

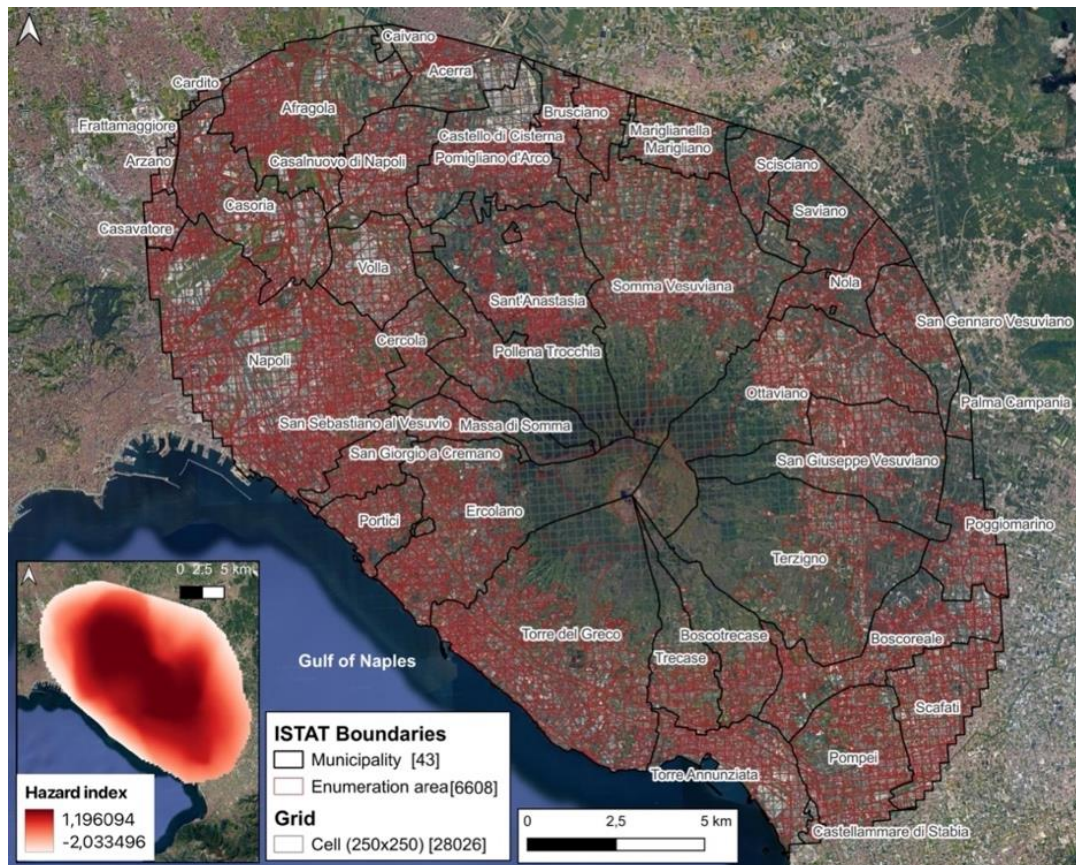


Figure S1 Study area intercepted by the volcanic hazard index map grid (left-bottom) with the identification of the municipalities and EAs possibly affected. The ISTAT boundaries refer to the year 2021 and were retrieved from <https://www.istat.it/notizia/basi-territoriali-e-variabili-censuarie/>. Google Satellite was used as a basemap and the entire figure was generated in QGIS software 3.32.2.

	MUNICIPALITY	N.° of EA21	POP21	BUILD21
1	ACERRA	118	15,360	1,312
2	AFRAGOLA	487	61,593	3,252
3	ARZANO	28	2,689	608
4	BOSCOREALE	247	26,317	3,569
5	BOSCOTRECASE	74	9,897	1,556
6	BRUSCIANO	95	1,5851	1,448
7	CAIVANO	1	1	13
8	CARDITO	11	2,696	163
9	CASALNUOVO DI NAPOLI	198	47,428	2,716
10	CASAVATORE	67	18,282	610
11	CASORIA	321	74,394	4,108
12	CASTELLAMARE DI STABIA	9	3,296	181
13	CASTELLO DI CISTERNA	78	7,815	1,270
14	CERCOLA	76	17,124	1,401
15	FRATTAMAGGIORE	8	434	46
16	MARIGLIANELLA	9	1,628	117
17	MARIGLIANO	57	6,725	1,702
18	NAPOLI	1,288	160,648	12,224
19	NOLA	78	5677	1 175
20	OTTAVIANO	132	23,064	3,804
21	PALMA CAMPANIA	8	257	82
22	POGGIOMARINO	72	21,504	1,971

23	POLLENA TROCCHIA	73	12,976	1,915
24	POMIGLIANO D'ARCO	318	39,762	2,963
25	POMPEI	187	22,339	3,007
26	PORTICI	190	52,500	1,863
27	ERCOLANO	297	50,580	5,054
28	SAN GENNARO VESUVIANO	46	11,714	1,669
29	SAN GIORGIO A CREMANO	186	43,057	1,346
30	SAN GIUSEPPE VESUVIANO	105	30,045	3,893
31	SAN SEBASTIANO AL VESUVIO	54	8,721	1,142
32	SANT'ANASTASIA	284	26,460	3,605
33	SAN VITALIANO	1	6	6
34	SAVIANO	25	5,960	1,643
35	SCISCIANO	28	3,095	975
36	SOMMA VESUVIANA	193	33,935	6,474
37	TERZIGNO	72	17,256	3,177
38	TORRE ANNUNZIATA	206	40,523	2,204
39	TORRE DEL GRECO	477	81,289	8,149
40	VOLLA	119	25,369	2,552
41	TRECASE	70	8,594	1,687
42	MASSA DI SOMMA	30	5,056	1,268
43	SCAFATI	185	33,591	2,884
	TOTAL	6,608	1,075,508	100,804

Table S1 Municipalities under investigation with number of EAs (EA21), inhabitants (POP21) and buildings (BUILD21) referring to the year 2021 intercepted by the hazard index grid map.

MUNICIPALITY	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
ACERRA	X	X	X		
AFRAGOLA	X	X	X	X	
ARZANO	X				
BOSCOREALE	X	X	X	X	
BOSCOTRECASE			X	X	X
BRUSCIANO	X	X			
CAIVANO	X				
CARDITO	X				
CASALNUOVO DI NAPOLI			X	X	X
CASAVATORE	X				
CASORIA	X	X	X	X	
CASTELLAMARE DI STABIA	X	X			
CASTELLO DI CISTERNA	X	X	X		
CERCOLA					X
FRATTAMAGGIORE	X				
MARIGLIANELLA	X				
MARIGLIANO	X				
NAPOLI	X	X	X	X	X
NOLA	X	X	X		

OTTAVIANO	X	X	X	X	X
PALMA CAMPANIA	X				
POGGIOMARINO	X	X			
POLLENA TROCCHIA					X
POMIGLIANO D'ARCO			X	X	X
POMPEI		X	X	X	
PORTICI	X	X	X	X	
ERCOLANO	X	X	X	X	X
SAN GENNARO VESUVIANO	X				
SAN GIORGIO A CREMANO		X	X	X	
SAN GIUSEPPE VESUVIANO		X	X	X	X
SAN SEBASTIANO AL VESUVIO				X	X
SANT'ANASTASIA					X
SAN VITALIANO	X				
SAVIANO	X				
SCISCIANO	X				
SOMMA VESUVIANA	X	X	X	X	X
TERZIGNO		X	X	X	X
TORRE ANNUNZIATA	X	X	X	X	
TORRE DEL GRECO	X	X	X	X	X
VOLLA				X	X
TRECASE			X	X	
MASSA DI SOMMA					X
SCAFATI	X				

Table S2. Volcanic hazard levels of EAs included in each municipality under investigation. Municipalities underlined with yellow color show the highest level of volcanic hazard.

MUNICIPALITY	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
ACERRA	X	X	X	X	X
AFRAGOLA		X	X	X	
ARZANO		X	X	X	X
BOSCOREALE		X	X	X	
BOSCOTRECASE		X	X	X	X
BRUSCIANO		X	X	X	X
CAIVANO	X				
CARDITO			X	X	X
CASALNUOVO DI NAPOLI		X	X	X	X
CASAVATORE			X	X	X
CASORIA		X	X	X	X
CASTELLAMARE DI STABIA			X	X	
CASTELLO DI CISTERNA	X	X	X	X	X

CERCOLA			X	X	X
FRATTAMAGGIORE		X	X		
MARIGLIANELLA			X	X	X
MARIGLIANO		X	X	X	X
NAPOLI		X	X	X	X
NOLA	X	X	X	X	X
OTTAVIANO	X	X	X	X	X
PALMA CAMPANIA		X	X	X	
POGGIOMARINO	X	X	X	X	X
POLLENA TROCCHIA		X	X	X	X
POMIGLIANO D'ARCO		X	X	X	X
POMPEI		X	X	X	X
PORTICI		X	X	X	
ERCOLANO	X	X	X	X	X
SAN GENNARO VESUVIANO		X	X	X	X
SAN GIORGIO A CREMANO		X	X	X	X
SAN GIUSEPPE VESUVIANO		X	X	X	X
SAN SEBASTIANO AL VESUVIO			X	X	X
SANT'ANASTASIA		X	X	X	X
SAN VITALIANO	X				
SAVIANO		X	X	X	X
SCISCIANO		X	X	X	X
SOMMA VESUVIANA		X	X	X	X
TERZIGNO	X	X	X	X	X
TORRE ANNUNZIATA		X	X	X	X
TORRE DEL GRECO	X	X	X	X	X
VOLLA			X	X	X
TRECASE			X	X	X
MASSA DI SOMMA			X	X	X
SCAFATI		X	X	X	X

Table S3. Exposure levels of EAs included in each municipality under investigation.

MUNICIPALITY	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
ACERRA	X	X	X	X	X
AFRAGOLA	X	X	X	X	X
ARZANO			X	X	X
BOSCOREALE	X	X	X	X	
BOSCOTRECASE	X	X	X	X	
BRUSCIANO	X	X	X	X	X
CAIVANO				X	
CARDITO				X	X

CASALNUOVO DI NAPOLI	X	X	X	X	X
CASAVATORE		X	X	X	X
CASORIA	X	X	X	X	X
CASTELLAMARE DI STABIA	X				
CASTELLO DI CISTERNA	X	X	X	X	X
CERCOLA	X	X	X	X	X
FRATTAMAGGIORE					X
MARIGLIANELLA					X
MARIGLIANO		X	X	X	X
NAPOLI	X	X	X	X	X
NOLA	X	X	X	X	X
OTTAVIANO	X	X	X	X	X
PALMA CAMPANIA	X				
POGGIOMARINO	X	X	X	X	
POLLENA TROCCHIA	X	X	X	X	X
POMIGLIANO D'ARCO	X	X	X	X	X
POMPEI	X	X	X		
PORTICI	X	X	X	X	X
ERCOLANO	X	X	X	X	X
SAN GENNARO VESUVIANO	X	X	X		
SAN GIORGIO A CREMANO	X	X	X	X	X
SAN GIUSEPPE VESUVIANO	X	X	X	X	
SAN SEBASTIANO AL VESUVIO	X	X	X	X	
SANT'ANASTASIA	X	X	X	X	X
SAN VITALIANO		X			
SAVIANO		X	X	X	
SCISCIANO	X	X	X	X	
SOMMA VESUVIANA	X	X	X	X	X
TERZIGNO	X	X	X	X	
TORRE ANNUNZIATA	X	X	X	X	X
TORRE DEL GRECO	X	X	X	X	X
VOLLA	X	X	X	X	X
TRECASE	X	X	X	X	
MASSA DI SOMMA	X	X	X	X	X
SCAFATI	X				

Table S4. Overall vulnerability levels of EAs included in each municipality under investigation.

MUNICIPALITY	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5
ACERRA	X	X	X	X	X
AFRAGOLA	X	X	X	X	X
ARZANO	X	X	X		
BOSCOREALE	X	X	X	X	X
BOSCOTRECASE		X	X	X	X
BRUSCIANO	X	X	X	X	X
CAIVANO	X			X	
CARDITO		X	X		
CASALNUOVO DI NAPOLI			X	X	X
CASAVATORE	X	X	X	X	
CASORIA		X	X	X	X
CASTELLAMARE DI STABIA	X	X			
CASTELLO DI CISTERNA	X	X	X	X	X
CERCOLA				X	X
FRATTAMAGGIORE	X	X			
MARIGLIANELLA		X	X		
MARIGLIANO	X	X	X	X	
NAPOLI	X	X	X	X	X
NOLA	X	X	X		
OTTAVIANO	X	X	X	X	X
PALMA CAMPANIA	X				
POGGIOMARINO		X	X	X	
POLLENA TROCCHIA	X	X	X	X	X
POMIGLIANO D'ARCO		X	X	X	X
POMPEI	X	X	X	X	
PORTICI	X	X	X	X	X
ERCOLANO	X	X	X	X	X
SAN GENNARO VESUVIANO	X	X			
SAN GIORGIO A CREMANO		X	X	X	X
SAN GIUSEPPE VESUVIANO	X	X	X	X	
SAN SEBASTIANO AL VESUVIO		X	X	X	
SANT'ANASTASIA		X	X	X	X
SAN VITALIANO	X				
SAVIANO	X	X	X		
SCISCIANO	X	X	X	X	
SOMMA VESUVIANA	X	X	X	X	X
TERZIGNO	X	X	X	X	X
TORRE ANNUNZIATA	X	X	X	X	X
TORRE DEL GRECO	X	X	X	X	X
VOLLA				X	X
TRECASE		X	X	X	X
MASSA DI SOMMA				X	X
SCAFATI	X	X			

Table S5. Volcanic risk levels of EAs included in each municipality under investigation.

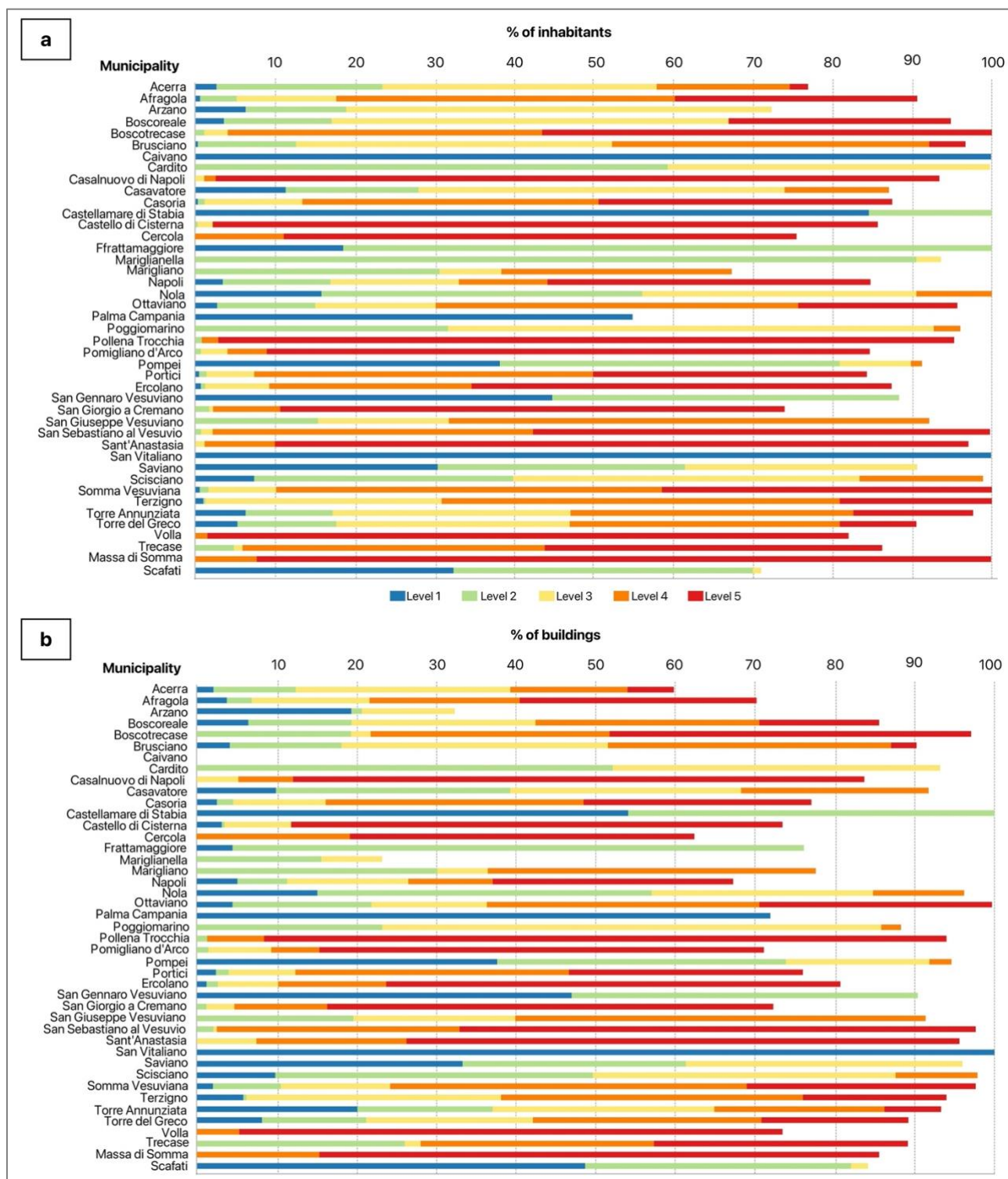


Figure S2. Percentage of inhabitants (a) and buildings (b) exposed to volcanic risk levels for each municipality.

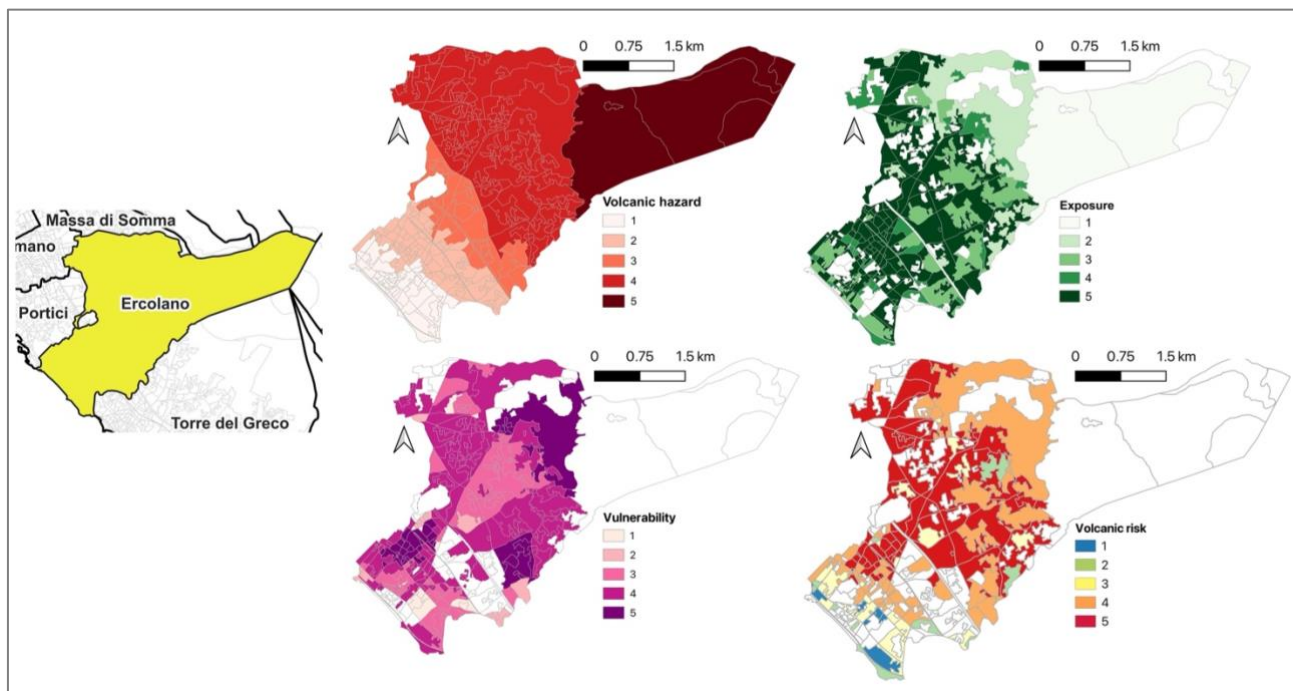


Figure S3. Volcanic risk components distribution across the municipality of Ercolano.

RISK COMPONENT	SUB-COMPONENT	VARIABLE	DATA SOURCE
Hazard	Volcanic	1. Flow temperature 2. Particle volumetric concentration 3. Flow duration 4. Flow dynamic pressure	<i>Mele et al., 2024</i> https://zenodo.org/records/13378963
	Population	1. N° of inhabitants	<i>ISTAT, 2021</i> https://www.istat.it/it/notizia/basi-territoriali-e-variabili-censuarie/
Exposure	Building	1. N° of buildings	<i>CPD, 2021</i> https://github.com/pcm-dpc/DPC-Aggregati-Strutturali-ITF-Sud/tree/master/Sud/Campania
	Social	1. Younger with age <15 years 2. Elderly with age > 64 years 3. Foreign residents 4. Households with members > 4 5. Low human capital (males) 6. Low human capital (females) 7. Unemployed males 8. Unemployed females 9. EA centroid X coordinate 10. EA centroid Y coordinate	<i>ISTAT, 2021</i> https://www.istat.it/it/notizia/basi-territoriali-e-variabili-censuarie/
		1. Residential buildings 2. Commercial buildings 3. Buildings constructed with masonry material	

Vulnerability	<i>Physical</i>	4. Buildings constructed with other material 5. Buildings < 1919 6. 1919 < Building < 1945 7. 1946 < Building < 1960 8. 1961 < Building < 1979 9. 1971 < Building < 1979 10. Buildings with more than 4 floors 11. Buildings in poor condition 12. Buildings in very poor condition 13. EA centroid X coordinate 14. EA centroid Y coordinate	<i>ISTAT, 2011</i> (http://dati-censimentopopolazione.istat.it/Index.aspx)
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Table S6. Variables and data sources used for hazard assessment, exposure calculation and vulnerability evaluation with indication of the data source.