Protection), which however is associated with a very limited penetration / effectiveness.



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