Nat. Hazards Earth Syst. Sci. Discuss., 1, 2231–2253, 2013
www.nat-hazards-earth-syst-sci-discuss.net/1/2231/2013/
doi:10.5194/nhessd-1-2231-2013
© Author(s) 2013. CC Attribution 3.0 License.

Natural Hazards and Earth System Sciences
Open Access
Discussions

This discussion paper is/has been under review for the journal Natural Hazards and Earth System Sciences (NHESS). Please refer to the corresponding final paper in NHESS if available.

Public participation in recovery after earthquakes in Friuli (NE Italy) and the Upper Soča Valley (NW Slovenia) in 1976, 1998, and 2004

P. Pipan and M. Zorn

Research Centre of the Slovenian Academy of Sciences and Arts,
Anton Melik Geographical Institute, Ljubljana, Slovenia

Received: 7 February 2013 – Accepted: 3 May 2013 – Published: 22 May 2013

Correspondence to: P. Pipan (primoz.pipan@zrc-sazu.si)

Published by Copernicus Publications on behalf of the European Geosciences Union.

Abstract

The article deals with public participation in recovery after earthquakes in the border region of Friuli (NE Italy) and the Upper Soča Valley (NW Slovenia) in 1976 (magnitude 6.4, 6 May; magnitude 6.1, 15 September), 1998 (magnitude 6.0, 12 April), and 2004 (magnitude 4.9, 7 July). It highlights the differences in the concepts of the post-earthquake recovery, taking into consideration the different political systems between the two countries (capitalist Italy vs. communist Slovenia in 1976) and changes in recovery after the change of political system in Slovenia (communist Slovenia in 1976 vs. capitalist Slovenia in 1998 and 2004).

1 Introduction

The wider area along the border between Friuli, Italy, and the Soča Valley, Slovenia, is known for major earthquakes (e.g., with a magnitude exceeding 5.0: these include a 5.3 magnitude earthquake in 1279, 6.5 in 1348, 7.0 to 7.2 in 1511, 6.2 in 1690, 5.6 in 1788, and 5.4 in 1857; Vidrih, 2008). This article discusses the most recent "major" earthquakes in this area.

The 1976 earthquakes with magnitudes of 6.4 (6 May) and 6.1 (15 September), or an intensity between IX and X and between VIII and IX on the European Macroseismic Scale (EMS), with an epicenter in the Venzone area in Italy claimed 939 lives, and 157 000 people lost their homes (Geipel 1982). There were no deaths in Slovenia, but 12 000 buildings were damaged and 13 000 people were left homeless (Orožen Adamič, 1980).

The 1998 earthquake (12 April, the "Easter Earthquake") with an epicenter in the Krn Mountains in Slovenia had a magnitude of 6 and an intensity between VII and VIII on the EMS-98 scale (Gosar et al., 1999; Ušeničnik, 1999). Approximately 4000 structures were damaged in Slovenia.

The last "major" earthquake occurred in 2004 (12 July). It had a magnitude of 4.9 and an intensity between VI and VII on the EMS-98 scale. Again, its epicenter was in the Krn Mountains. Nearly 2000 structures were damaged in Slovenia (Vidrih, 2008; Zorn and Komac, 2011) among others also individual structures that had already been renovated after the 1998 earthquake.

This article highlights the concepts of post-earthquake recovery in various political systems (capitalist Italy vs. communist Slovenia in 1976), and the concepts of recovery in Slovenia after the changes to its political system (communist Slovenia in 1976 vs. capitalist Slovenia in 1998 and 2004).

2 Methodology

This study is based on a qualitative case study of settlements carried out through interviews and a comparative analysis (Pipan, 2011a). The basic method used was interviews (a similar method was also used in a similar study in Iran after the 2003 earthquake in Bam; Omidvar et al., 2011), which provided first-hand information from the eyewitnesses to the recovery and individuals that participated in it.

Six cases of settlement renovation are studied. They were ranked on the Arnstein scale (Fig. 1; Arnstein, 1969) based on public participation in decision-making processes (Thomas, 1995). Arnstein (1969) understands citizen participation in decision-making as a categorical factor supporting citizen power provided that all the stakeholders or interested parties participate in the decision-making process. Her citizen participation ladder includes eight rungs (Fig. 1): from non-participation (manipulation and therapy) at the very bottom of the ladder, through the levels of "tokenism" that allow the have-nots to hear and to have a voice (informing, consultation, and placation), to various levels of citizen power (partnership, delegated power, and citizen control), which enable citizens to negotiate and engage in tradeoffs with traditional power holders, and can even allow them to obtain full managerial power (Arnstein, 1969; Mušič, 1999).

According to Gamper (2008, p. 240), public participation in issues and decisions connected with natural disasters "could be beneficial; both for experts, to gain in acceptance and divide the share of responsibility ... and the public, for integrating their local knowledge ... as well as preferences in the decision process." If allowed, the public can participate in various stages of natural-disaster management (Pearce, 2003; Kuhlicke et al., 2011) and various types of natural disasters such as mass movements (Mikoš, 2011), floods (Lara et al., 2010; Meyer et al., 2012; concerning foods, the EU Floods Directive (2007/60/EC) even "recognizes the necessity of public participation in the making of public policy concerning floods", Lara et al., 2010, 2003), or earthquakes (Pipan, 2011a, b; Omidvar, 2010, 2011).

The following three settlements, which were included in the recovery after the 1976 earthquake, were studied in Friuli: Venzone, Portis, and Oseacco. In the Upper Soča Valley, the settlements studied include Breginj (connected with the 1976 earthquake), Drežniške Ravne (connected with the 1998 earthquake), and Čezsoča (in relation to the 1998 and 2004 earthquakes) (Table 1).

3 Concepts of recovery after the 1976, 1998, and 2004 earthquakes

With the legislation that was adopted for recovery after the 1976 earthquakes, the region of Friuli–Venezia Giulia (Italy) transferred the responsibility for post-earthquake recovery to municipalities as the smallest units of local government. The municipalities obtained professional assistance from the earthquake office, but the responsibility for the recovery lay solely with the individual municipalities and their mayors, who represented both the region and the central government in Rome during the post-earthquake recovery. The central government allocated recovery funds to the region, and this in turn allocated it to individual municipalities or mayors because they had the best overview of what was happening in the field. During the recovery, there were only two cases of irregularities or misused funds discovered in the entire region; in one (the

Municipality of Resia) irregularities only occurred due to a lack of necessary knowledge (Pipan, 2011a).

In Slovenia, as in Italy, the responsibility for recovery after the 1976 earthquakes was assumed by the municipalities, which relied on local communities (smaller administrative units within a municipality). The communal assemblies of the municipalities of Tolmin, Nova Gorica, and Idrija established an inter-municipal board that coordinated post-earthquake recovery across the entire Soča Valley (Ladava, 1980). The Municipality of Tolmin was most affected; however, because it did not have a majority on the inter-municipal board, its needs may have been overruled by the other two municipalities, which had not been as badly affected and were also more economically developed at the time. The responsibility that the Municipality of Tolmin had did not include sufficient funding for spending on the entire public infrastructure needed, and especially the renovation of cultural heritage, which was shown in the case of Breginj (Sect. 4.4).

Selective allocation of recovery funding was also typical at the municipal administrative level. With an area of 939 km^2, the Municipality of Tolmin was the largest in Slovenia, which is why there was a clear gap in economic development between the municipal center and its periphery. Spending as part of post-earthquake recovery was thus directed to the central area of the municipality (i.e., Tolmin), followed by the areas of Bovec and Kobarid, where recovery was underway in Breginj (Sect. 4.4; Pipan, 2011a). The disparity between the periphery and the center was also reflected in the Kobarid area, where the local communities of Breginj and Borjana – that is, distinctly peripheral settlements compared to the center of Kobarid – were most affected. Thus one could talk about a periphery at three levels: of the Municipality of Tolmin from the perspective of Slovenia, of the Kobarid area from the perspective of the Municipality of Tolmin, and of the local communities of Breginj and Borjana from the perspective of the Kobarid area. Thus for example, in the local community of Breginj the planned post-earthquake recovery was not fully implemented because of the allocation of funds at the municipal level.

After the 1998 earthquake, the central government supervised the recovery in Slovenia. Thus a shift in responsibility from the local (municipal) level to the state level is evident after the change of the political system. To this end, the Slovenian government established the National Technical Office in the affected area as a temporary body with regional branches in the municipal seats of Tolmin, Kobarid, and Bovec (during the 1990s, the large Municipality of Tolmin, which supervised the recovery in 1976, was divided into three municipalities; Janežič, Dolinšek, and Kos, 2003). In order to avoid a repetition of the concept of recovery in the Breginj area in 1976, during which entire settlements were relocated, the law prioritized recovery at the same location. In order to protect cultural heritage, the recovery of damaged buildings had priority over new construction. The law simplified the administrative procedures connected with building construction as part of the post-earthquake recovery and combined them under the jurisdiction of the National Technical Office, which provided assistance to those affected in handling the required documentation. Before individual projects started being implemented, all of the administrative procedures needed to be completed because the goal was to not repeat the story from 1976, when buildings were renovated or new ones were built, but not entered in the land register for another three decades after the recovery was completed.

4 Case studies

4.1 Venzone

Venzone stands out in Italy as an exemplary case of post-earthquake recovery. In order to protect cultural heritage, the entire historical center inside the city walls was proclaimed a cultural monument of national importance in 1965 (Bellina et al., 2006). Post-earthquake recovery was carried out based on two different legal bases. Procedures envisaged in post-earthquake legislation applied to the entire area in Friuli–Venezia Giulia that was affected by the earthquake, whereas in Venzone they only

applied to the area outside the city walls. Recovery of the historical center inside the city walls as protected cultural heritage thus took place with an emphasis on preserving architectural cultural heritage (Fig. 3).

On the Arnstein ladder of citizen participation, Venzone is ranked under "Citizen Control" (Fig. 1); this applied to both the area within and outside the culturally protected historical center. Its residents successfully resisted the manipulation attempts by the municipal authorities, which planned to raze buildings that had not been damaged in the earthquake in order to make space for building a new sports center as part of post-earthquake recovery. Inside the city walls, residents prevented some of their fellow residents from purposely razing some of the buildings that had been damaged in the first earthquake. They reacted the same way a year later, when a series of old damaged houses were razed by an order of the municipal administration. The residents established a special committee, which issued a weekly publication titled Cjase Nestre (Our House). This publication, which all the residents of the Municipality of Venzone received free, critically evaluated even the smallest step of both the municipal and regional authorities (Bellina et al., 2006). With a very active and effective bottom-up organization, the residents of Venzone provided support to the Regional Cultural Heritage Office in the critical times of post-earthquake recovery. Venzone, whose renovation was exemplary, is now visited by 130 000 tourists a year.

4.2 Portis

Portis lies on the left bank of the Tagliamento River in the Municipality of Venzone, just three kilometers from the municipal seat. The settlement's official name is Portis, but because of the 1976 earthquake the residents distinguish between the old Portis (Portis vecchio) and the new Portis (Nuova Portis). The old Portis lies right along the Tagliamento River, whereas the new Portis, which was built after the 1976 earthquakes, lies 1.5 km further north. Due to the risk of rockfalls after the 1976 earthquakes (Fig. 4), the authorities decided to relocate the settlement (Fig. 5) over the objection of a considerable number of residents. In line with the post-earthquake act, the residents provided

the impetus for establishing the New Portis cooperative for building the settlement at a new location. Through the cooperative, the residents successfully implemented post-earthquake recovery at the lowest, local decision-making level, and were the first in Friuli–Venezia Giulia to complete the majority of the recovery work (in 1981). Portis is a good example of how the residents took responsibility for the post-earthquake recovery into their own hands and also showed that this was the right choice after the authorities had ordered them to move to a new location (Storia, 1992; Pipan, 2011a). Due to its relocation, Portis is ranked under "Informing" on the Arnstein citizen participation ladder, but its later recovery can be ranked under the highest level: Citizen Control (Fig. 1).

4.3 Oseacco

In terms of the Arnstein ladder of citizen participation, the Municipality of Resia is negatively classified under "Citizen Control" (Fig. 1). Even though the new settlement named Lario with prefabricated houses as the most damaged part of Oseacco was already completed in the fall of 1976, recovery in Resia took a very long time. The law assigned responsibility for the recovery to the municipality, but this was too much for the weak local community to handle. The reason for this was a combination of unfavorable circumstances such as a large extent of damage, the peripheral location of the municipality in the mountains, and ineffective management of the recovery, which resulted from overly frequent replacements of ineffective mayors. Thirteen years were lost because of this. The renovation work only resumed in 1990 and ended in 1996, which was twenty years after the earthquake (Madotto, 1998). In addition to the problems connected with electing an effective mayor, the negotiations between individual settlements also proved extremely difficult. The settlements that had suffered less damage were suitably renovated, but in Oseacco, which had had the most picturesque architectural heritage in the valley before the earthquake, everyone renovated their houses as they pleased. Thus an eyesore that mars the overall image of the settlement is what has remained of the settlement formerly styled as "Little Venice".

4.4 Breginj

The situation in the old Breginj was complicated even before the earthquake. Despite the efforts made by the Municipality of Tolmin and the Cultural Monument Protection Institute to preserve the architectural heritage, the local community was divided. After the 1976 earthquakes, the authorities ordered that the residents had to be in new houses by winter. Thus from the "Informing" through the "Consultation" levels on the Arnstein ladder (Fig. 1), an agreement was reached to preserve and renovate only a very small part of the old Breginj (Fig. 6). However, due to the lack of funds, this renovation was not carried out until 2004. Based on the public discussion on renovating Breginj that was aired on Ljubljana TV in 1983, this example of post-earthquake recovery can be classified under "Manipulation" because the program that presented this discussion was censored and, in fact, cancelled (Pipan, 2011a).

After the 1976 earthquakes, the government did not act as it should have with regard to architectural heritage because it did not have suitable mechanisms in place and sufficient financial resources to protect and renovate cultural heritage of national importance. The local authorities had power only on paper and their responsibility was too great given the financial resources available.

4.5 Drežniške Ravne

Drežniške Ravne was badly damaged in the 1998 earthquake, and the mayor saw a good opportunity to renovate the settlements as part of a comprehensive regulatory plan. The stage in which the plan was being drafted is an example of successful cooperation between the affected residents, the municipality, and the state. On the Arnstein ladder this could be classified under "Partnership" (Fig. 1). However, in the case of Drežniške Ravne, problems started with the implementation stage of the regulatory plan because there was not sufficient funding available. In addition, residents and the authorities understood the plan differently. Despite the fact that the renovation was successfully completed, it could have been better, taking into account the original plan.

4.6 Čezsoča

In Čezsoča (Figs. 8 and 9), the 2004 earthquake also damaged buildings that had already been renovated after the 1998 earthquake. Čezsoča is an example of a settlement in which the general public started doubting the operation of professional institutions despite its lack of knowledge of earthquake-safe construction. Recovery after the 1998 earthquake was based on the assumption that those affected in the earthquake could not be trusted and that the state had to direct and supervise the renovation in the form of a National Technical Office. The damage to all houses in the village in 1998 amounted to almost one-third of the overall market value (28 %) of all real estate in the village (Komac et al., 2012). The 2004 earthquake revealed that a great deal of the construction work that had already been paid and documented as finished had not been carried out at all. This undermined the people's trust in the operation of the recovery system. Čezsoča can be classified under "Informing" and partly also under "Therapy" on the Arnstein Citizen Participation Ladder (Fig. 1).

5 Conclusions

Each case is a story in itself, but the cases described here show that several factors affect the success of post-earthquake recovery. In addition to various political and legislative-administrative contexts, responsible citizens also play an important role. In the case of Venzone, the majority of residents and stakeholders had a positive influence on the preservation of cultural heritage because they reduced the negative impacts of individuals and were successful in resisting the municipal authorities' desire for a quick post-earthquake recovery, as had occurred in Breginj on the other side of the border. Portis is a good example of how the local community successfully agreed on how to renovate its settlement and also carried out the renovation entirely on its own. The responsibility for carrying out the post-earthquake recovery proved to be too much for the weak local community in the Municipality of Resia. Due to the large amount of damage

and ineffective management of the renovation, recovery was only completed after two decades. The case of preserving the architectural heritage of Breginj involved a divided local community and the municipality's responsibility for carrying out the recovery was not supported with sufficient government funds. The unwillingness of the authorities to critically evaluate the renovation also stands out in this case because they even censored the television program featuring this issue. Drežniške Ravne is an example of good negotiations with the locals in drafting the regulatory plan for renovating the settlement affected in the earthquake. Unfortunately, due to a lack of funds, the government did not fully implement what was originally a very good regulatory plan. In the case of Čezsoča, the residents' warnings and discomfort regarding irregularities in the recovery after the 1998 earthquake were only confirmed by the 2004 earthquake.

Acknowledgements. This work was partly supported by Slovenian Research Agency (ARRS) through project L6-4048 (A).

References

Arnstein, S. R.: A ladder of citizen participation, J. Am. I. Planners, 35, 116–224, doi:10.1080/01944366908977225, 1969.

Arnstein, S. R.: A ladder of citizen participation, http://lithgow-schmidt.dk/sherry-arnstein/ladder-of-citizen-participation.html, last access: 12 February 2009.

Bellina, A., De Colle, A., Moretti, A., and Quendolo, A.: Venzone – la ricostruzione di un centro storico, Bollettino dell'associazione "Amici di Venzone", 35, 103 pp., 2006.

Gamper, C. D.: The political economy of public participation in natural hazard decisions – a theoretical review and an exemplary case of the decision framework of Austrian hazard zone mapping, Nat. Hazards Earth Syst. Sci., 8, 233–241, doi:10.5194/nhess-8-233-2008, 2008.

Geipel, R.: Disaster and Reconstruction, George Allen & Unwin, London, 1982.

Gosar, A., Živčić, M., Cecić, I., Zupančič, P.: Seizmološke značilnosti potresa, Ujma, 13, 57–65, 1999.

Janežič, I., Dolinšek, B., and Kos, J.: Popotresna obnova Posočja: tehnični postopek in ekonomski vidik prenove stanovanjskih objektov, Gradb. Vestn., 52, 107–113, 2003.

Komac, B., Zorn, M., and Kušar, D.: New possibilities for assessing the damage caused by natural disasters Slovenia – the case of the real estate record, Geogr. Vestn., 84, 113–127, 2012.

Kuhlicke, C., Steinführer, A., Begg, C., Bianchizza, C., Bründl, M., Buchecker, M., De Marchi, B., Di Masso Tarditti, M., Höppner, C., Komac, B., Lemkow, L., Luther, J., McCarthy, S., Pellizzoni, L., Renn, O., Scolobig, A., Supramaniam, M., Tapsell, S., Wachinger, G., Walker, G., Whittle, R., Zorn, M., and Faulkner, H.: Perspectives on social capacity building for natural hazards: outlining an emerging field of research and practice in Europe, Environ. Sci. Policy, 14, 804–814, doi:10.1016/j.envsci.2011.05.001, 2011.

Ladava, A.: Izhodišča za odpravo posledic potresa 1976 na Tolminskem, in: Potresni zbornik, edited by: Dolenc, J., Temeljna kulturna skupnost, Odbor za ugotavljanje in odpravo posledic potresa, Tolmin, 153–186, 1980.

Lara, A., Saurí, D., Ribas, A., and Pavón, D.: Social perceptions of floods and flood management in a Mediterranean area (Costa Brava, Spain), Nat. Hazards Earth Syst. Sci., 10, 2081–2091, doi:10.5194/nhess-10-2081-2010, 2010.

Madotto, A.: Resia: paesi e localita, Circolo Culturale "Rozajanski dum", Prato di Resia, 1998.

Meyer, V., Kuhlicke, C., Luther, J., Fuchs, S., Priest, S., Dorner, W., Serrhini, K., Pardoe, J., McCarthy, S., Seidel, J., Palka, G., Unnerstall, H., Viavattene, C., and Scheuer, S.: Recommendations for the user-specific enhancement of flood maps, Nat. Hazards Earth Syst. Sci., 12, 1701–1716, doi:10.5194/nhess-12-1701-2012, 2012.

Mikoš, M.: Public perception and stakeholder involvement in the crisis management of sediment-related disasters and their mitigation: the case of the Stože debris flow in NW Slovenia, Integr. Environ. Assess. Manag., 7, 216–227, doi:10.1002/ieam.140, 2011.

Mušič, V. B.: Civilna družba v urbanizmu med državo in krajevno samoupravo, in: Civilna družba v Sloveniji in Evropi: zbornik razprav, edited by: Bohinc, R. and Černetič, M., Društvo Občanski forum, FDV, Ljubljana, 253–258, 1999.

Omidvar, B., Zafari, H., and Derakhshan, S.: Reconstruction management policies in residential and commercial sectors after the 2003 Bam earthquake in Iran, Nat. Hazards, 54, 289–306, doi:10.1007/s11069-009-9468-y, 2010.

Omidvar, B., Zafari, H., and Khakpour, M.: Evaluation of public participation in reconstruction of Bam, Iran, after the 2003 earthquake, Nat. Hazards, 59, 1397–1412, doi:10.1007/s11069-011-9842-4, 2011.

Orožen Adamič, M.: Neposredni učinki potresa v pokrajini, in: Potresni zbornik, edited by: Dolenc, J., Temeljna kulturna skupnost, Odbor za ugotavljanje in odpravo posledic potresa, Tolmin, 81–122, 1980.

Pearce, L.: Disaster management and community planning, and public participation: how to achieve sustainable hazard mitigation, Nat. Hazards, 28, 211–228, doi:10.1023/A:1022917721797, 2003.

Pipan, P.: Primerjava popotresne obnove v Italiji in Sloveniji po potresih v Zgornjem Posočju in Furlaniji, PhD. theses, Oddelek za geografijo Fakultete za humanistične študije, Koper, 327 pp., 2011a.

Pipan, P. 2011: Sodelovanje javnosti v obnovi po naravnih nesrečah na primeru potresov v Furlaniji in Zgornjem Posočju v letih 1976, 1998 in 2004, in: Neodgovorna odgovornost, Naravne nesreče, 2, edited by: Zorn, M., Komac, B., Ciglič, R., and Pavšek, M., Založba ZRC, Ljubljana, 21–29, 2011b.

Storia: Storia di un paese ricostruito, Cooperativa edilizia Nuova Portis 1978–1991: Societa Cooperativa a responsabilita limitata "Cooperativa Edilizia Nuova Portis" con sede in Venzone – Frazione Portis, Venzone, 1992.

Thomas, J. C.: Public Participation in Public Decisions, Jossey–Bass, San Francisco, 211 pp., 1995.

Ušeničnik, B.: Ukrepanje ob potresu, Ujma, 13, 71–84, 1999.

Vidrih, R.: Seismic activity of the Upper Posočje Area, Urad za seizmologijo in geologijo Agencije Republike Slovenije za okolje, Ljubljana, 509 pp., 2008.

Zorn, M. and Komac, B.: Damage caused by natural disasters in Slovenia and globally between 1995 and 2010, Acta Geogr. Slov., 51, 7–41, doi:10.3986/AGS51101, 2011.

Table 1. Selected cases (Fig. 2; Pipan, 2011a).

Case study (settlement)	Country	Year of earthquake	Political system	Basic features of recovery
Venzone	Italy	1976	Capitalism	A low-lying settlement along the main road affected in the 1976 earthquakes. As a cultural monument of national importance, the historical center inside the city walls was renovated as a model example of cultural heritage protection. It is the seat of the Municipality of Venzone.
Portis	Italy	1976	Capitalism	A small low-lying settlement along the main road in the Municipality of Venzone affected in the 1976 earthquakes. Due to the risk posed by a rockfall triggered by the earthquake, the settlement was rebuilt at another location.
Oseacco	Italy	1976	Capitalism	A settlement in the remote hilly border Municipality of Resia with a Slovenian ethnic minority. It was the most severely affected settlement in this municipality in the 1976 earthquakes. In terms of the post-earthquake recovery approach, its recovery differs from that in other settlements in the municipality.
Breginj	Slovenia	1976	Communism	A remote, hilly border settlement that was so severely damaged in the 1976 earthquakes that it was rebuilt at a new location. Through this, valuable architectural cultural heritage was destroyed.
Drežniške Ravne	Slovenia	1998	Capitalism	A small remote hilly settlement in the Municipality of Kobarid, in which nearly all the buildings were damaged in the 1998 earthquake. The Municipality of Kobarid adopted a special regulatory plan that envisaged the comprehensive renovation of the settlement.
Čezsoča	Slovenia	1998, 2004	Capitalism	A small settlement in the Municipality of Bovec, not far from the municipal seat, which was severely damaged by the 1998 and 2004 earthquakes. In the 2004 earthquake, buildings were also damaged that had already been renovated after the 1998 earthquake.

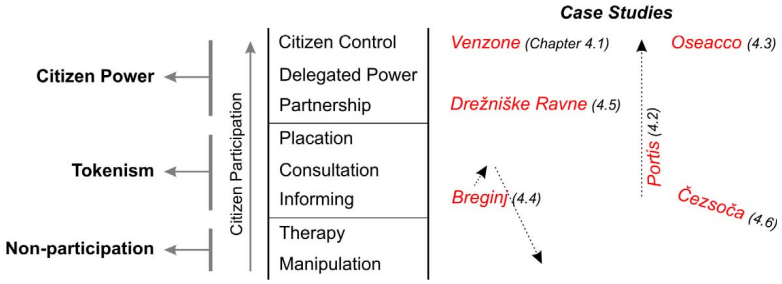

Fig. 1. Arnstein's Ladder of Citizen Participation (Arnstein, 1969, 2009) and the ranking of the settlement recovery studied.

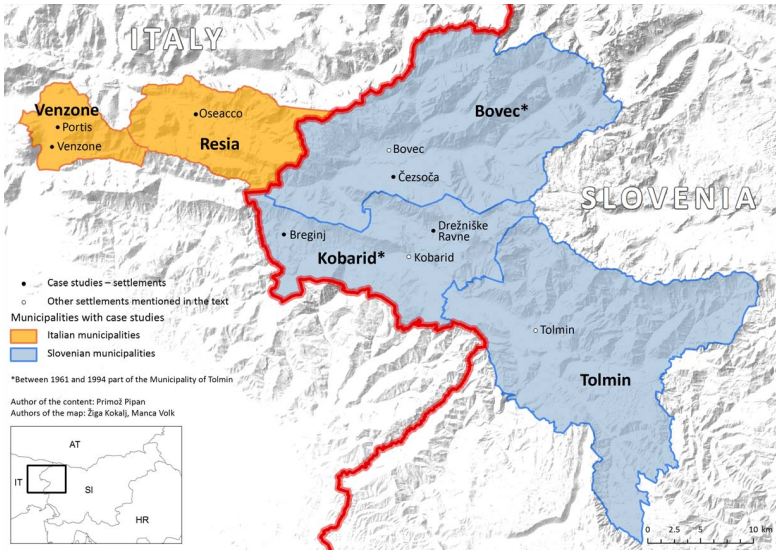

Fig. 2. Study area with selected settlements.

Fig. 3. Markings based on which parts of the buildings were reconstructed after the two earthquakes are still visible on many buildings in the old town of Venzone (photo: Primož Pipan).

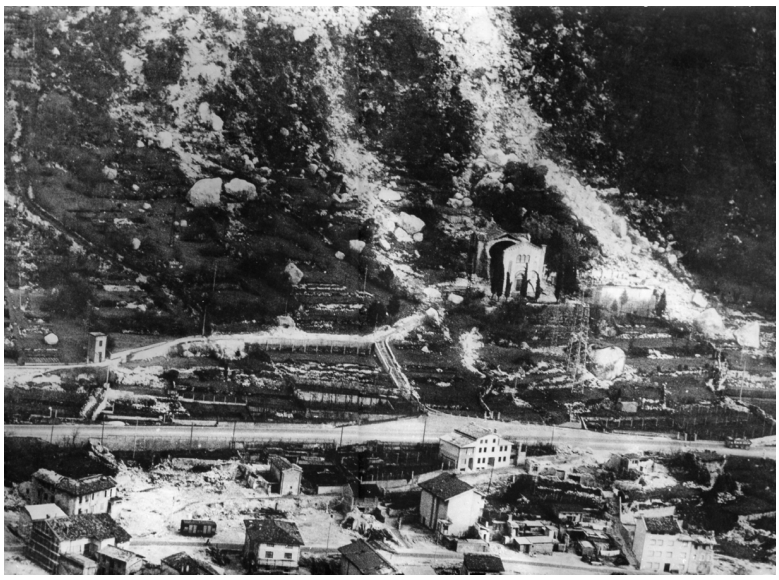

Fig. 4. Portis after the September 1976 earthquake. Rockfalls, which were the main reason for relocating the settlement, can be seen in the background (Archive of Ezio Gollino).

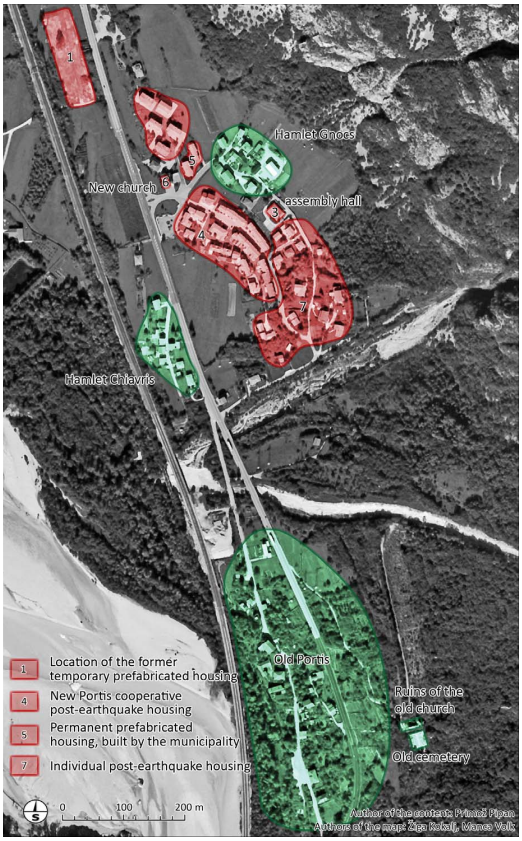

Fig. 5. Relocation of Portis following the 1976 earthquakes.

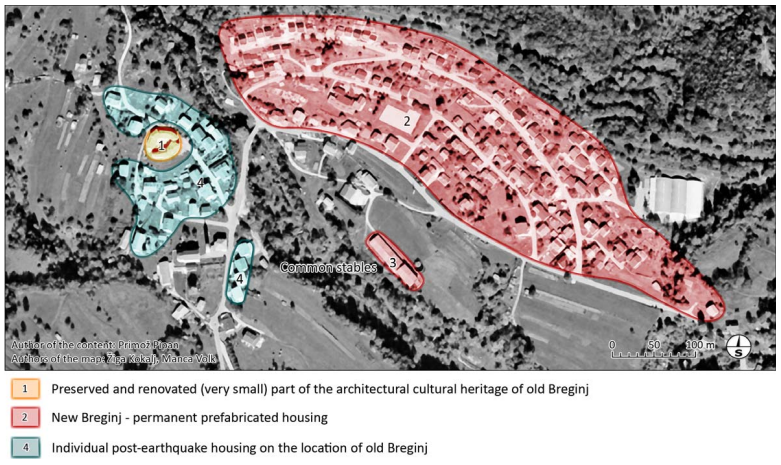

Fig. 6. The old and new Breginj. Only a tiny part of the former architectural heritage has been preserved in the old Breginj. It is surrounded by individual houses that were built after the earthquake. Cookie-cutter prefabricated houses are typical of the new Breginj.

Fig. 7. Damage to buildings in Drežniške Ravne after the 1998 earthquake (photo: Matija Zorn).

Fig. 8. Damage to buildings in Čezsoča after the 2004 earthquake (photo: Matija Zorn).

Fig. 9. New house build in Čezsoča after the 2004 earthquake (photo: Primož Pipan).