The research appreciates the invariance of earthquake resistant vernacular architectures on the basis of two complementary perspectives: cultural and technical. It’s aim is to put forward ways to further benefit from features of vernacular risk culture that contribute to seismic vulnerability reduction process of present-day local environments. The study considers the seismic region of the Alpide belt - a large territory extending from Morocco to Indonesia through the Apennines, Anatolia and Himalayas. It relies on in-depth analysis of the masonry material and to the shape of timber elements implemented with techniques empirically developed by builders using mainly natural materials and without the supervision of any architects or engineers, those structures are of several types: some buildings have proven to perform adequately during earthquakes (see pictures below), some not as much.

**Vernacular building cultures**

Building Typology: Masonry with horizontal timber elements

In the Turkish territory along the North Anatolian Fault, architectures corresponding to this typology of masonry with horizontal timber elements has been identified with constant occurrence both in villages and in cities, from Burdur Province (Marmara Region) to Erzincan Province (Eastern Anatolia Region).

On the basis of examples that have been observed, different typological sub-types have been identified in relation to masonry material and to the shape of timber elements.

**Specific seismic damages**

- Toothed bond type
- Smooth-cut and large size
- Use of two or three long nails with different direction
- Half joint with double dovetail at sill, lintel and roof level
- Reduced height of upper parts
- Rising of masonry between two orthagonal walls
- Disconnection between horizontal and vertical timber elements (e.g. notched dovetail)
- Falling of stones of the outer part
- Vertical cracking in masonry exactly
- Masonry falling where horizontal timber elements

Post-earthquake reconnaissance has been performed in Macerodian village of Bucchisciano (Eastern Statistical Region), situated less than 1km away from the epicenter of a moderate earthquake (M 4.5). Some factors likely to increase or to reduce the likelihood of vulnerability of buildings have been identified.

**Objective**

Exploring building typologies mixing wood, stone and earth

Investigating the interaction between vernacular built environment and earthquake phenomena is crucial in order to assess the building workmanship manner improving the seismic performance.

Due to the heterogeneity of vernacular architectures - in terms of forms, materials, techniques and details - it is essential to analyze it by combining data related to distinctive building typologies, collected before seismic events - so that local building cultures can be pointed out - as well as after an earthquake - in order to identify their seismic impact.

Through literature review and field studies, this research considers different typologies of vertical load bearing typologies mixing wood, stone and earth (e.g. infill timber frame structures, masonry with horizontal timber elements, masonry with vertical and horizontal timber elements, etc.) (see pictures below).

**Outcome**

Learning from vernacular architecture ... for a risk mitigation between culture and technology

Most of the time, vernacular builders have implemented technologies that are affordable in relation to local resources and performing relatively well in relation to local natural phenomena - both ordinary (rain, humidity, wind, etc.) and extraordinary ones (earthquakes, floods, cyclones, etc.).

Nowadays, learning from these technologies by - looking for vernacular parametric building workmanship manner - represents a creative and pragmatic process that has - inter alia - the following two following potentialities:

- To strengthen the resilience of societies dealing with built environments-shaped with vernacular techniques whose building workmanship manner are no more implemented and no longer transmitted;
- To offer a source of technological inspiration for heritage conservation activities and for new contemporary architectures in seismic prone areas.

Collective decisions regarding earthquakes are always a cultural product in which new knowledges overlap old ones, and ethical concerns intertwave political matters. In such a dynamic, it is essential to rely on a constructive subjectivity allowing to face the risk in an interdisciplinary way - by including socio-cultural issues that are associated to technological aspects - and in a critical way - by bringing out technical and social factors that are susceptible to decrease global resilience.

Considering vernacular building cultures as an appreciable expression of the link between the human beings, the technology and the territory, the focus is to promote an approach that allows to reinforce vulnerability. In this sense, the exploration of vernacular parametric building workmanship manner together with the understanding of the contextual dynamics - ancient and contemporary local risk cultures - can be considered as a starting point for a risk mitigation that relies also on the potentialities offered by site-specific cultural background.