



UNIVERSITÉ  
DE GENÈVE  
FACULTÉ DES SCIENCES



# Building resilient communities through urban planning and the integration of the Natural Sciences:

Integrating hazard and risk data into policymaking for inclusive, safe,  
resilient and sustainable cities and human settlements

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## Impact assessment to support more resilient, recovery and enhanced risk mitigation strategies

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# Points of the presentation

1. Why impact assessment in terms of post-disaster damage and losses assessment is important?
2. Conceptual link between different aspects and purposes of damage and losses assessment
3. First example of post-flood damage assessment in the Umbria Region after a sequence of severe floods affecting a number of cities and rural areas
4. Second example of post-earthquake damage assessment conducted ten years after the event: what lessons can be learned regarding data collected for first recovery and reconstruction
5. Looking ahead...at enhanced practices



# Why bothering with damage and losses data collection and analysis?

The framework below is based on the one developed by the JRC technical working group (De Groeve, K. Pljansek, D. Erlich, Recording disaster losses, JRC, 2013)

Motivation

Objectives

Local users

National users

Global users

Loss Accounting

Recording the impact

Measuring trends



Local policy (city)

National policy (National Administrations)

International policy (UN, donors, EU Policy-DG ECHO)

Disaster forensic

Identify the cause

Learning from the past



Local expert teams

National expert teams

International expert teams (PDNA)

Risk modelling

Modelling future losses

DRR and mitigation



Local research/policy

National research/policy (Regional, GEM)

International initiatives (GEM, GAR), EU policy

Needs assessment (compensation)

Recovery

Fair resources allocation



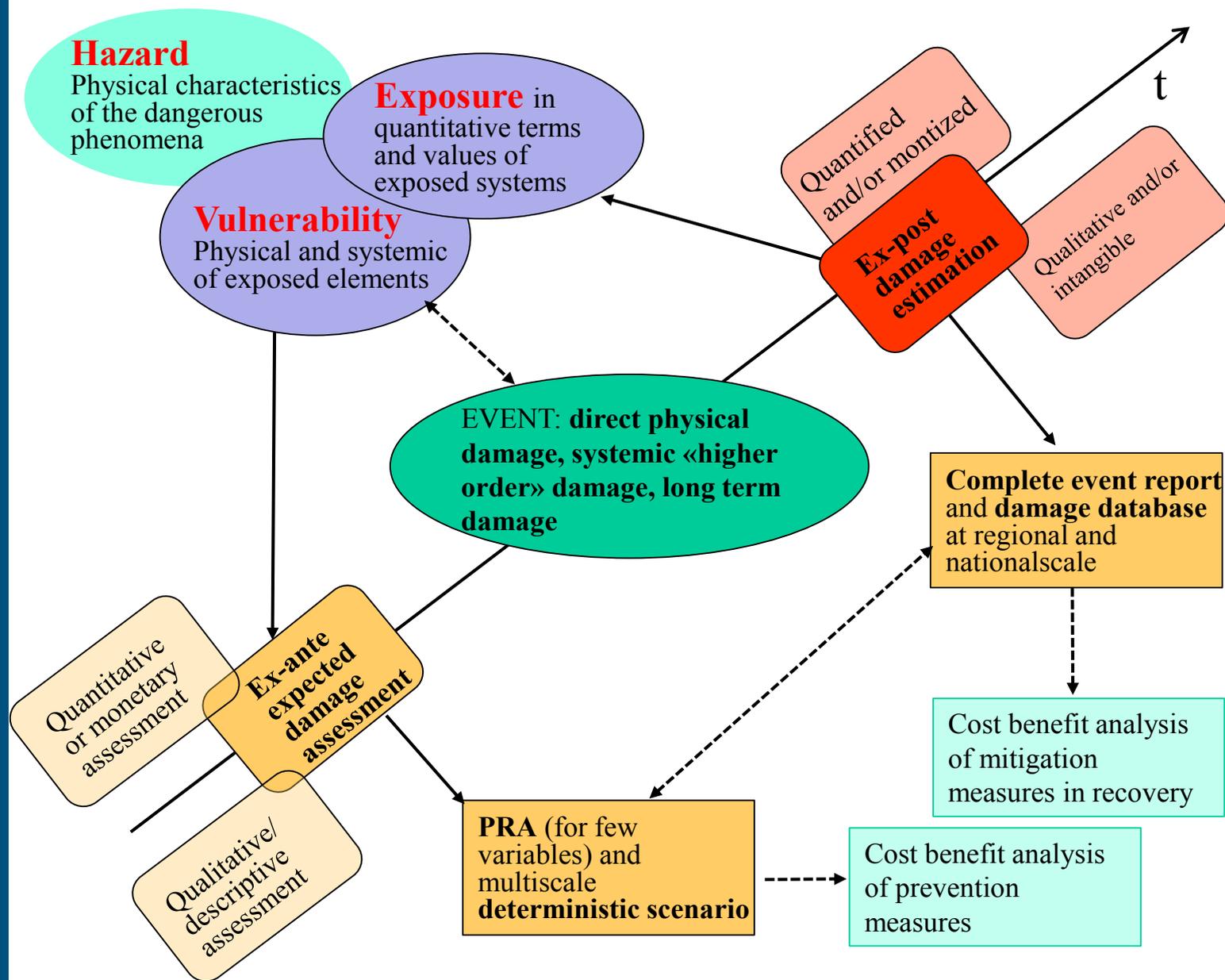
Local officials/insurers

Regional/national officers, insurance companies

EU Solidarity Fund in case of activation



# Why bothering with damage and losses data collection and analysis?



In the Umbria Region we are working together with the Regional Civil Protection **to develop tools for post-flood damage assessment**, integrating compensation and risk assessment needs, with the aim of advancing in accountability and prioritization of recovery and reconstruction. Post flood damage assessment is carried out for multiple sectors at the regional and local scales.

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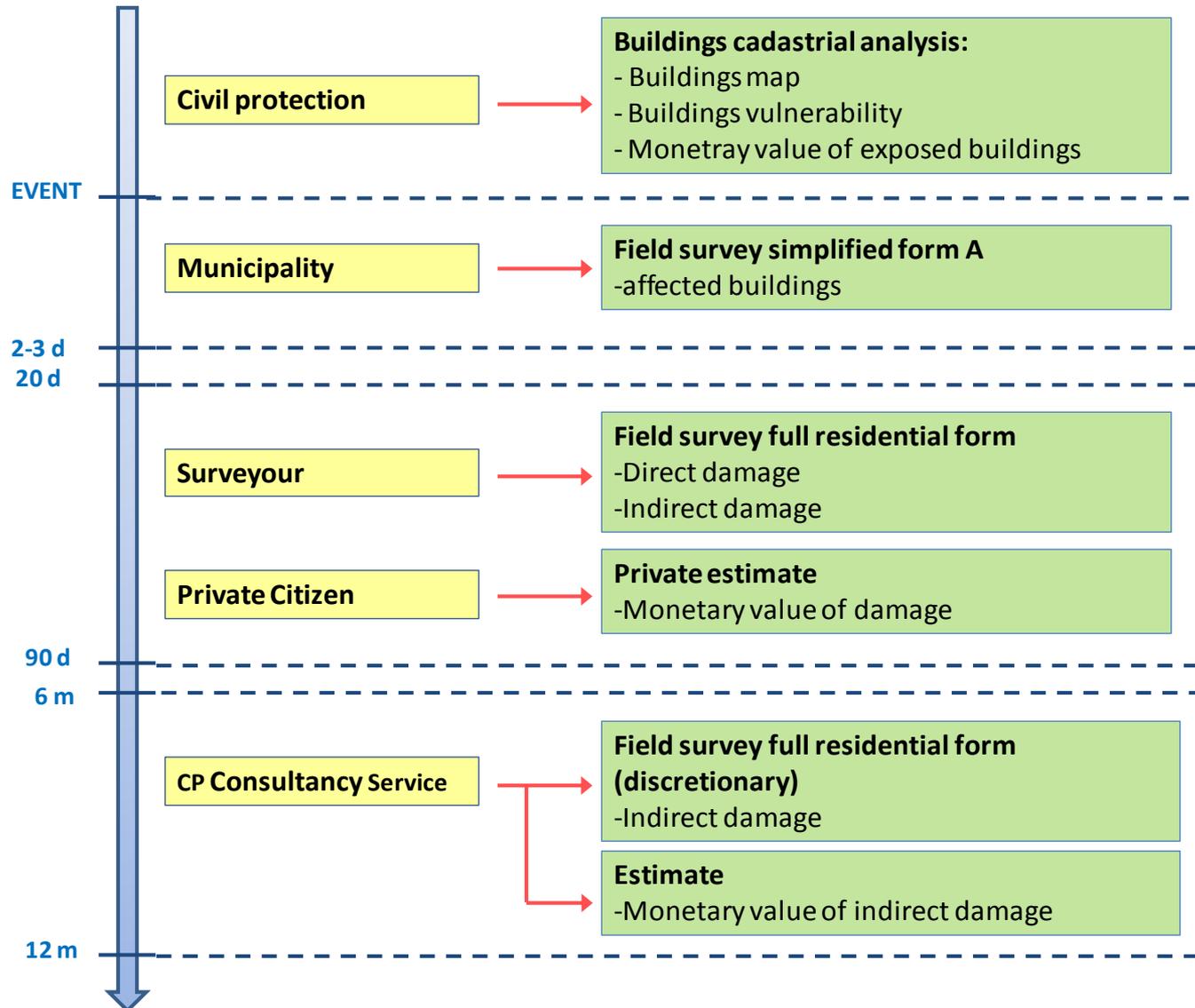


Sectors	Scale	Aspects	Type of damage	Tool/data
Event	local/regional	hazard		regional/CNR/Tevere River Basin/other
People (victims, evacuated)	local	loss	direct and indirect	Regional Authority and interviews
Lifelines	regional	loss and functionality	direct and indirect	Regional Authority, lifelines providers
Public facilities	provincial/ regional	loss and functionality	direct and indirect	Regional, provincial and local authorities
Agriculture	regional/large scale	loss	direct	Regional/associations/ others
Industrial plants	local	vulnerability and loss	direct and indirect	Local authorities, Regional authorities, direct surveys
Residential buildings	local	vulnerability and loss	direct and indirect	Local authorities, direct surveys
Natural environment	local/regional	loss	direct (?) and indirect	Regional authorities, Parks, others





The procedure that is under development is combining the different requirements associated to the purposes for which damage assessment is carried out (compensation, forensic, needs assessment)

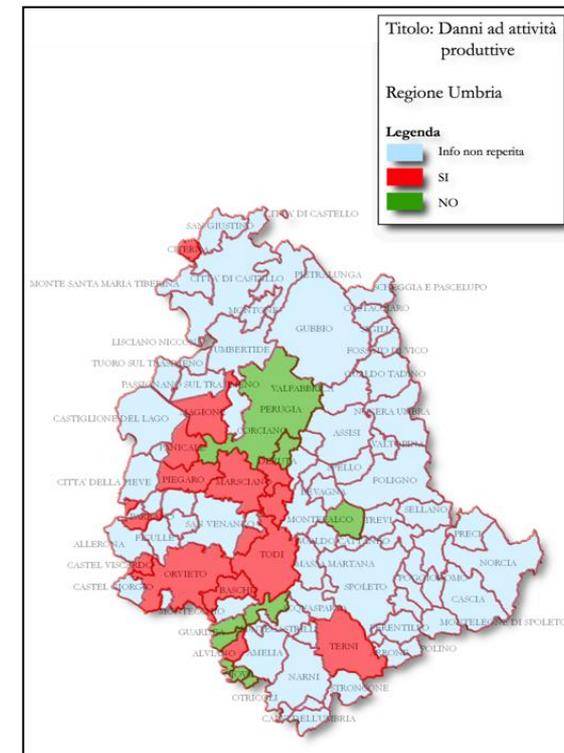
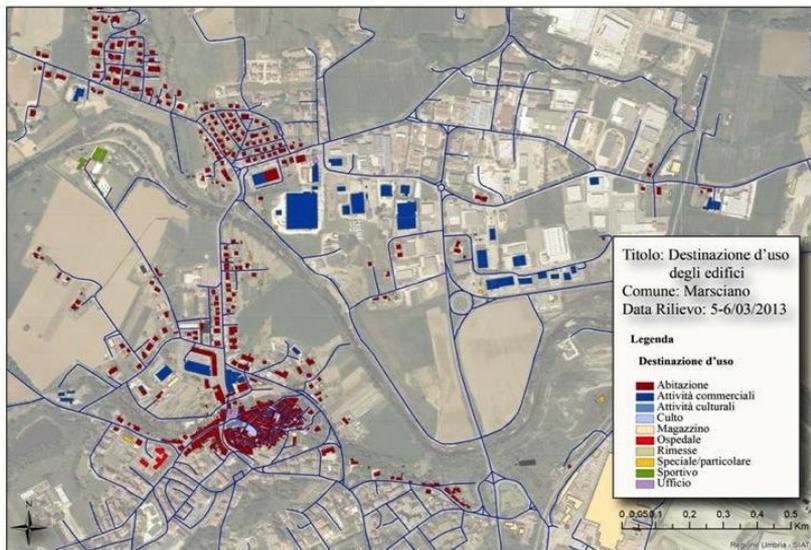
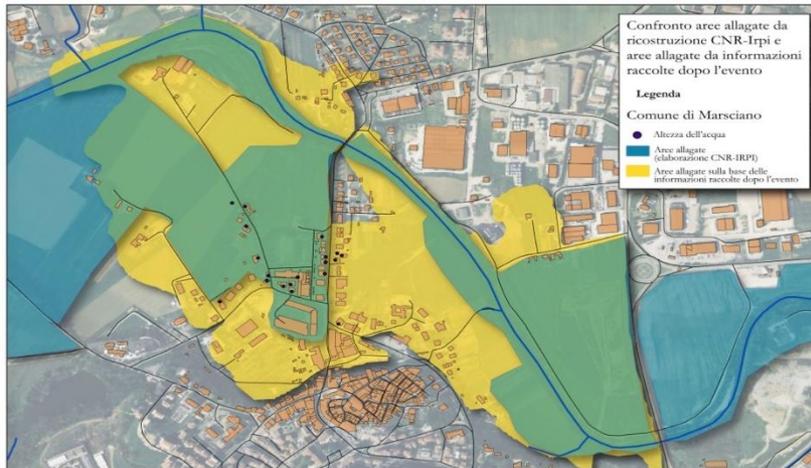


Application of the methods and development of reports on the three events of November 2012, 2013, and February 2014.

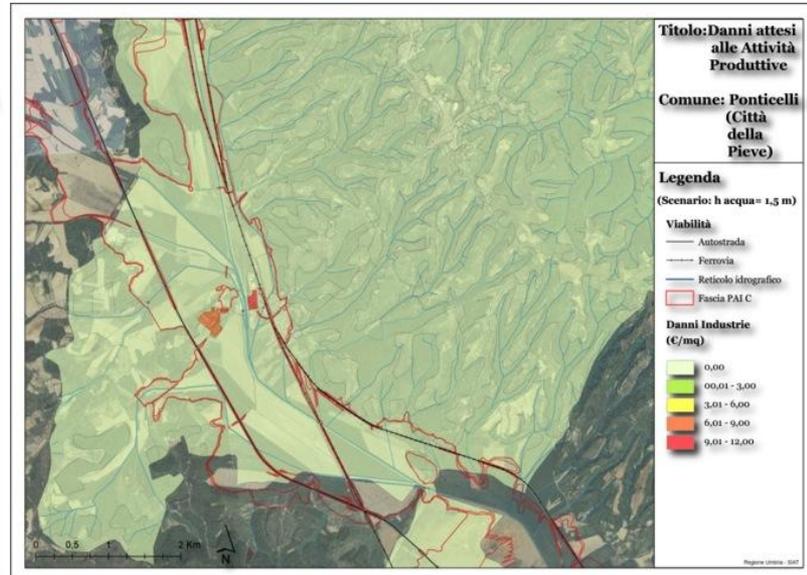
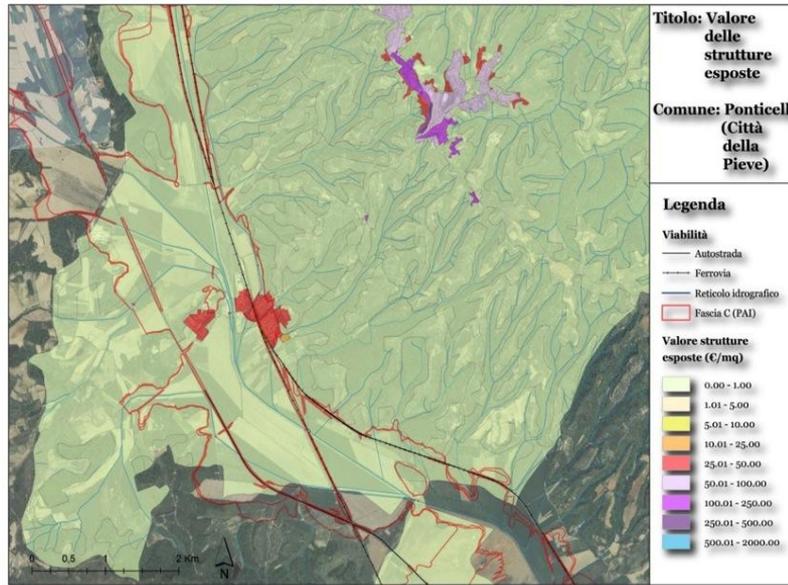
## “Real life test”: the Umbria/Central Italy floods and landslides in November 2012 and 2013



# Results that have been obtained for the Umbria Region: examples taken from the 2012 Event Report.



# How results of the damage analysis can support better reconstruction and recovery? How to have an impact on land use and urban planning?

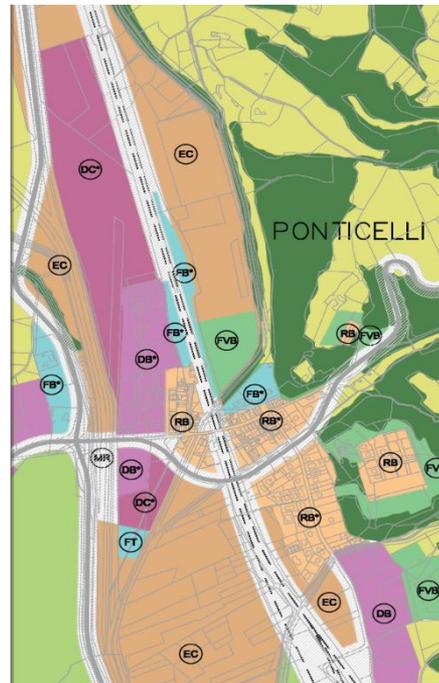


**LEGENDA**

RA	TERRITORIO ESISTENTE DI FORMAZIONE STORICA PREVALENTEMENTE RESIDENZIALE
RB	TERRITORIO ESISTENTE CENTRI E BORGI RURALI MINORI
RB	TERRITORIO ESISTENTE DI FORMAZIONE RECENTE PREVALENTEMENTE RESIDENZIALE
FB	TERRITORIO ESISTENTE DI FORMAZIONE RECENTE PREVALENTEMENTE DESTINATO A SERVIZI
FT	TERRITORIO ESISTENTE DESTINATO A SERVIZI TURISTICI
FT	TERRITORIO ESISTENTE DI FORMAZIONE RECENTE PREVALENTEMENTE DESTINATO A SERVIZI TECNOLOGICI
DB	TERRITORIO ESISTENTE DI FORMAZIONE RECENTE PREVALENTEMENTE PRODUTTIVO
FVB	AMBITI DESTINATI A VERDE URBANO E VERDE ATTREZZATO
FT	TERRITORIO ESISTENTE
IC	ZONE DI NUOVO IMPIANTO PREVALENTEMENTE RESIDENZIALI
IC	ZONE DI NUOVO IMPIANTO PREVALENTEMENTE DESTINATE A SERVIZI
DC	ZONE DI NUOVO IMPIANTO PREVALENTEMENTE PRODUTTIVE
FVC	AMBITI DESTINATI A VERDE URBANO E VERDE ATTREZZATO NUOVO IMPIANTO
MR	AMBITI DI RISPETTO URBANO
P	AMBITI DESTINATI AL SISTEMA DELLA SOSTA DI VALENZA STRATEGICA ESISTENTI O DI PREVISIONE
PA	AMBITI ZONIZZATI SOTTOPOSTI A DISCIPLINA SPECIFICA RELATIVA AL RISCHIO IDRAULICO (ambiti da studi o Piani dell'Alto Fiume Arno del P.A.U. di Settore del Fiume Tevere del Comune)
EA	AREE AGRICOLE DI PREGIO
EC	AREE AGRICOLE COMPROMESSE
ED	AREE AGRICOLE
EB	AREE BOSCHIVE
SP	AMBITI A DESTINAZIONE SPECIALISTICA

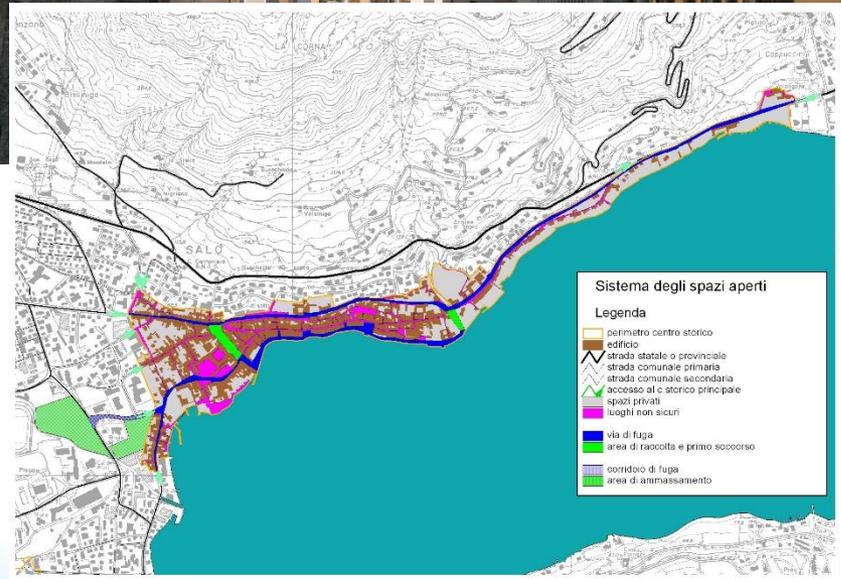
**VIABILITÀ**

- AUTOSTRADA
- VIABILITÀ DI INTERESSE SOVRACOMUNALE ESISTENTE
- VIABILITÀ DI INTERESSE SOVRACOMUNALE DI PROGETTO





At the ten anniversary of the earthquake that hit the Salò town and its surroundings in the Garda Lake, Northern Italy, area on November 2004, we conducted a study to recover the information on the physical direct damage to buildings that was in the municipality archives



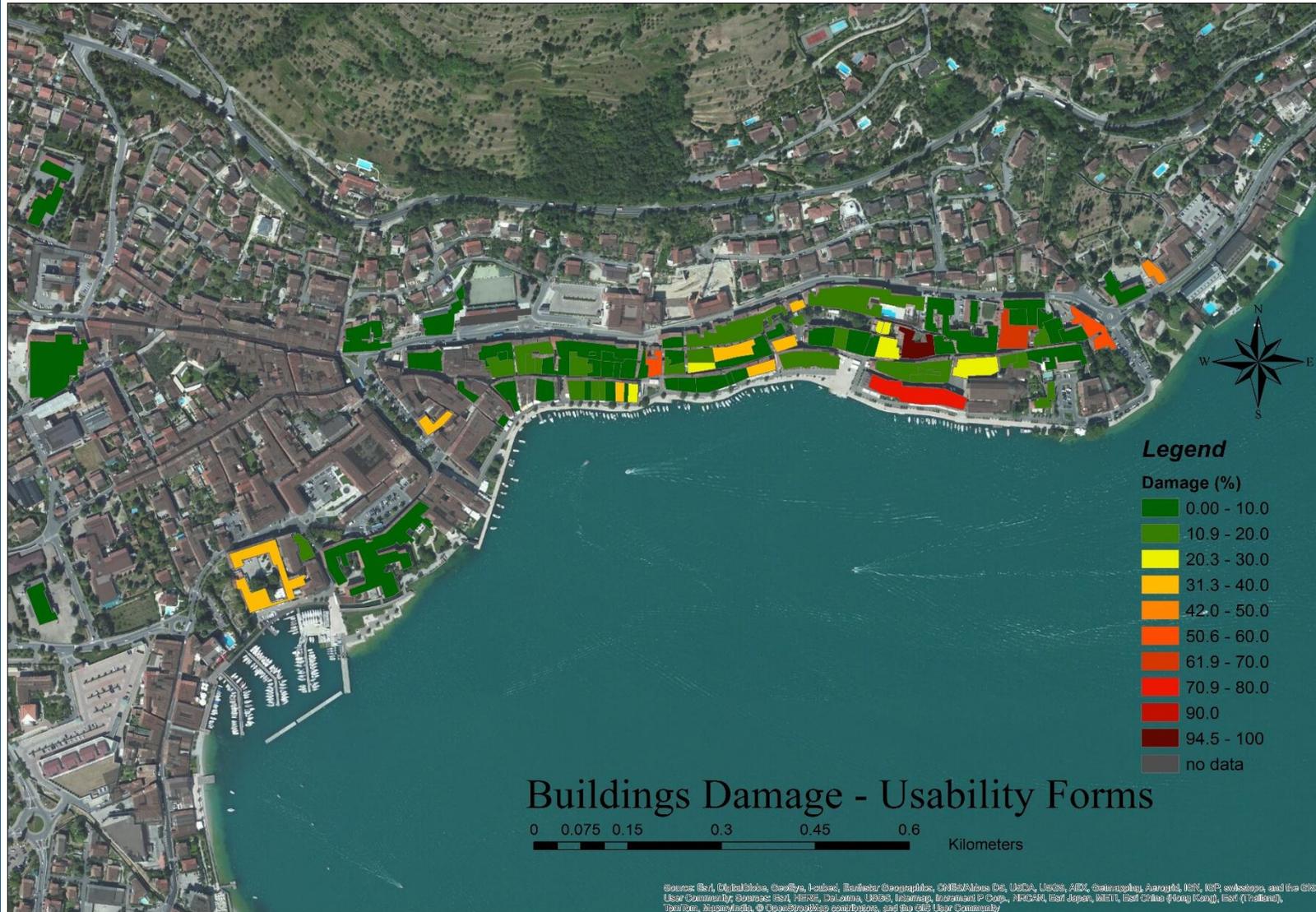


The usability forms that were collected those days after the earthquake to support emergency and recovery management were analysed together with the database where the data had been input

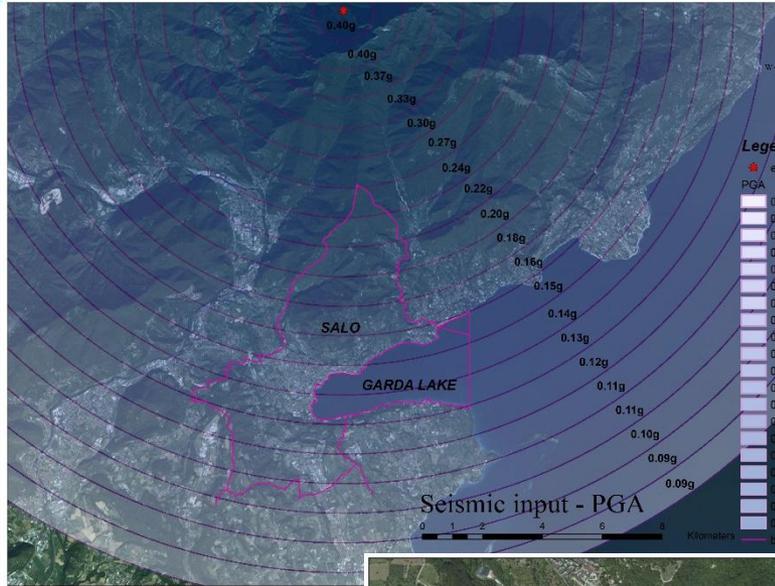
ID	NumeroPrat	Istat	Data	CodiceComu	CodiceLoca	Typology ID	Address
616	0171700616	003017170	27/11/2004	017170	017170	1	VIA FANTONI
628	0171700628	003017170	27/11/2004	017170	017170	1	VIA FANTONI
730	0171700730	003017170	27/11/2004	017170	017170	1	VIA FANTONI
1340	0171701340	003017170	28/11/2004	017170	017170	1	VIA FANTONI
1438	0171701438	003017170	28/11/2004	017170	017170	1	VIA FANTONI
1448	0171701448	003017170	28/11/2004	017170	017170	1	VIA FANTONI
1573	0171701573	003017170	28/11/2004	017170	017170	1	VIA FANTONI
1612	0171701612	003017170	28/11/2004	017170	017170	1	VIA FANTONI
1726	0171701726	003017170	28/11/2004	017170	017170	1	VIA FANTONI
1756	0171701756	003017170	28/11/2004	017170	017170	1	VIA FANTONI
1945	0171701945	003017170	29/11/2004	017170	017170	1	VIA FANTONI
1946	0171701946	003017170	29/11/2004	017170	017170	1	VIA FANTONI
1950	0171701950	003017170	29/11/2004	017170	017170	1	VIA FANTONI
Demand Number	Stato	ID_inspection	ID_pr_dem2	ID result type	ID result	Date of inspection	Team ID
0171700587		4321	583	1		08/12/2004	389
0171700601		6342	596	0		14/12/2004	494
0171700700		4971	695	0		08/12/2004	389
0171701285		913	1277	1		30/11/2004	106
0171701375		923	1366	1		30/11/2004	106
0171707147		6338	7113	1		14/12/2004	494
0171701504		4322	1495	0		08/12/2004	389
0171701541		2797	1532	5		04/12/2004	147
0171701646		2842	1637	1		04/12/2004	257
0171701680		916	1671	1		30/11/2004	106
0171701858		918	1849	1		30/11/2004	106
0171701857		2790	1848	1		04/12/2004	147
0171701862		2843	1853	1		04/12/2004	257
0171701874		343	1865	4		27/11/2004	1
0171701906		930	1897	1		30/11/2004	106
0171701995		2793	1986	1		04/12/2004	147
0171702002		921	1993	1		30/11/2004	106
0171702003		2532	1994	0		03/12/2004	206

A damage map has been therefore drawn based on some fields in the usability forms describing the damage to buildings. Georeferencing has been carried out building by building as coordinates were lacking in the forms, a problem that is solved today that forms are compiled with a tablet and coordinates are calculated each time a building is surveyed

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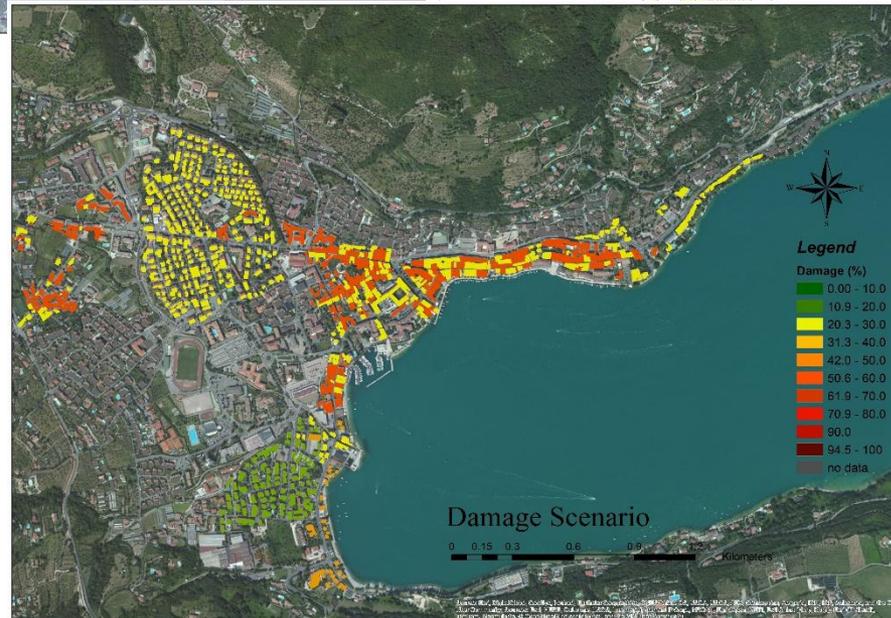


Then a «pre-event» damage scenario using as a seismic input the real event that struck the town on the 24° of November 2004 was estimated. Buildings vulnerability assessments were available from several studies that had been conducted prior to the event



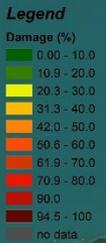
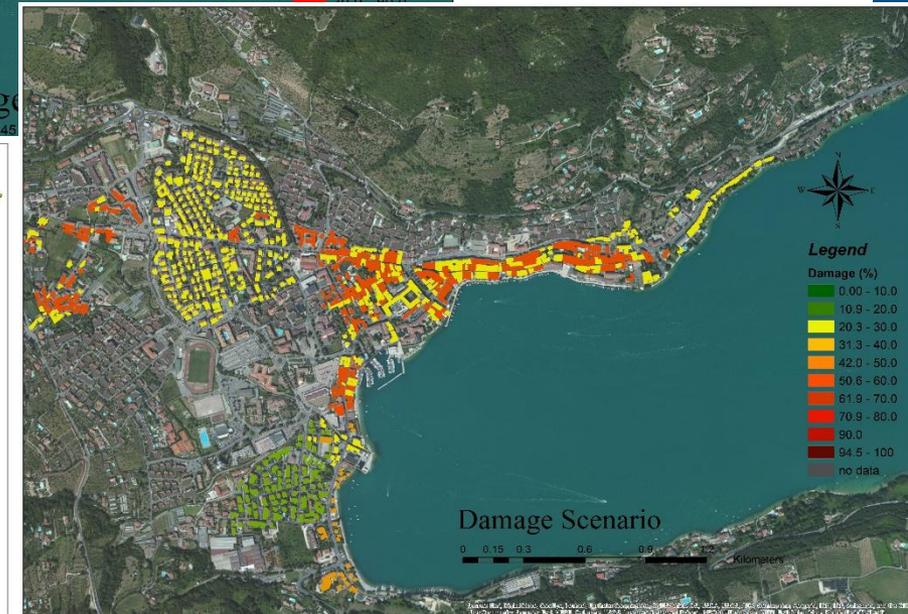
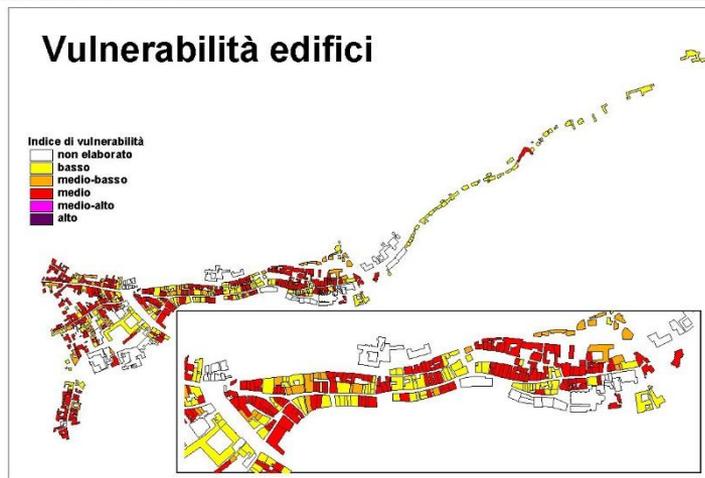
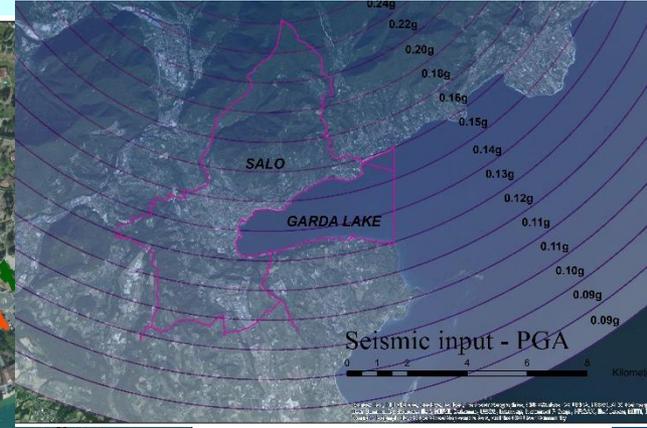
### Vulnerabilità edifici

- Indice di vulnerabilità
- non elaborato
  - basso
  - medio-basso
  - medio
  - medio-alto
  - alto



The two maps, the damage map obtained from the information in the usability forms and the damage map obtained running the scenario have been compared to «test» the risk assessment methodology and the scenario model

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# What is the added value of damage assessment in the aftermath of a disaster?

## 1. In the case of the Umbria Region several purposes are fulfilled:

- \* Damage and loss estimation provide **input for recovery and reconstruction** decisions;
- \* Damage and loss estimation permit to verify in a real case what are the **priorities in terms of damage and therefore protection after floods** (lifelines and industries);
- \* Damage and loss estimation provide more reliable data to **feed further risk assessments** in the same areas and in similar ones

## 2. In the Salò case:

- \* The comparison permits to **rethink about vulnerability assessment methods**;
- \* Problems of current **usability forms** and survey methods have been clearly highlighted once the data were used for forensic purposes and not just to support post disaster needs assessment (sheltering);
- \* **Pre-event scenarios** may be useful to check initially where the largest damage has occurred, and also to better understand why damage occurred differently from what could be assessed before the event and what mitigation fits best



## What is the added value of damage assessment in the aftermath of a disaster?

- \* In order to **support better and more reliable cost-benefit analysis** of mitigation measures taken either before or after an event we need to rely on better data than data available today.
- \* The examples that we have presented show that the assessment of the direct physical damage is not enough to provide a real picture (scenario) of the impact of an event, **equally important are indirect, «higher order» and secondary damage.**
- \* How **different sectors respond to different hazards** (floods, earthquakes) has an important ripercussions on cities and regions. We need to know what sectors are most effected in different types of events, for how long and to what extend (industries, lifelines) to address mitigation priorities
- \* We need to get to a situation where we are able not only to estimate the loss that has been encountered, but also **the loss that will be suffered should given planning decisions be taken**

