Proceedings of the 2nd Croatian Conference on Earthquake Engineering - 2CroCEE
Zagreb, Croatia - March 22 to 24, 2023

DOI: https://doi.org/10.5592/CO/2CroCEE.2023.105

THE ROLE OF DISASTER RISK GOVERNANCE IN POST-DISASTER RECOVERY

Zvonko Sigmund [(1)], Marko Šimić [(2)]

[(1)] *Assistant professor, University of Zagreb Faculty of Civil Engineering, zvonko.sigmund@grad.unizg.hr*
[(2)] *Lieutenant colonel, Croatian Defence Academy doc. Franjo Tuđman, marko.simic2@gmail.com*

Abstract

This paper emphasizes the role of decision-making and disaster risk governance in post-disaster recovery on the example of the post-disaster recovery of Croatia after a series of strong seismic events in mainland Croatia. The analysis is based on a thorough review of the national documents of Croatia that overlapped with the national journals reporting on the situation from the affected areas.

Keywords: Disaster risk governance; disaster risk management; Sendai framework; Croatia; case study.

1. Introduction

Natural disasters, alongside climate change cause, ever-increasing losses with a 3 x increase in losses only in the last 20 years [1]. In order to improve the rate of implementation of scientific advances effectively in disaster risk reduction it is important to understand what the major barriers to effective disaster risk management are.

Disaster risk governance has traditionally been fragmented between local, state, and national entities and between sectors, and compartmentalized in highly variable bureaucratic structures [2], which is the case in Croatia as well. Risk governance is mostly viewed through the lens of disaster or emergency management departments, agencies, or organizations, which often have little interaction with other governmental, civil society, or corporate entities. Visible in times of crises, risk governance is rarely seen as part of everyday public or private functions such as planning, social welfare, investments, or fiscal responsibilities [2], [3].

The statement that disaster risk needs to be taken care of in a more holistic way whereby also DRM capacity is built is a widely supported thesis [4], [5]. This includes moving beyond a focus in DRM on preparedness and emergency management to building capacity in disaster prevention, mitigation, and long-term recovery [6]. This need, to advance the DRM becomes a necessity as soon as a disaster happens, as did in Croatia in the year 2020.

This paper aims to emphasize the importance of decision-making on a higher, governmental level, but also the role of disaster risk governance in the implementation of disaster risk recovery in the example of Croatia. Hereby, the authors are only concentrating on the construction industry. Disaster risk governance principles as were defined and planned through regulatory framework as well as the changes that were introduced after the earthquake series that struck mainland Croatia during the year 2020 are reviewed in this paper.

For the need of this paper, the UNDRR terminology glossary [7] is used. Disaster risk governance is defined as “The system of institutions, mechanisms, policy and legal frameworks and other arrangements to guide, coordinate and oversee disaster risk reduction and related areas of policy”, and disaster risk management is “the application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses” [7].

Proceedings of the 2nd Croatian Conference on Earthquake Engineering - 2CroCEE
Zagreb, Croatia - March 22 to 24, 2023

DOI: https://doi.org/10.5592/CO/2CroCEE.2023.105

Croatia was struck with two major earthquakes: the Zagreb earthquake that struck on March 2020 (M5.0), just after the Croatian government issued a complete lockdown due to the COVID pandemic; and the Petrinja (about 50 km from Zagreb) earthquake (M6.4) on December 2020.

On 22 March 2020, Zagreb was struck by an M5.5 [8]. A pronounced issue that arose is the damaging of many historical buildings which were in many cases used for public purposes: hospitals, schools, theatres, local or state administration, etc. The earthquake was followed by 10 aftershocks of M3+ during the time of the next 4 months[9]. 1 person succumbed to injuries caused by the earthquake, and about 24.000 buildings were reported to have been damaged, of which about 5.000 buildings were heavily damaged [10]. Total damages and losses according to the rapid damage and needs assessment were 11.3 billion Euros [11].

Petrinja earthquake began with an earthquake of M5.0 followed by M4.5 and M3.8 on the same day on December 28th, 2020, [12]. The behavior was considered to be a sign of calming down, this, however, was not the case. On December 29th the main shock struck Petrinja with M6.4 [13], [14]. In the aftermath of the Petrinja earthquake [12]: 7 persons were confirmed dead, and about 45.000 buildings were reported to have been damaged, of which about 11.000 buildings were assessed by engineers to be unusable due to the damages [15]. Total damages and losses according to the rapid damage and needs assessment were assessed at 4.8 billion Euros [16].

2. Seismic disaster risk management -case of Croatia

Croatia has just recently (within the last few years) started switching its focus from disaster risk preparedness to disaster risk management with the introduction of the Homeland Security System Act [17].

While mainly oriented toward disaster response, in general, the Croatian disaster risk management system (regulatory framework) recognizes only two areas of disaster risk management: prevention and response. Therefore, the Croatian disaster risk management system can hardly be fully valorized through the objectives of the Sendai framework for disaster risk reduction.

2.1 Croatian disaster recovery framework after the earthquake series in the year 2020

Prior to the earthquake, the only law to regulate recovery is the Law on mitigation and elimination of the consequences of natural disasters. This law regulates governmental financial responsibility towards all affected by disasters and the operationalization of the activities of the Ministry of Finance in cases of disasters. The responsibility is instrumentalized through financial support but includes an assessment of the effects of disastrous events and the allocation of partial financial relief to affected areas [18]. Other institutionalized measures for disaster recovery were so far regulated only after the occurrence of the disaster, as was the case of the area destructed by flooding in 2014 [19].

As soon as the first earthquake struck Zagreb, on the governmental level, it was clear that the Croatian legal framework cannot be kept as was. The new legislation would need to come in place to enable recovery and reconstruction works. Nevertheless, even though the legislator had a clear vision of the regulatory framework that needed to be defined, the disaster recovery and reconstruction regulatory framework that was initially prescribed needed to be adapted in accordance with needs identified during the practical use of the legislation:

On March 21, 2020. Croatian Government introduced a “stay at home” order for the whole country due to the COVID-19 pandemic, and the very next day a magnitude 5.5 quake shook the capital - city of Zagreb [19]. The regulatory framework for disaster recovery was structured in a series of different measures: suspension of COVID-19 restricting measures in the affected areas, financial relief and support, disaster emergency housing, emergency repair support in terms of financial and workforce organization, and finally the framework supporting the recovery and repair of damaged infrastructure and the built environment.

Proceedings of the 2nd Croatian Conference on Earthquake Engineering - 2CroCEE
Zagreb, Croatia - March 22 to 24, 2023

DOI: https://doi.org/10.5592/CO/2CroCEE.2023.105

The main goal of the regulatory framework, after the earthquake series, was to assist the owners or co-owners of damaged and destroyed real estate to set up their estates as quickly and with less effort in comparison to the previously available legal framework. The first recovery and reconstruction law was created to aid the affected areas of the first earthquake: Law on the reconstruction of buildings damaged by earthquakes in the City of Zagreb, Krapina-Zagorje County, and Zagreb County [20]. The main goals of the Law were to reduce and simplify the documentation needed for the approval of the reconstruction, and:

- To establish the "Reconstruction fund" - the main governmental executive body for organization, implementation, and monitoring of the implementation of reconstruction activities of earthquake-damaged buildings [21].
- To define the process of building reconstruction in case the building was only damaged, construction of replacement housing in case a house was destroyed or damaged in a way that repair is not possible or financially inefficient.
- To prescribe financial support for temporary repair works, building reconstruction and repair works

In addition to the law, in October 2020 the First program of measures for the reconstruction of earthquake-damaged buildings in the City of Zagreb, Krapina-Zagorje County, and Zagreb County was prescribed. This program of measures would define the levels and scopes of repair and/or reconstruction that can be financed from the reconstruction fund. Further on it would define the organizational structure of the governmental bodies responsible for activities in the reconstruction, criteria for project parties' selection, reconstruction priorities, etc. [22]. As the title of the law shows, the law regulates the recovery measures only in the affected areas and cannot be implemented outside of the mentioned counties.

By October 2020, 7 months from the earthquake have passed. By that date mainly the emergency repair works were done, besides these only a few reconstruction projects were started among which the City of Zagreb was the main investor. By that time, even though there is no official data, the number of reconstruction activities in the affected region is at a minimum.

With the occurrence of the second earthquake series in the area of Petrinja (Sisak-Moslavina county) amendment to the already existing law on reconstruction was made with the Law amendments from the February of 2021 [23] (just two months after the December earthquake series). As the new situation required a new approach, the amendment of the law was not only used to broaden the area of use to the newly affected areas, but also to accommodate new needs. Except for the historic city centers in the affected areas of Sisak-Moslavina County and the other affected areas, these areas are more rural type areas with occasional historic buildings and the occasional industrial facilities, which have now sustained major damages, as opposed to the earthquakes of Zagreb, where most damages were sustained in the historical buildings which were not designed to withstand seismic activities of any kind.

By the time of the Law amendment publication, the Reconstruction fund began to function as intended resulting in the first 231 finished reconstruction investments with the investment sum of about 1.1 mil EUR [24]. As the earthquake from December 2020 had more serious consequences than the one from Zagreb County (March 2020) the main changes in legislation were oriented toward creating emergency housing capacities for people whose homes were destroyed or severely damaged. Herefore, a part of the responsibilities and powers that were the main activities of the Reconstruction fund was transferred to the Central State Office for Reconstruction and Housing to divide the intensity and the activity scope of the Reconstruction fund [23].

During the reconstruction process, several main issues were encountered that were slowing down the reconstruction process:

- The owners (potential investors) were not allowed to start the reconstruction on their own, but to be entitled to governmental funding, the reconstruction process had to start via the governmental administration [25], which process was rather sluggish
- Co-financing measures are limited to 80% of the cost of structural renovation of a building which in the whole process of reconstruction would cover no more than 30% of the whole

Proceedings of the 2nd Croatian Conference on Earthquake Engineering - 2CroCEE
Zagreb, Croatia - March 22 to 24, 2023

DOI: https://doi.org/10.5592/CO/2CroCEE.2023.105

reconstruction investment causing many potential investors to give up on the potential reconstruction investment [26]

- There is a problem of unresolved ownership relations for which the process of renewal is entirely disabled even for cases when real ownership is not in question, but it is not legally implemented, or the legal trace of ownership is difficult to prove (problem expressed in rural parts of Croatia) [27]
- Construction works prices have risen uncontrollably on the global market, which is more pronounced in Croatia due to a sped-up increase in demand for construction and reconstruction works and the COVID-19 sanitary crisis. Hereby the owners' ability to invest is severely diminished [28]
- The affected area is widely marked by cultural heritage buildings, which also make up a significant share of the damaged buildings. The necessary activities of the relevant administration for cultural heritage are poorly defined even by basic laws, which is even more evident in crisis situations [29]
- The reconstruction process indicated some administrative deficiencies in the process [29]among which is for instance the Demolition of heavily damaged buildings that potentially threaten the environment requires a series of administrative approvals

Still, even with the flaws of the law, the rate of investments in reconstruction rose to 792 reconstruction investments in total and approximately 5,6 mil EUR [24]. In relation, the investments rose from form 33 cases per month and approximately 160.000 Eur/month to 99 cases / months and 700.000 EUR/month. Still, these numbers cannot be taken as the absolute measure of the success of the Laws, but still, they can be taken as an indicator that the reconstruction measures are giving positive results.

These mentioned issues were to be resolved by the latest amendment of the Law on reconstruction [30] with next measures:

- Main and most important change is the reorganization and improved definition of the tasks of governmental bodies included in the process of reconstruction. The improvements also include the definition of the maximum allowed time for decision-making in the process of project approval or the definition of requested conditions that must be obeyed (e.g., preservation measures for cultural heritage buildings).
- The governmental financial support for reconstruction increased from 80 to 100% of the construction reconstruction cost with the possibility to receive the governmental subsidies in advance (only in the case where the building has a legal and official representative). This reduces the initial cost of reconstruction and repairs at the start of the investment process.
- For the cases where family house owners are willing to invest in the recovery of their real estate, they are now allowed to finance the works by themselves with the possibility to request a full refund of the applicable reconstruction costs (only for the construction reconstruction)
- To improve the implementation rate of the Law, the state can buy off the ownership of a building or a part of the ownership to improve the implementation of the Law on reconstruction
- The demolition of heavily damaged buildings is financed completely by the government, and in case a building is endangering the surroundings or persons, the building can be demolished by a shortened administrative procedure (duration of up to 5 days); where the owners of a demolished real estate have the possibility to receive financial reimbursement for their real estate or they can request a replacement house (only for real estate where owners were living in at the time of the earthquake)

Hereafter until the day of writing this paper (02.03.2023.) further 911 reconstruction investments and approximately 9,5 mil EUR [24] were approved. In relation to the previous regulatory framework, the investment number fell from 99 cases per month and almost 700.000 EUR/month to 53 cases per month and 560.000 EUR/month.

Proceedings of the 2nd Croatian Conference on Earthquake Engineering - 2CroCEE
Zagreb, Croatia - March 22 to 24, 2023

DOI: https://doi.org/10.5592/CO/2CroCEE.2023.105

Interestingly enough, in the current state, the Croatian government introduced a new Law on reconstruction with new by-laws. Still, as the innovation in the regulatory framework is completely new the effects cannot be seen yet. The new Law on reconstruction [31]:

- emphasizes self-renovation as the government will give more financial support even before the reconstruction process starts
- ownership issues are regulated in cases where the data from the land register does not match the actual situation or the land register does not exist.
- reduces the number of participants in the renovation process hoping to boost the reconstruction and recovery
- reconstruction of buildings cultural heritage buildings is made more easy by regulating the involvement of cultural heritage protection experts in the renovation process
- introduces the provision of financial aid to citizens for the removal of all destroyed buildings, as well as financial aid for project development costs.
- it is now possible to build a replacement family house when it is determined that the repair of the structure is not justified due to landslides and other geological changes that caused a change in the basic characteristics of the soil.

3. Conclusions

The Croatian case study emphasizes the role of disaster risk governance showcasing the adaptation process for the post-disaster recovery process to start. Here the process could have evidently been shortened had the post-disaster recovery regulatory framework been ready and waiting in case of an emergency. That the disaster risk recovery governance was weakly developed was already identified by the National disaster risk assessment. This emphasizes the importance of the second Sendai framework priority, which also highlights the importance of the necessary political will and the positive and enabling surrounding for effective disaster risk reduction measures. Without either the political will or the enabling surrounding the disaster risk management is next to impossible.

The National risk assessment clearly states that the government had been strongly and intensively investing in preparedness, and these activities played an important role in the short-term post-disaster process. It can be safely assumed that the disaster risk management disabling surrounding and the nonexistent political will made it tough and de-motivating to invest in preventive disaster risk-reducing measures, at least when it comes to retrofitting the built environment to resist the expected seismic events. Hereby the number of investments aimed at reducing the risk of damage to the built environment was severely reduced, making another strong statement that national governance makes a strong impact on enabling disaster risk management. One can argue that both issues can be attributed to a weak understanding of the risk at hand, here for however it is unclear which awareness-raising processes could have achieved the wanted result.

Analysis shows that disaster risk reduction measures need time to be adopted in a culture, and Croatian risk-raising campaigns have started only a decade ago, still, it is unclear if a longer or more aggressive risk-raising campaign would have had a wanted impact and would have enabled the creation of the so much needed disaster risk reduction governance.

Whether known or unknown disaster risk sources are numerous, and their direct impacts are very well-known, and these are ever-increasing. However, as currently we are living in a globalized world real unwanted impacts of a particular disaster can only be discovered once the disaster happens. These can have a much more spread-out impact than obvious at the first sight. At the time of writing this article, the Covid-19 pandemic has made this global risk landscape more evident than ever. Due to the current global crisis, States must undertake immediate action at community, national, and international levels to reduce the risks.

References

Proceedings of the 2nd Croatian Conference on Earthquake Engineering - 2CroCEE
Zagreb, Croatia - March 22 to 24, 2023

DOI: https://doi.org/10.5592/CO/2CroCEE.2023.105

[1] Statista research department, "Cost of natural disaster losses worldwide from 2000 to 2020, by type of loss," Natural disaster losses cost worldwide 2000-2020, 2021. https://www.statista.com/statistics/612561/natural-disaster-losses-cost-worldwide-by-type-of-loss/ (accessed Oct. 17, 2021).

[2] A. Altshuler et al., "Socioeconomic and data challenges: disaster risk reduction in Europe," 2019.

[3] M. Gall and S. L. Cutter, "Governance in Disaster Risk Management Social Sensing and Big Data Computing for Disaster Management View project SoVI Brazil View project," 2014, doi: 10.13140/2.1.2130.2568.

[4] T. Bryant, "Mapping Vulnerability: Disasters, Development and People," Geographical Research, vol. 44, no. 3, pp. 328–329, 2006, doi: https://doi.org/10.1111/j.1745-5871.2006.00395.x.

[5] C. Wisner and D. Nivaran, "At Risk: natural hazards, people's vulnerability and disasters," 2003.

[6] R. Few, Z. Scott, K. Wooster, M. F. Avila, M. Tarazona, and A. Thomson, "Strategic Research into National and Local Capacity Building for DRM Synthesis Report," Geneva, 2015. [Online]. Available: www.ifrc.orgSavinglives,changingminds.

[7] UNDRR, "Terminology - Online glossary," 2017. https://www.undrr.org/terminology (accessed Oct. 17, 2021).

[8] S. Markušić, D. Stanko, T. Korbar, N. Belić, D. Penava, and B. Kordić, "The Zagreb (Croatia) M5.5 earthquake on 22 March 2020," Geosciences (Switzerland), vol. 10, no. 7, pp. 1–21, 2020, doi: 10.3390/geosciences10070252.

[9] "Analiza naknadnih potresa." https://www.pmf.unizg.hr/geof/seizmoloska_sluzba/o_zagrebackom_potresu_2020/pola_godine_od_potresa/analiza_naknadnih_potresa (accessed Oct. 13, 2021).

[10] HCPI, "Rezultati procjena oštećenja građevina nakon potresa u Zagrebu 2020," 2020. https://www.hcpi.hr/rezultati-procjena-ostecenja-gradevina-nakon-potresa-31 (accessed Oct. 13, 2021).

[11] Government of Croatia and World Bank, "CROATIA EARTHQUAKE Rapid Damage and Needs Assessment," Zagreb, 2020.

[12] S. Markušić et al., "Destructive m6.2 petrinja earthquake (croatia) in 2020—preliminary multidisciplinary research," Remote Sens (Basel), vol. 13, no. 6, Mar. 2021, doi: 10.3390/rs13061095.

[13] USGS, "Earthquake near Petrinja, Croatia," 2020. https://earthquake.usgs.gov/earthquakes/eventpage/us6000d3zh/map (accessed Oct. 17, 2021).

[14] EMSC, "M 6.4 - CROATIA - 2020-12-29 11:19:54 UTC," 2020. https://www.emsc.eu/Earthquake/earthquake.php?id=933701#providers (accessed Oct. 17, 2021).

[15] HCPI, "Hrvatski Centar za Potresno Inženjerstvo," 2021. https://www.hcpi.hr/ (accessed Dec. 28, 2021).

[16] Government of Croatia and World Bank, "Croatia December 2020 Earthquake - Rapid Damage and Needs Assessment," Zagreb, 2021.

[17] Parliament of Croatia, "Homeland Security System Act (NN108/17)," Zagreb, 2017. Accessed: Oct. 13, 2021. [Online]. Available: https://narodne-novine.nn.hr/clanci/sluzbeni/2017_11_108_2489.html

[18] Pairlament of Croatia, Law on mitigation and elimination of the consequences of natural disasters. Croatia: Official Gazette, 2019.

[19] Z. Sgmund, M. Uroš, and J. Atalić, "The Earthquake in Zagreb amid the COVID-19 Pandemic: OPINION," 2020. Accessed: Dec. 28, 2021. [Online]. Available: https://www.undrr.org/news/earthquake-zagreb-amid-covid-19-pandemic-opinion

[20] Pairlament of Croatia, NN 102/20 - Law on Reconstruction of Earthquake Buildings on the Territory of the City of Zagreb, Krapina-Zagorje County and Zagreb County. Croatia: Official Gazette, 2020. Accessed: Nov. 01, 2021. [Online]. Available: https://narodne-novine.nn.hr/clanci/sluzbeni/2020_09_102_1915.html

Proceedings of the 2nd Croatian Conference on Earthquake Engineering - 2CroCEE
Zagreb, Croatia - March 22 to 24, 2023

DOI: https://doi.org/10.5592/CO/2CroCEE.2023.105

[21] C. and S. P. Ministry of Physical Planning, "Fond za obnovu," 2020. https://mpgi.gov.hr/o-ministarstvu/djelokrug/graditeljstvo-98/obnova-zgrada-ostecenih-potresom-na-podrucju-grada-zagreba-i-krapinsko-zagorske-zupanije/fond-za-obnovu/11220 (accessed Nov. 06, 2021).

[22] Pairlament of Croatia, NN 119/20 - First Program of Measures For Reconstruction of Earthquake Damaged Buildings in the City of Zagreb, Krapina-Zagorje County And Zagreb County. Croatia: Official Gazette, 2020. Accessed: Nov. 01, 2021. [Online]. Available: https://narodne-novine.nn.hr/clanci/sluzbeni/2020_10_119_2309.html

[23] Pairlament of Croatia, NN 10/21 - Amendments to the Law on Reconstruction of Earthquake Damaged Buildings on the Territory of the City of Zagreb, Krapina-Zagorje County and Zagreb County. Croatia: Official Gazette, 2021. Accessed: Nov. 01, 2021. [Online]. Available: https://narodne-novine.nn.hr/clanci/sluzbeni/2021_02_10_191.html

[24] Reconstruction fund, "Reconstruction fund - overview of payments and costs," 2021. https://www.arcgis.com/apps/dashboards/fd7f27fcda014e97a8ef1238729f837e (accessed Nov. 23, 2021).

[25] Ministry of Physical Planing Construction and State Assets, "Expert reconstruction advice meeting - 03.02.2021.," Feb. 03, 2021. https://mpgi.gov.hr/vijesti/izmjenama-programa-mjera-dodatno-ce-se-pojednostaviti-procedure-u-obnovi-i-smanjiti-potrebna-dokumentacija/11497 (accessed Nov. 23, 2021).

[26] A. Latinović, "GDJE JE ZAPELO? Obnova nakon potresa u Italiji najbolji je putokaz za Hrvatsku, trebamo međunarodnu pomoć, ali i onu iz dijaspore...," 2021. Accessed: Nov. 23, 2021. [Online]. Available: https://direktno.hr/direkt/gdje-je-zapelo-obnova-nakon-potresa-u-italiji-najbolji-je-putokaz-za-hrvatsku-trebamo-medunarodnu-pomoc-ali-i-onu-iz-dijaspore-247986/

[27] M. Pušić, "Prizori s Banije prije i poslije: Novi krovovi niču, ali postoji jedan veliki problem," 2021. Accessed: Nov. 23, 2021. [Online]. Available: https://www.jutarnji.hr/vijesti/hrvatska/prizori-s-banije-prije-i-poslije-novi-krovovi-nicu-ali-postoji-jedan-veliki-problem-15107101

[28] E. Felić, "GRAĐEVNI MATERIJAL - Cijene poludjele, a rast će i dalje," 2021. Accessed: Nov. 23, 2021. [Online]. Available: https://lider.media/poslovna-scena/hrvatska/gradevni-materijal-cijene-poludjele-a-rast-ce-i-dalje-135844

[29] Ministry of Physical Planing Construction and State Assets, "Expert reconstruction advice meeting - 27.10.2020.," Oct. 27, 2020. https://mpgi.gov.hr/vijesti-8/pocetak-obnova-manjih-zgrada-trebao-bi-krenuti-do-proljeca/11155 (accessed Nov. 23, 2021).

[30] Pairlament of Croatia, NN 117/21 - Amendments to the Law on Reconstruction of Earthquake Damaged Buildings on the Territory of the City of Zagreb, Krapina-Zagorje County and Zagreb County. Croatia: Official Gazette, 2021.

[31] Pairlament of Croatia, Law on Reconstruction of Earthquake Damaged Buildings on the Territory of the City of Zagreb, Krapina-Zagorje County and Zagreb County. 2023.