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Reflections on the L'Aquila trial and the social dimensions of disaster risk

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Abstract

Purpose – The purpose of this paper is to reflect on what can be learned about disaster risk reduction (DRR) from the L'Aquila trial of scientists. The court case was initiated because of a controversial meeting on 31 March 2009 of the Major Risks Committee (MRC), held under the auspices of the Italian Department of Civil Protection. The purpose of the meeting was to consider (prior to the fatal earthquake of 6 April 2009) disaster risk in the L'Aquila area, which was being affected by an earthquake swarm since October 2008.
Design/methodology/approach – The authors undertook a document analysis of trial materials, and a review of academic and media commentary about the trial.
Findings – The legal process revealed that disaster governance was inadequate and not informed by the DRR paradigm or international guidelines. Risk assessment was carried out only in a techno-scientific manner, with little acknowledgement of the social issues influencing risks at the local community level. There was no inclusion of local knowledge or engagement of local people in transformative DRR strategies.
Originality/value – Most previous commentary is inadequate in terms of not considering the institutional, scientific and social responsibilities for DRR as exposed by the trial. This paper is unique in that it considers the contents of the MRC meeting as well as all trial documents. It provides a comprehensive reflection on the implications of this case for DRR and the resilience of peoples and places at risk. It highlights that a switch from civil protection to community empowerment is needed to achieve sustainable outcomes at the local level.

Keywords Disaster risk management, Disaster risk reduction, Civil protection, Community resilience, Vulnerability, Community empowerment, Disaster governance, Transformative knowledge

Paper type Research paper

Introduction

The 6 April 2009 earthquake in L'Aquila, Italy, drew the attention of scientists all over the world for various reasons. One was that the earthquake and its aftermath "triggered an unprecedented series of legal consequences" (Benessia and De Marchi, 2017, p. 35). Over 200 legal inquiries were initiated, primarily relating to the collapse of public buildings or to the concrete buildings where most fatalities occurred (Alexander and Magni, 2013). However, what gained most attention and has come to be known as "the L'Aquila Trial" was the prosecution of six scientists and one government official. Initially accused of negligence, carelessness and malpractice, at the conclusion of a lengthy trial, they were initially found guilty of manslaughter, bodily harm and conspiracy, and were sentenced to six years prison and faced massive costs (Tribunale di L'Aquila, 2012). Following a successful Court of Appeal hearing, a counter appeal led to a hearing by the Supreme Court of Cassation (SCC, *Corte Suprema di Cassazione*). The total legal process lasted more than five years, ending in November 2015 with the SCC decision that the six scientists were acquitted. The government official, however, was found guilty, and sentenced to two years jail.

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The L'Aquila trial and the meeting of the Italian Major Risks Committee (MRC), which was the reason for the trial, is not just a story of a trial of scientists or about how information was disseminated by the Italian Department of Civil Protection (DCP). It is a story that revealed multiple failures, especially a failure to implement disaster risk reduction (DRR) and to enhance resilience at the local community level. A social understanding of disaster means acknowledging that disasters result from socially produced vulnerabilities and failures (Quarantelli, 1998; Perry and Quarantelli, 2005; Oliver-Smith *et al.*, 2017). Disasters and related risks result from many factors, especially the social dimensions of an area, including people's hazard exposure, their vulnerabilities and capacities to manage risks and be prepared. The widespread recognition of this means that disasters are domains of potential injustice and do not provide dispensation to those who are guilty of professional neglect (Lauta, 2014). Rather than being blame games or witch hunts (e.g. Nosengo, 2010; Boschi, 2013; Clark, 2012; Yeo, 2014), disaster trials can be transformative opportunities (Benadusi and Revet, 2016). Reflections on trials following a disaster are opportunities to understand local disaster governance and recognise the drivers and constraints to social and institutional learning about DRR (Simoncini, 2014; Bretton *et al.*, 2015).

The L'Aquila trial has been much commented on. Many papers were published while the legal process was underway (e.g. Alexander, 2010, 2013, 2014; Nosengo, 2010, 2012; Hall, 2011; Cartlidge, 2012; Notaro, 2014; Fioritto, 2014; Simoncini, 2014; Lauta, 2014; Scolobig *et al.*, 2014; Bretton *et al.*, 2015), however, only a few have been published since the definitive sentence in November 2015 (e.g. Ciccozzi, 2016; Pietrucci, 2016; Stucchi *et al.*, 2016; Benessia and De Marchi, 2017). There is yet to be a comprehensive reflection on the trial in terms of international policies concerning DRR, which is what we do in this paper.

This paper is part of a larger research project investigating the social dimensions surrounding the 2009 L'Aquila earthquake (Imperiale and Vanclay, 2016a, b). Its purpose is to reflect on the L'Aquila trial and consider what the trial reveals about Italian disaster management. This paper primarily draws on a document analysis of trial materials, which amounted to over 1,100 pages (Tribunale di L'Aquila, 2012; Corte di Appello dell'Aquila, 2014; Corte di Cassazione, 2016). We also considered commentary in academic journals, the international, national and local media, and we did a rapid assessment of social media accounts of the trial. Four significant identities associated with the topic were interviewed.

The social, political and seismological context

The 6 April 2009 earthquake was preceded by much seismic activity starting in October 2008. This activity increased in frequency and intensity, alarming residents, local administrators and the DCP. In March 2009, over 100 tremors occurred in the vicinity of L'Aquila. The local anxiety was arguably increased because of predictions being made by Giampaolo Giuliani, a somewhat unorthodox amateur Seismologist, who considered that radon emissions could predict an imminent earthquake, something not yet accepted by orthodox science (Alexander, 2014; Stucchi *et al.*, 2016). Due to this seismic "swarm", many buildings began to crack. Public schools were often closed as a precaution. According to our interviewees, L'Aquila city and surrounding area were unprepared for any disaster and no civil protection plans existed. The L'Aquila hospital and other key public buildings were known to be vulnerable to seismic hazards, and many residential buildings were badly constructed. The poor state of buildings and the risks associated with this were known for at least 20 years (Boschi *et al.*, 1995; Barberi *et al.*, 2007). As a key informant reported, local awareness of the increasing vulnerability was evident in comments made at body corporate meetings by some residents about cracks appearing in buildings (many of which collapsed during the earthquake) and by their demands for building inspections and to see civil protection plans.

A press release from the Abruzzo Region Civil Protection (ARCP) on the morning of 30 March 2009 stated that no more shocks were foreseen – paradoxically, there was a 4.1 earthquake that very afternoon. During the trial, the Chief of the DCP, Guido Bertolaso, declared that this press release and the Giuliani predictions were the reasons for calling the MRC meeting on 31 March. After reading the press release, Bertolaso phoned Daniela Stati (Abruzzo Region Councillor responsible for civil protection and the ARCP) stating: "you must tell your staff not to write press releases that say other earthquakes will not happen, because this is bullshit and when talking about earthquakes these things must not been said" (Tribunale di L'Aquila, 2012, p. 150). He went on:

> Listen, De Bernardinis, my deputy, will call you shortly. A meeting [of the MRC] about this earthquake swarm will be held in L'Aquila in order to shut up any imbecile, calm down any conjectures, worries etc. […] I will make them [the members of the MRC] come to L'Aquila to the Abruzzo region's headquarters, or to the local prefecture, you choose, I do not care, so that it will be more of a media move [strategy]. Understand? […] In this way, they, who are the best in earthquakes, will say: in a normal situation, they [the tremors] are phenomena that happen, and better that there be 100 tremors of 4 on the Richter scale rather than silence, because 100 earthquakes serve to release energy, and therefore there will never be the big one, the one that really hurts. […] Now, talk with De Bernardinis and decide where to hold this meeting tomorrow and make it known that there will be a meeting, and that this is not because we are afraid or worried, but because we want to reassure and calm people. Instead of us talking, we will let the best scientists in the field of seismology talk (Tribunale di L'Aquila, 2012, p. 152, author translation).

The meeting was scheduled for 18:30 on 31 March at the Abruzzo Region Headquarters in L'Aquila. It was convened by sending a faxed letter in the evening of 30 March to the MRC members. The letter stated that the discussion topic was "to carefully analyse the scientific and civil protection issues related to the seismic sequence occurring in L'Aquila Province over the last four months and which culminated in the 4.0 earthquake on 30 March 2009" (Tribunale di L'Aquila, 2012, p. 94). The DCP also issued a press release stating that an MRC meeting was convened for 31 March to provide information from the scientific community about the recent seismic activity and that there would be a press conference following the meeting.

The meeting of the Italian MRC

The trial documents (Tribunale di L'Aquila, 2012, pp. 99-103) indicate that the MRC meeting began at 18:30 and ended at 19:30. The two-page draft minutes (dated 2 April 2009) and the five-page formal minutes (dated 6 April 2009) were reproduced in the trial documents (Tribunale di L'Aquila, 2012). They indicate that 19 named people and a few unnamed people were present. Although there is no verbatim transcript or audio recording, because the trial primarily related to the conduct and content of this meeting, the discussion in that meeting was reasonably re-constructed through the trial process. The people present at the meeting (with their role at the time) were:

(1) The senior government official:

- Bernardo De Bernardinis, Deputy Technical Head, Department of Civil Protection.

(2) Full members of the MRC:

- Franco Barberi, MRC Deputy President, Professor of Volcanology at Roma Tre University;
- Enzo Boschi, President of the Italian National Institute of Geophysics and Volcanology and Professor of Terrestrial Physics at the University of Bologna;

- Gian Michele Calvi, Director of the European Centre for Training and Research in Earthquake Engineering and Professor of Planning in Seismic Zones at the University of Pavia; and
- Claudio Eva, Professor of Terrestrial Physics at the University of Genoa.

(3) Other invited scientists:

- Mauro Dolce, Director of the DCP Seismic Risk Office and Professor of Construction Technology at the University of Naples Federico II; and
- Giulio Selvaggi, Director of the Italian National Centre for Earthquakes.

(4) People present in a formal capacity:

- Leone Altero, Technical Head of ARCP;
- Gianluca Braga, L'Aquila Prefecture Office;
- Massimo Cialente, Mayor of L'Aquila;
- Attilio D'Annibale, DCP Communication Service;
- Antonio Lucantoni, DCP Seismic Office;
- Marinello Mastrogiuseppe, ARCP;
- Graziella Patrizi, L'Aquila Prefecture Office;
- Rinaldo Pezzoli, L'Aquila Prefecture Office;
- Roberto Riga, L'Aquila Councillor, responsible for civil protection;
- Lorella Salvatori, DCP employee (produced the minutes);
- Daniela Stati, Abruzzo Region Councillor in Charge of Civil Protection; and
- Carlo Visca, ARCP.

(5) People not named in the minutes, but can be deduced as being present because they signed the document, were mentioned in the trial or were indicated by our sources as being present:

- Christian Del Pinto, Seismologist for the Molise Region Civil Protection;
- Carlo Gizzi, Press Officer for the Abruzzo Region; and
- Two or three members of the local fire service.

Curiously, the President of the MRC, Giuseppe Zamberletti, was not present. No explanation was given for this, and there was little mention of him in the trial. The trial did not raise any issues relating to the integrity of the formal minutes, and one of our interviewees (who was present) indicated that the formal minutes were congruent with what transpired at the meeting. Drawing on the formal minutes and the court discussion, the general outline of the meeting can be reconstructed (see below).

Although Barberi was ostensibly the Chair, De Bernardinis opened the meeting, passed on the greetings of the DCP Chief (Bertalaso, who could not attend) and then introduced the people present. He quickly explained why the meeting was convened and invited the discussion to start. As evident in the minutes, there were two main topics of discussion: making an objective evaluation of the on-going seismic events, especially in relation to what could be forecasted, and providing advice concerning the increasing alarm in the local population.

Dolce spoke first. He gave an overview of the seismic activity and then stated that panic was being created because of unfounded rumours, by which he probably meant Giuliani,

although there were reports of other people creating alarm. Leone Altero (representing ARCP) said that the local police special branch had identified these people. The minutes give no information about what was going to be done about this. Curiously, this was the only remark made by him or other ARCP officials during the whole meeting. Despite a stated purpose of the meeting being civil protection issues, Altero was not asked to provide any information concerning DRR strategies, civil protection plans or local preparedness, nor did he elaborate on this at any time. The focus only on the local police action revealed that the main concern for the ARCP and DCP was alarmism rather than DRR, and indicates unease by these agencies.

Discussion of the scientific risk assessment took the majority of the meeting. All scientists agreed that: it was not possible to predict earthquakes; given the earthquake swarm, it was unlikely the magnitude of the tremors would increase; and that little damage had been caused as a result of the seismic activity to date. Discussion of the second agenda item was initiated by Stati who thanked the scientists for their explanation (that a serious earthquake was unlikely), but noted that she and the mayor were in positions in which they must give political answers. She asked the scientists whether she and the mayor should pay attention to the people who were creating alarm. Barberi responded by saying that no measurement tool could predict earthquakes and therefore the MRC should not waste time discussing this topic. Barberi said that the earthquake swarm predicts nothing but reminds us that L'Aquila is in a seismic area and that sooner or later, a big event will occur. He remarked that the only defence is for the DCP and Abruzzo Region to invest in strengthening buildings and better planning. Somewhat surprisingly, Dolce highlighted that future building assessments should pay more attention to damage to the non-supporting structures (chimneys, ceilings, cornices, balconies, etc.) rather than to the supporting structures (walls, etc.), which almost surely were not damaged by the earthquake swarm. Stati concluded the meeting by saying: "thank you for your statements which will allow me to reassure the public through the media we will meet at the press conference". The meeting closed at 19:30.

The press conference with national and regional press followed immediately in the same building, being attended by Stati, Cialente, De Bernardinis and Barberi. It was organised by DCP Staff Member, Simona Bernacchi, together with the Abruzzo Region Press Officer, Carlo Gizzi. Rather than the information presented at the press conference, what was broadcast on local and national media was an interview De Bernardinis had given to a local TV station earlier in the day, in which he said the earthquake swarm was normal, there was no danger, and the scientific community confirmed that the situation was favourable in that there was a continuous discharge of energy and that, rather than worry, it was better to drink a glass of Montepulciano D'Abruzzo wine (Corte di Appello dell'Aquila, 2014).

The trial established that late in the evening of 31 March, Barberi and Dolce independently phoned Bertolaso to inform him how the meeting went, each saying that it "went as instructed" and that they made the Abruzzo councillor (Stati) happy by saying that there were no tools for earthquake forecasting (Tribunale di L'Aquila, 2012). This suggests that the meeting was a political stunt involving stooges rather than professional advice from independent scientists.

The earthquake, trial, appeal and final outcome

At 3:32 in the morning of 6 April 2009, a devastating earthquake (Mw 6.3) struck L'Aquila, killing 309 people, leading to much grieving and blaming. A local lawyer, Valentini, began acting on behalf of people seeking justice and/or to sue for damages. He began investigating the issues behind the earthquake. In late August 2009, Valentini filed a suit (*denuncia penale*) with the local prosecutor alleging that the DCP and MRC had failed in its duty to ensure

adequate prevention and preparedness, noting that the inability to predict earthquakes did not mean that a serious earthquake would not occur and did not exempt the DCP and MRC from their duty of care. Following extensive investigations, on 3 June 2010 the local prosecutor, Alfredo Rossini issued indictments against Barberi, Boschi, Calvi, De Bernardinis, Dolce, Eva and Selvaggi for negligence (*negligenza*), carelessness (*imprudenza*) and malpractice (*imperizia*) with respect to their public duty of precaution and prevention (Law 225 of 24 February 1992), and for violating their responsibilities regarding public communication by a public institution (Law 150 of 7 June 2000). On 25 May 2011, the investigating Judge, Romano Gargarella, confirmed that the trial would proceed.

The trial formally commenced on 20 September 2011. On the first day of hearings, it was announced that additional legal actions had been initiated by the Municipality of L'Aquila and by 67 individuals (mostly in a class action), 53 of who were claiming damages from the State. The presiding Judge, Marco Billi, announced that the court would hear all actions together, with the State (in the form of the Presidency and the DCP) being added to the list of defendants.

Following a trial spanning 13 months (with 31 days of court hearings), on 22 October 2012 Judge Billi delivered a guilty verdict and sentenced the accused persons to six years in jail (Tribunale di L'Aquila, 2012). They were found guilty of multiple manslaughter (*omicidio colposo plurimo*), bodily harm (*lesioni colpose*) and conspiracy (*cooperazione colposa*). Billi stated that the accused had conducted an assessment of risks that was "too approximate, generic and ineffective" and omitted relevant factors. This led to "incomplete, inaccurate and contradictory information" that had an inappropriate reassuring effect on the behaviour of many people. In addition to finding the seven defendants guilty, Judge Billi held them, together with the State, responsible for the court costs and compensation for loss of life or injury for the vast majority of claims.

The State and the seven defendants appealed. Following a lengthy process, on 10 November 2014, the Court of Appeal announced it had overturned the conviction. It ruled that no blame should be assigned to the six scientists. The civil servant, De Bernardinis, however, was not absolved from responsibility, but his sentence was reduced from six to two years jail and the financial liability was reduced to payment of legal costs, with no compensation to be paid for loss of life or injury.

De Bernardinis and the State were still not happy and appealed this decision. Conversely, the claimants were also dissatisfied, especially given the loss of compensation, and also appealed. These appeals meant the case had to be considered by the SCC. In its definitive decision of 20 November 2015, the SCC upheld the decision of the Court of Appeal. The 169-page decision statement (Corte di Cassazione, 2016) repeated key facts and articulated various high level principles, some of which are discussed below.

Key issues in the legal process

The various phases of the legal process identified many issues and had differing interpretations of them. These related to the status of the meeting held in L'Aquila, the public duty the DCP and MRC had for precaution and prevention of disaster risks, the risk assessment conducted and the communication implemented. A major difference of legal opinion emerged between the initial trial and the Court of Appeal, with the Court of Appeal's interpretation being endorsed by the SCC. In Table I, we summarise these key points.

A key issue relates to the status of the meeting held in L'Aquila. This was significant because of the obligations potentially imposed on the participants. The SCC determined that the MRC meeting was not a conventional meeting because it was convened using emergency procedures and was inquorate. It also considered that whether it was a formal meeting or not was irrelevant because the scientists were nevertheless required to fulfil their duty of providing "techno-scientific and proactive advisory activities pertaining to precaution and prevention" (Corte di Cassazione, 2016, p. 131). However, the SCC ruled that the MRC and

First trial 22 October 2012	Appeal court 10 November 2014
The meeting of 31 March 2009 was a proper meeting of the MRC and all participants were aware of its public role (due to the press release issued by the DCP). They shared with the DCP a duty of precaution and prevention, and of fairly informing the public	The meeting was not an official MRC meeting since it was not convened through normal procedure and was inquorate. The meeting was closed to the public. There is no proof the scientists knew of the DCP press release or the intention to make a public statement. By being convened through emergency procedures, the scientists were only providing advice to the DCP
The public duty of precaution and prevention required that the risk assessment be complete and adequate, and that there be proper assessment of all factors influencing disaster risk, including vulnerability and hazard exposure	Even if it was an official MRC meeting, no regulation established what would comprise a proper risk assessment
The risk assessment done by the MRC was inadequate because it did not consider the vulnerability of housing and the built environment, or hazard exposure in relation to population density and distribution	The scientists provided a scientifically correct analysis of the risks associated with the earthquake swarm. Assessment of vulnerability or hazard exposure was irrelevant for the intended purposes of the meeting
The scientists were aware of the public role of the meeting. They should have ensured that all information provided to the public was adequate. They were expected to correct any misleading information that might have been provided by the DCP	Only the DCP had responsibility in relation to information provided to the public. The DCP and De Bernardinis were negligent because they should have considered the influence institutional communication had on the public

Table I.
Comparison of interpretations between the first trial and the appeal court

Sources: Extracted from Tribunale di L'Aquila (2012) and Corte di Appello dell'Aquila (2014)

DCP have differing responsibilities. The only task the MRC scientists had was to provide techno-scientific advice, while responsibility for implementing precaution and prevention was up to the Presidency of the Council of Ministers operating through the DCP and the various local civil protection authorities. Because the duties of the MRC scientists were different to the obligations of the DCP, the scientists were exonerated, while the senior public servant (De Bernardinis) representing the DCP and the Presidency was guilty of inappropriate public communication.

The first trial judge determined the scientists were culpable by arguing they were negligent because they should have observed the principles of precaution and prevention in the risk assessment. Conversely, the SCC ruled that, while the principles of precaution and prevention establish what the DCP and MRC should do (i.e. the duty of diligence), they do not establish how this should be done (i.e. the diligence due), therefore the scientists could not be held individually accountable. The SCC ruled there was no specific action the scientists had to follow, except to utilise the best available scientific knowledge. The SCC considered there was nothing the scientists could have done that would have reduced the risk of an earthquake occurring. The SCC determined that the scientists did utilise the best available scientific knowledge and that they adequately discussed what the earthquake swarm meant regarding whether or not it was a precursor to more severe earthquakes. Evidently, risk was understood in the legal process as likelihood of an earthquake, not the interplay between the hazard itself, hazard exposure, the extent of vulnerability and resilience, and likely negative social consequences. The SCC judgement revealed that the regulations governing Italian civil protection do not establish any particular measures that must be adopted to implement DRR other than "generic cautions that the institutional bodies have to adopt in general" (Corte di Cassazione, 2016, p. 130). Furthermore, in current

law on civil protection, there is neither any definition of disaster risk, nor a prescribed methodology to follow to analyse and assess disaster risk.

Another issue concerned whether the scientific risk assessment should have considered the vulnerability of buildings and hazard exposure of local people. This was a key basis by which the original judge determined the risk assessment was inadequate and the scientists negligent. The Court of Appeal and SCC, however, said that the poor state of buildings was already known for at least 20 years by the people at the MRC meeting (Boschi *et al.*, 1995; Barberi *et al.*, 2007) and therefore was irrelevant in terms of whether it should have been explicitly discussed. This also reveals limited framing in how disaster risks were conceived.

The wider implications of the trial

The L'Aquila trial exposed many things, which are mostly too complicated to discuss in one short paper. Primarily, the trial revealed the narrowness of the techno-scientific approach towards disaster risk that was applied by the DCP and the members of the MRC, all of whom apparently had little understanding of the social dimensions of disaster risk. In asking the scientists to "carefully analyse the scientific and civil protection issues related to the seismic sequence occurring in L'Aquila Province" (Tribunale di L'Aquila, 2012, p. 94), the DCP expected that there be a risk assessment only in terms of the likelihood of a strong earthquake in the short term. The focus of the risk assessment was not on local people's well-being, their vulnerabilities, resilience or transformative change processes, but strictly only on the hazard phenomenon. What the MRC scientists and DCP understood as "civil protection issues" were actually matters of public control rather than DRR.

Such a limited perspective is odd, because at the time of the 2009 earthquake, the DRR paradigm had been well established for over 15 years, and was embedded in international declarations such as the Yokohama Strategy (IDNDR, 1994) and the Hyogo Framework for Action (UNISDR, 2005) – and subsequently in the Sendai Framework (UNISDR, 2015). The DRR paradigm requires a proper risk assessment that considers the multiple dimensions of local people's well-being. This means, for each dimension, understanding which assets are more vulnerable to the negative consequences of disasters, and which capacities local communities activate to manage risks and convert them into opportunities for development and enhanced resilience. Managing disaster risk demands transformative knowledge co-production processes that are capable of understanding, recognising, engaging and empowering the driving forces that reduce vulnerabilities and enhance local people's wellbeing and resilience (Future Earth, 2014; Gall *et al.*, 2014; Imperiale and Vanclay, 2016b; Patterson *et al.*, 2015).

The MRC discussion was seen as confidential advice to the DCP rather than being an opportunity for place-based transformative knowledge co-production. Had they been engaged, the local public health system, municipal services, professional associations, building firms, NGOs, and other formal and informal groups and individuals could have helped to better understand and identify local risks and vulnerabilities. Their potential role in contributing to prevention and preparedness, adding to knowledge concerning local disaster risk, and recognising the increasing vulnerability of buildings and local people's hazard exposure should have been valued and utilised.

Over-reliance on the techno-scientific approach demonstrates there is still a lack of understanding about how social vulnerability, risk and impacts are theoretically and practically related and about how science can contribute to enhancing local sustainable transformation (Future Earth, 2014; Patterson *et al.*, 2015; Imperiale and Vanclay, 2016b). This lack of understanding of the social dimensions of disaster results in disaster risks being narrowly defined in regulatory frameworks and in inadequate procedures for managing disaster risk, conducting proper risk assessments and pursuing sustainable transformation.

Conclusion

The key issue in the trial were related to the responsibilities and duties of scientists and the inadequacies of the MRC's risk assessment, especially the lack of consideration of local vulnerabilities and hazard exposure. The trial was not about whether the fatal earthquake could have been predicted or not, it was about whether the relevant public bodies (the Major Risk Committee and the Department of Civil Protection) adequately fulfilled their duty of care by conducting a proper risk assessment and whether they adequately communicated with the public. Although the scientists were eventually exonerated by the SCC, this was only possible because of inadequacies in the Italian regulations about how risk is defined and how risk should be assessed and managed. In contrast, the State, DCP and government official (De Bernardinis) were found guilty of inadequate information dissemination. We consider that, despite the not guilty decision, the trial process suggests that some scientists at the MRC meeting displayed callousness and sycophancy, suggesting their complicity and/or naiveté in deceptive strategic action intended to suppress concern in the community, subdue alarmism and demonstrate institutional action.

The academic debate about the trial focused mainly on issues such as earthquake forecasting, how uncertainty should be addressed and how risks should be communicated. There was strong sympathy for the scientists, who were generally seen as being inappropriately accused. In our view, much of the academic analysis failed to consider the institutional, scientific and social responsibilities to implement DRR at all levels. The technical perspective that framed most of this academic discussion failed to appreciate the social dimensions of disaster and disaster risk. In the academic and popular discussion, there was little reflection on the responsibilities of the public institutions or on the transformational role the DRR paradigm demands of science.

Our analysis revealed multiples failures by all relevant institutions at all levels. At the theoretical level, there was an over-reliance on techno-scientific analysis, which failed to understand the social dimensions of disaster risks and failed to engage local communities in knowledge co-production and sustainable transformation. At the practical level, there was a lack of planning and an over-reliance on a top-down system of command-and-control that centralised responsibility and stifled local action. It was clear that the meeting of MRC scientists was only a political stunt intended to harness their status to make a statement that could be used by politicians to calm the public, and to legitimise the lack of institutional (and social) preparedness. Ideally, the MRC should have taken sufficient time to conduct a proper risk assessment that would have appreciated the multiple dimensions of disaster risk, focussed on local people's well-being, their vulnerabilities, and resilience, and be a transformative change process that engaged all relevant local actors.

Notwithstanding many reports highlighting vulnerabilities in the local built environment, the local authorities took no action, nor were any civil protection plans or emergency/evacuation plans shared with the public before the earthquake. This lack of preparedness was not considered a relevant matter to discuss in the MRC meeting. As our document analysis revealed, there is still a lack of understanding about how to conduct a proper disaster risk assessment and fully respect the duty of care concerning DRR. While the trial established that the only responsibility the scientists had was to refer to the best available scientific knowledge, now, ten years after the L'Aquila disaster, it is high time to consider the questions: does the best available scientific knowledge concerning DRR only relate to seismological analysis of physical hazards? Should there be an interdisciplinary risk assessment protocol the MRC should follow to consider the multiple dimensions of disaster risk?

The political patronage system in Italy has led to elite capture and distortion in the allocation of funds, and to poor planning practice and culture. The regulations governing Italian civil protection do not establish any particular measures that must be adopted to

implement DRR other than "generic cautions that the institutional bodies have to adopt in general". According to the legal framework underpinning Italian disaster governance and to the trial documents, responsibility for implementing DRR strategies is up to the Presidency of the Council of Ministers operating through the national DCP and the local civil protection authorities. Although the Italian State issues laws, provides recommendations, establishes building codes, and commissions technical reports and information campaigns, there is little in this system that protects against elite capture or ensures adequate implementation. Because of restrictions on funding for prevention, and a belief that DRR is a constraint to development, local political authorities are often unwilling and ill-prepared to implement DRR. Consequently, in L'Aquila there was a lack of prevention and preparedness.

Overall, what emerged from our analysis was that there was: a widespread lack of understanding in the DCP–MRC system of the interplay between social vulnerability, risk and impacts; a lack of definition of risk in all its dimensions and lack of procedure for proper disaster risk assessment and management in regulatory frameworks; a lack of awareness about the transformative role of science for DRR purposes; and a consequent lack of planning and monitoring of DRR strategies and of acknowledgement of the role local communities must have in planning.

Despite the thorough analysis of DRR throughout the legal process (especially in the first trial), it was surprising there was not any reference to the international DRR paradigm (e.g. Yokohama Strategy, the Hyogo Framework for Action and the concept of community resilience). This lack of awareness of the international discourse is odd and arguably reveals: a lack of influence by United Nations bodies; disconnection between national bureaucracies (at least in Italy) and international thinking; a widespread resistance in the para-militaristic command-and-control approach of the Italian DCP (and civil protection systems in general) to transformative learning.

According to the international DRR paradigm, understanding disaster risk in all its dimensions means understanding that disaster risks are part of all societies. Disasters and disaster risks are not external forces from which society must be protected. Rather than protecting societies from risks, DRR requires effective transformational knowledge to empower societies to better manage risks and achieve social development. A radical shift from civil protection systems to community empowering systems is needed so that disasters (and disaster risks) are no longer seen as external forces from which societies must be protected, but as potential threats originating from the vulnerabilities of a society, which must be understood and reduced at the local level. These threats should be managed by understanding and reducing local vulnerabilities and risks, and by recognising, engaging and strengthening local people's assets and capacities in order to better design, implement and monitor participatory mitigation strategies, thus enabling the conversion of risks into opportunities for the enhancement of well-being and resilience at the local community level.

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