An integrated approach for investigating flood risk perception in urban areas: some hints from the city of Brindisi (southern Italy)

Stefania Santoro, Vincenzo Totaro, Ruggiero Lovreglio, Domenico Camarda, Vito Iacobellis, Umberto Fratino

AIMS

Exploring innovative approaches in which new technologies on the one hand, and history on the other, can support Flood Risk Management in urban areas.

CASE STUDY

Brindisi is crossed by several streams, whose risk is mapped by the local Basin Authority. Hydraulic properties of the soil make the city prone to frequent flooding.

METHODOLOGY

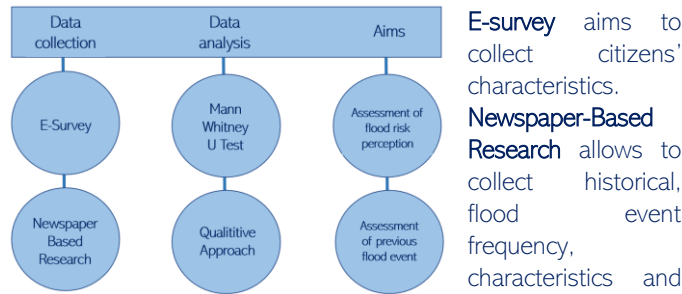A coupled approach combining E-Survey and Newspaper-Based Research has been applied (Fig.1).

Fig.1_Methodology

E-survey aims to collect citizens' characteristics.
Newspaper-Based Research allows to collect historical, flood event frequency, characteristics and effects

The degree of citizens' risk perception has been investigated through factors influencing risk perception (Fig.2) and measured on Likert Scale (1: low; 7:High)

A preliminary analysis of flood frequency and structure was conducted exploiting the AVI dataset and integrating data from local newspapers.
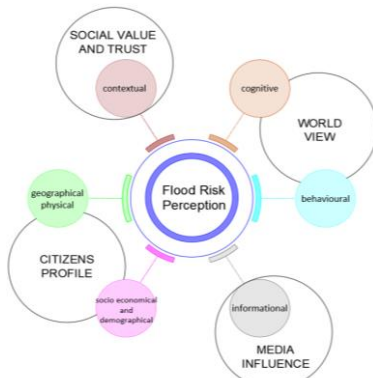

Fig.2_Risk Perception Factors

RESULTS From flood risk perception analysis

The analysis was carried out on a sample of 301 citizens.

The results are relating to *Hazard Proximity* variable. From the observation of the boxplot, it is possible to notice that people living in floodable areas have a higher perception of risk.

On the other hand, from the map it is possible to notice non negligible values of perception away from floodable areas. This can support the hypothesis that a correct analysis of risk perception should be addressed to the detection of all possible sources of floods and social dynamics.
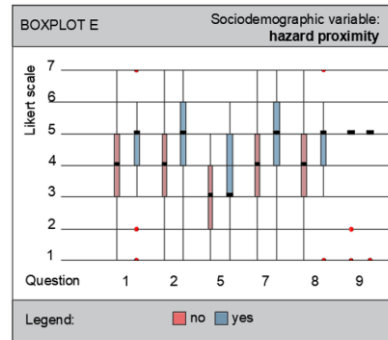

Fig.3_Boxplot of statistically significant variables

Fig.4_Flood Risk Perception Map

RESULTS From flood hystorical analysis

Newspaper-based hystorical analysis allowed to detect 65 flood event from 1951 to 1998, providing details about affected streets, neighborhoods and types and dynamics of floods.

Street name	Neighborhood	Number of Events (1951-1998)
Via Torpisana	Commenda	18
Via Appia	Cappuccini	10
Via Commenda	Commenda	10
Via del Mare	Centro	8
Via Imperatore Costantino	Commenda	7
Via Porta Lecce	Centro	6
Via Bastioni San Giacomo	Centro	5
Via Ciciriello	Paradiso	5
Via Provinciale per S. Vito	Paradiso	5
Via Carmine	Centro	4
Via Liguria	Commenda	4
Via Nicola Brandi	Paradiso	4
Via Cinque Giornate	Santa Chiara	3
Via Provinciale Lecce	Perrino	3

Tab.1_Flood Landmark from historical research

Fig.5_Flood Landmark Map from historical research

CONCLUSIONS

The E-survey has the advantage for the analyst to create a database to be checked and analyzed in a short time, information to be spatially localized, and data to be used for more accurate analyses. Elements that would improve the flood risk management process by planning more precise strategies focused on specific categories of citizens according to their demography and location in an urban area at risk. On the other hand, it may have two limitations: (i) excluding the knowledge of citizens who do not use the web platform and (ii) providing results in an aggregated form that recognizes an "average" of citizens' knowledge and perception.

The Newspaper-based research allowed to carry out a preliminary and critical analysis about typology, frequency and severity of floods, revealing itself to be a precious and diffuse source of information about historical dynamics in urban areas.

Combining these approaches can result as an additional source of knowledge for improving preparedness and resilience of communities to flood risk.

MAIN REFERENCES

-Santoro S., Totaro V., Lovreglio R., Camarda D., Iacobellis V., Fratino U. (2021); Risk perception and preparedness knowledge for flood risk planning. The case study of Brindisi (Puglia region); Journal of Environmental Management; submitted.
-Di Baldassarre, G., Kooy, M., Kemerink, J.S., Brandimarte, L., 2013. Towards understanding the dynamic behaviour of floodplains as human-water systems. Hydrol. Earth Syst. Sci. 17, 3235–3244. https://doi.org/10.5194/hess-17-3235-2013
-Lechowska, E. (2018). What determines flood risk perception? A review of factors of flood risk perception and relations between its basic elements. Nat Hazards 94, 1341–1366 https://doi.org/10.1007/s11069-018- 3480-z
-Maidl E, Buchecker M (2015) Raising risk preparedness by flood risk communication. Nat Hazards. Earth Syst Sci 15:1–19;
-Voinov, A., Kolagani, N., Mccall, M.K., Glynn, P.D., Kragt, M.E., Ostermann, F.O., Pierce, S.A., Ramu, P., 2016. Environmental Modelling & Software Modelling with stakeholders e Next generation. Environ. Model. Softw. 77, 196–220. https://doi.org/10.1016/j.envsoft.2015.11.016

Corresponding author:

Stefania Santoro, PhD candidate,
University Polytechnic of Bari, Dicatech via E. Orabona 4
stefania.santoro@poliba.it