

Communicating earthquake risk to the public: the trial of the “L’Aquila Seven”

David E. Alexander

Received: 27 December 2012 / Accepted: 19 January 2014 / Published online: 30 January 2014
© Springer Science+Business Media Dordrecht 2014

Abstract The trial and conviction of seven public officials in L’Aquila, central Italy, for having allegedly given out misleading and incorrect information to the public before the 6 April 2009 earthquake has proved to be one of the most momentous developments of recent times in science and disaster risk reduction—and also one of the most misunderstood. It highlights the difficulty in transforming the findings of the earth sciences, which are often characterised by uncertainty, into information that can be used to protect ordinary citizens. This paper describes those elements of the disaster at L’Aquila which are pertinent to the trial and the legal proceedings that followed them. It analyses the political, social and scientific context of the trial, and the reaction of scientists and their institutions in Italy and other countries. I conclude that the defendants were tried as responsible public officials, not as scientists. The mass media in Italy and abroad tended to insist that what was on trial was the ability to predict earthquakes, and this had an enormous influence on the opinion of scientists in many different places. However, the trial was actually about the apparently fatal consequences of misleading the public with “incomplete, imprecise and contradictory information”, as the prosecutors put it. I believe that much of the international reaction to the trial was misguided because it was based on incomplete, second-hand information about the proceedings. If scientists were to make judgements on their own work in such a superficial manner, the results would be highly unreliable and public faith in science would plummet.

Keywords Earthquake · Disaster · Warning · Public information · Legal proceedings · Italy

1 Introduction

The magnitude 6.3 earthquake that struck the central Italian city and province of L’Aquila at 3.32 a.m. on 6 April 2009 killed 308 people and injured 1,500, 202 of them seriously. It

D. E. Alexander (✉)
University College London, London, UK
e-mail: david.alexander@ucl.ac.uk

damaged about 100,000 buildings and left 67,000 people homeless (Alexander 2010a). The physical event was relatively moderate (moment magnitude 6.3), but it revealed the very high vulnerability of lives, livelihoods, building stock and institutions in the Apennine Mountains. It also led to a series of scandals and controversies that were destined to last for years (Erbani 2010). During the aftermath of the disaster, one of the most controversial developments was the trial and prosecution of seven functionaries of the Italian National Department of Civil Protection (DPC), “for having given out falsely reassuring information to members of the public”. The prosecution alleged that 26 citizens had acted on that information and as a consequence had lost their lives. The trial lasted for 3 months and ended, on 22 October 2012, with the conviction of all seven defendants for manslaughter, the serving out of massive fines and their condemnation to 6 years of imprisonment, for having issued “incomplete, imprecise and contradictory information on the nature, causes, dangers and future development of seismic activity in the area in question” (Il Centro 2012a).

The trial and sentence caused a furore in scientific and political institutions around the world and was vigorously discussed in many different forums (Euronews 2012). Some commentators maintained that this was the greatest attack on the integrity of science since 1633 and the trial of Galileo Galilei for heresy, or the burning at the stake of Giordano Bruno in 1600.¹ In reality, few events in the history of modern science have been so thoroughly misunderstood as have the court proceedings in L’Aquila. In this account, I aim to construct a narrative of the trial and consider its significance in a context of science, politics, earthquake reconstruction and local and national affairs. It is emphatically not my intention to try to “hold a second trial”, nor to attempt to judge whether the outcome was right or wrong. Instead, I will seek to shed light on the motivations of the protagonists of this story and consider what, *if any*, are the implications for science in the modern world.

I start by declaring the extent of my involvement in the proceedings in L’Aquila. I am an academic with an interest in Italian earthquakes that goes back to the days, more than 30 years ago, when one of them partially destroyed the house I was living in. As a home owner in a highly seismic part of Italy, I still incur a significant risk. Recently, I directed an international team of researchers who studied the epidemiology of victims and welfare of survivors directly after the L’Aquila earthquake. I know personally all seven defendants in the court proceedings and have worked with several of them on projects unrelated to L’Aquila. However, I hope the reader will appreciate that it is not my intention either to defend or to condemn the “L’Aquila Seven”, but to consider their trial with a degree of detachment. The point of doing so is to ascertain whether some of the sweeping pronouncements made about the trial in scientific circles and the mass media are justified (for example, that scientists will never again be able to conduct their work without fear of political interference—L’Occidente 2012). I believe that, for the good of science, political administration and civil protection in Italy and anywhere else in the world, misconceptions about this trial need to be dispelled.

The epidemiological study of the aftermath of the L’Aquila earthquake that I directed was carried out under the aegis of the European-funded project MICRODIS (Alexander et al. 2011). It revealed a complex situation in which there were winners and losers, but many of the victims, especially women, were left in a precarious position as a result of highly questionable political and administrative decisions (see Dell’Osso et al. 2011). One

¹ Giordano Bruno’s cosmology was unacceptable to the cardinals who tried him, but the main reason for his condemnation and execution by the Inquisition appears to have been his pantheism. This is a good reason why it was inappropriate to cite him in arguments relating to the L’Aquila trial.

of the principal conclusions of the MICRODIS study is that developments in the aftermath of the earthquake can only be fully understood by applying a political logic (Alexander 2012). The logic of politics relates to votes at election time and the exercise of political power at other times. The expenditure of colossal sums of money on projects of questionable validity and benefit characterised the first 3 years of the L'Aquila recovery process, which was slow, painful, expensive and inequitable (Alexander 2011). At several points, political logic and common sense logic manifestly diverged, as demonstrated so brilliantly in Sabina Guzzanti's award-winning and biting satirical cinema film *Draquila*. By conflating Dracula and L'Aquila in the title, Guzzanti intended to symbolise how the political classes suck the lifeblood out of the long-suffering earthquake survivors. I mention this example to support the observation that it would be unwise to consider the trial of the "L'Aquila Seven" without careful consideration of its social, political and cultural referents and its context within the progress of the earthquake emergency.

In the next section, I will describe some of the key events and developments immediately before the earthquake in the light of how they motivated prosecutors to indict the seven defendants and how they created a context for the trial.

2 How the case developed: before the L'Aquila earthquake

Gioacchino Giampaolo Giuliani is a technician who, in 2009, worked in the physical laboratories located in the tunnels underneath Gran Sasso, the highest mountain in the Apennines and peninsular Italy (L'Aquila city is about 25 km distant). His hobby is the monitoring of radon emissions in the hope of using them to predict impending earthquakes. Radon is a stable, inert gas that appears in fluids that have been in contact with rock surfaces. Micro-cracking during the process of slip-faulting increases the surface area that comes into contact with air and water and hence the transmission of radon in fluids. Although it is only one of at least a dozen physical changes that have been consistently noted before certain earthquakes, and one of several elements that can be monitored from this point of view, radon is easy to detect in air and water and responds rapidly and consistently to faulting processes. Giuliani, in fact, had detected large radon anomalies between 48 and 24 h before the magnitude 5.4 San Giuliano di Puglia earthquake of 31 October 2002, which killed 30 people. However, he was unable to locate the source of the tremors, which was 200 km southeast of L'Aquila, and thus a long way away from his monitoring apparatus.

Abruzzo region, in which L'Aquila lies, has had many disastrous earthquakes. That of 1703 killed an estimated 6,000 people in L'Aquila city and its immediate surrounds (Cello et al. 1998). The event of 13 January 1915 killed 32,500 people, including 94 per cent of the population of Avezzano (9,328 of 11,000 inhabitants), 50 km south of L'Aquila (Molin et al. 1997). The 1703 event was part of an earthquake sequence (or swarm) rather like that which in September–December 1997 caused devastation in Umbria and Marche regions further north (Galli and Galadini 1999). In October 2008, another earthquake swarm began in the vicinity of L'Aquila. By late winter, several alarming shocks had occurred, but none was powerful enough to cause major damage.

In the 12 days before the 6 April 2009 earthquake, Giuliani vacillated between declaring that the seismic energy would dissipate in small shocks (which was the official line taken by the Italian National Institute for Seismology and Volcanology—INGV) and raising the alarm with the local authorities, in particular the mayor of Sulmona (pop. 25,200), a town 70 km southeast of L'Aquila. Given the tendency of the earthquake shocks

to become more frequent and more powerful, and local residents to become more anxious, Giuliani's prudence in reassuring the public but at the same time alerting the authorities came to nothing. On 29 March 2009, his instruments, located in a cellar at San Bernardino in the middle of L'Aquila City, detected severe anomalies in the atmospheric emission of radon. He informed the authorities that an impending strong earthquake was possible, "within a week and probably centred upon Sulmona". On both counts, he was wrong (Kerr 2009), but the prediction—if that is what it could be called—was leaked to the public and the population became agitated.

Dr Guido Bertolaso, Undersecretary of State and Head of the national DPC, announced to journalists that the Italian state would henceforth prosecute Giuliani for unnecessarily disturbing the public peace, and the DPC would request punitive damages. At the same time, he called for a meeting of the National Commission on Major Risks (Commissione sui Grandi Rischi) to be held in L'Aquila on 31 March 2009. The main scope of this meeting, as admitted by the participants, was to discuss ways of reassuring the population of L'Aquila that nothing was amiss.

After the earthquake, the two-page minutes of the meeting were published by the weekly magazine *L'Espresso* (L'Espresso 2009). Present at the meeting were regional functionaries and six professors of geosciences or engineering, all of whom had important managerial appointments in the national civil protection organisation. One was the Director of the National Institute of Geophysics and Volcanology, and two were officials of the national DPC.

The consensus of the discussion, as reported in the minutes, is summed up in the following statement by the volcanologist Professor Franco Barberi, who was later to be one of the defendants in the trial:

"Il Prof. Barberi conclude che non c'è nessun motivo per cui si possa dire che una sequenza di scosse di massa magnitudo possa essere considerata precursore di un forte evento." ("Professor Barberi concludes that there is no reason for saying that a sequence of low magnitude shocks could be considered the precursor of a strong event.")

The tone of the discussion, as evinced by the minutes, is more than definite: it is categorical. Those who were present initialled the minutes and one of them, Dr Bernardo De Bernadinis, gave a television interview in which he told viewers that there was nothing to worry about. "Go home and have a glass of wine—Montepulciano d'Abruzzo, of course", he joked. The video of this interview has been widely circulated and since the earthquake has assumed an overtone that varies between ironic and macabre.

On Sunday 5th April 2009, sizeable earthquake shocks occurred at 11.30 p.m. and midnight. Radon levels soared and Giuliani evacuated his family from their home, or so he later claimed. A violent and thoroughly alarming tremor occurred at 00.30 h. In Paganica, a satellite town of L'Aquila city, people came out of their homes until functionaries of the civil protection service came around and told them to "calm down and go home because everything is under control". I investigated a case of this kind in L'Aquila city, in which the foreshock after midnight had caused a family of three to go outside. The daughter slept in the family car and survived: her parents took the advice of the civil protection and went back to bed. Their apartment was in the centre of a multi-storey building that suffered mid-floor failure. Firemen extracted their bodies from a space only 15 cm wide between the two collapsed floors.

The reason for describing these developments in detail is that they illustrate the link that the prosecution presumed had existed between the reassuring advice given by the civil

protection authorities and the deaths of 26 people who took that advice, and of course a link with the injuries sustained by others who were lucky enough to survive the collapse of their homes. At this stage of the narrative, it is important to bear in mind that the April 2009 L'Aquila earthquake disaster occurred at night, which involved a certain uniformity of behaviour (i.e. people were at home and mostly ready to sleep), a fact which the MICRODIS surveys amply confirmed (Alexander and Magni 2013). The disaster is also unusual because it was preceded 3 h earlier by a large foreshock which faced local people with the dilemma of what to do next—was it or was it not safe to return home? Besides, these provisos, it is important to try to avoid the trap of viewing a highly unpredictable situation with hindsight, in which the outcome is viewed as predetermined because everything has already happened (Pidgeon 1997).

3 How the case developed: after the L'Aquila earthquake

As soon as the disaster occurred, a massive national relief effort was launched that eventually involved more civil protection operatives (94,000) than the population of L'Aquila City (72,800). After search and rescue were complete, failed buildings were rapidly cordoned off and many of the sites were placed under judicial investigation to ascertain whether there were any culpable responsibilities for the collapses. This was especially true of San Salvatore, the local general hospital, which was put out of action by the earthquake as a result of structural failures (Augenti and Parisi 2010).

As always seems to be the case in Italy, furious polemics broke out in the public forum. The official plan to sue Giuliani disappeared in a trice. It was replaced by a heated argument about the predictability of earthquakes. Eventually, a dozen or more scientific papers were published, post hoc, on geophysical precursors of the L'Aquila earthquake, including studies of uranium anomalies (Plastino et al. 2010), ionospheric phenomena (Tsolis and Xenos 2010), electro-magnetic signals (Di Lorenzo et al. 2011), meteorological phenomena (Fidani 2010) and the unusual behaviour of toads (Grant and Halliday 2010).

The Italian government commissioned an international enquiry into the practice of earthquake prediction (Jordan et al. 2011). The authors of this concluded that Giuliani's work did not amount to a valid prediction (p. 323), and the best research in other countries has not led to a state in which short-term earthquake prediction is feasible (p. 354), but "From the perspective of long-term seismic hazard analysis, the L'Aquila earthquake was no surprise" (Jordan et al. 2011, p. 321). Despite much intensive and well-funded research, the ICEF's conclusions on earthquake prediction (pp. 358–359) reveal a situation that in essence has not changed in decades. Nevertheless, it did conclude that the DPC should do more to inform the public of Italy about seismic risk and the results of probabilistic forecasting (Jordan et al. 2011, p. 363).

For a brief moment after the earthquake, I was at the centre of the debate when the Minister of Defence cited my declaration to a German press agency that earthquakes are essentially not predictable in the short term. However, he did not mention what I went on to say, namely that in the case of L'Aquila, the whole matter was irrelevant as it is one thing to predict an earthquake to the day, and another to have a well-developed system to deal with the socio-economic consequences of such a prediction. By the standards of other regions, and the needs generated by a potential disaster, civil protection in Abruzzo and L'Aquila was not a well-developed service (OECD 2010, pp. 77–78). Indeed, one interpretation of the debate is that the Italian Government's insistence on the unpredictability of

the event was intended to mask an inability to do much about it should such an earthquake prediction become a real event.

Long after the furore had died down, on 25th May 2011, Judge Marco Billi initiated a prosecution against seven functionaries for giving out official information that culpably misled local residents by inducing them not to take precautions against an impending earthquake disaster. The defendants were

- Enzo Boschi, Professor and Director of the National Institute of Seismology and Volcanology (INGV)
- Franco Barberi, Professor of Volcanology at Pisa and Rome III Universities and former Director of the Italian national DPC
- Gian Michele Calvi, Professor of Seismic Engineering at the University of Pavia and Director of the EU Centre for Seismic Engineering
- Mauro Dolce, Professor of Construction Techniques and Director of the Office of Seismic Risk Prevention and Mitigation of the DPC
- Claudio Eva, Professor of Terrestrial Physics at the University of Genoa
- Dr Bernardo De Bernardinis, Deputy Director of the DPC
- Dr Giulio Selvaggi, Director of the Italian National Earthquake Monitoring Centre

On 22 October 2012, the charge of manslaughter (*omicidio colposo plurimo e lesioni*) was upheld and the seven defendants were condemned to 6 years in prison. They were also permanently barred from holding public office and were required to compensate the families of the deceased to the sum of €450,000 each. By the end of 2012, eight million euros had been allotted by the judge as interim compensation to the plaintiffs.

4 Reactions to the trial and sentence

In early 2010, when preparations for the trial began, members of the Italian academic community alerted their colleagues abroad (Hall 2011, p. 265). Solidarity among geophysicists and seismologists led 5,000 American scientists to sign a petition calling for the charges to be dropped. On 29 June 2009, it was presented to Giorgio Napolitano, the President of Italy, by Alan I. Leshner, CEO of the American Association for the Advancement of Science. Leshner's letter uses an uncompromising tone, as these three extracts show:

“The charges against these scientists are both unfair and naïve.”

“The basis for these indictments appears to be that the scientists failed to alert the population of L'Aquila of an impending earthquake.”

“It is manifestly unfair for scientists to be criminally charged for failing to act upon information that the international scientific community would consider inadequate as a basis for issuing a warning.”

However, the seven public officials were not being charged for failing to predict an earthquake or warn the population and there was never any intention to prosecute them for such omissions, and this was made explicit at the start of the trial.

There is a natural tendency to interpret news and information in the light of one's own experience and concerns. This explains the following two quotations, which I have chosen from among many that could be cited:

“Dr. Tom Jordan, the director of the southern California Earthquake Center, told CBS News, ‘This trial has raised huge concerns within the scientific community because here you have a number of scientists who are simply doing their job being prosecuted for criminal manslaughter and I think that scares all of us who are involved in risk communication.’” (*CBS News*, 22 October 2012)

“‘It’s a sad day for science,’” said seismologist Susan Hough, of the U.S. Geological Survey in Pasadena, Calif. ‘It’s unsettling.’ That fellow seismic experts in Italy were singled out in the case ‘hits you in the gut,’ Hough added.” (*WKYC News*, <http://www.wkyc.com>, “Italian court convicts 7 for no quake warning”).

But had either commentator read the motivations of the trial, or even followed it? Lack of familiarity with the details led to the following sort of casual assumption:

“It is not a far stretch to think that this type of Inquisition could take place in the U.S.” (in: “Galileo convicted by Italian court. No, wait, it was seismologists convicted for not being psychics.” - www.alfafapress.com/tag/laquila/).

By no stretch of the imagination was the trial an inquisition, and it most certainly had no similarity whatsoever with Galileo’s appearance in front of the Vatican Authorities in 1633. What I find perturbing about this is that scientists—and large numbers of them—are able to make superficial judgements on the basis of patently inadequate information in absolute defiance of the scientific method that they are supposedly trained to apply. Tolerance of superficiality, and predilection for melodrama and pathos, is everywhere apparent in the media treatment of the trial. The mass media, if not the scientists, totally confuse prediction with warning and ignore the finer distinction between warning citizens and providing them with advice. The scientists failed to correct this misassumption.

Although the misconceptions about earthquake prediction, reviving the trial of Galileo, and so on, persisted during the trial and are probably still dearly held in its aftermath, a reaction did eventually set in. On the day of the sentence, 22 October 2012, *Scientific American* published a balanced and well-reasoned account of the trial (Ropeik 2012). The International Seismic Safety Organization (headquartered in Northern Italy) sent a petition to President Napolitano in support of the trial and asking him *not* to interfere with the legal proceedings (it is in any case unlikely that he would have done so). Previously, Stephen Hall, writing in *Nature*, produced another more balanced view of the situation, which by the standards of the English-language accounts is relatively rich in factual detail (Hall 2011).

5 Context of the trial and pertinent questions

The trial of the “L’Aquila Seven” is singular in that nothing similar appears to have been attempted elsewhere in the world. Why should it happen in Italy and why now?

To begin with, Italian disasters are routinely accompanied by scandals and recriminations. The slowness of national aid to the stricken areas of Irpinia and Basilicata in the magnitude 6.8 earthquake of 23 November 1980 led to a furious indictment of the Government of the day by the then President of Italy, Sandro Pertini (Chubb 2002). The Italian intervention in Albania in favour of Kosovar refugees led to accusations of corruption and misuse of aid resources, which, although unproven, led to a change of leadership at the DPC (De Guttery and Pagani 1999). And so it goes on: politics are always at the roots.

During Silvio Berlusconi's fourth mandate as Prime Minister of Italy (8 May 2008–12 November 2011), there was an increase in the tensions between the judiciary and the executive. There is no doubt that, objectively, enough evidence existed to justify prosecuting Berlusconi, a billionaire and the richest man in Italy, for fraud, tax evasion and the corruption of minors, possibly also for conspiracy and conflict of interest. However, besides hiring an adept legal team to defend himself, he launched repeated attacks on the judiciary and did everything he could to limit its powers. He already had a reputation for promoting *ad personam* laws—i.e. statutes for his personal protection rather than those of the public. His defence in this respect is that such laws were necessary for him to defend himself against politically biased magistrates who constantly exceeded their powers (Viroli 2010).

In this context, the L'Aquila trial can be seen as one of the judiciary's attempts to assert its independence from political interference (Guarnieri 2011). However, this interpretation has to be qualified by an understanding of the lack of faith in institutions among members of the public and their perception that State institutions are neither reliable nor necessarily acting in the interests of ordinary citizens (Guano 2010).

At this juncture, it is pertinent to ask why such a high level of seismic vulnerability existed in L'Aquila. In part, this is because it is a city with a thousand-year history, and the concentration of historic buildings at its centre presupposes a degree of fragility. In the 2009 earthquake, the most modern constructions generally performed well, which indicates that the reforms of the seismic building code enacted in the 2000s were justified and that the codes were respected (Todaro 2008). However, from the 1980s until the mid-2000s, L'Aquila was classified as only at moderate risk of earthquake damage (Oliveto et al. 2010). Indeed, it formed an enclave of reduced seismic risk amid the central Apennine concentration of earthquake activity, but this was based on an unnaturally optimistic assessment of vulnerability, not seismic hazard. The latter was judged to be as serious in L'Aquila as in the surrounding areas (Salvi et al. 2003). In the light of the massive damage and loss of life caused by the 1703 earthquake (estimated magnitude 6.7), and the pattern of faults and epicentres (Cello et al. 1998), there is absolutely no scientific justification for this anomaly. Therefore, it can only be explained by a desire to keep the law at bay in order to build more cheaply.² The results of this are evident in the proliferation of mid-floor failures, punctuated by 'pancake'-style total collapses, in so many of the condominiums erected during the building boom of the 1960s and 1970s. Moreover, the story of San Salvatore, the regional hospital of L'Aquila, is one of corruption, inefficiency and delays, which meant that it took 30 years to build—but shoddily, as soon after it was finally completed, it was compromised by the 2009 earthquake to the extent that it immediately went out of action (Augenti and Parisi 2010).

Hence, the impact of the L'Aquila earthquake of 6 April 2009 was more profound and more complex than it would have been if preparedness had been better and precautions had been more rigorous. As a result of the shortage of local arrangements, Massimo Cialenti, the Mayor of L'Aquila, was more or less forced into a position of having to abdicate his responsibilities as head of civil protection (as specified in Italian law no. 225 of 1992, Article 15) in favour of leadership by national powers. The role of the Italian DPC was extremely comprehensive and covered the short- to medium-term recovery periods, including the full provision of transitional housing. It therefore assumed the risks

² There are plenty of precedents for this in Italy. The twentieth-century battle to abolish anti-seismic construction regulations in Rimini is a case in point (Emanuela Guidoboni, personal communication—see also Rumiz 2011).

associated with policies that could be challenged in the courts. With the full backing of Berlusconi and his ministers, local policy was determined and enacted nationally on behalf of the local population but without allowing it to participate significantly in making any of the major decisions.

Until the fall of Guido Bertolaso on 5 November 2010 in yet another scandal, there were fears that the DPC had assumed excessive powers, indeed, *absolute* powers, according to one left-wing e-newspaper (*Il Fatto Quotidiano*, 12 February 2010). Bertolaso's resignation came in the wake of a major national scandal connected with €10.6 billion spent on construction work by using emergency ordinances to circumvent normal regulations (Alexander 2011, p. 181). There were also allegations of collusion with developers in the sale, purchase and modernisation of property in Rome (Ferri 2010).

Although Silvio Berlusconi has no academic background, in Italy it is common for senior university professors to become politicians. In fact, there is a remarkable correspondence between the power structures of the universities and of the political apparatus. While in some cases, this alliance has endowed the political scene with people of remarkable technical competence, particularly engineers and economists, it has also supplied a number of characters whose reputation was dubious in both academic and political life. Details are supplied in the best-selling book *La Casta* ("The Caste") by investigative journalists Gian Antonio Stella and Sergio Rizzo (Stella and Rizzo 2007). All this contributes to popular distrust of the state and of its organs, and a feeling among the citizenry that these agencies pursue an agenda that is not particularly focused on the public good (Cavalli 2001).

6 What next?

In accordance with law, the motivation for the sentence (i.e. the reasoning behind it) was deposited in the archives of the court of justice on 22 January 2013 3 months after the trial ended.

A year will then pass during which the defendants can avoid having the sentence carried out by formally appealing against their conviction. This is happening. If they are absolved at appeal, they will have had a severe fright, many months of inconvenience, high monetary costs, a heavy burden of uncertainty, but eventually their freedom. If not, there may be a further (second level) appeal and more uncertainty. Quite possibly, as in many other trials in Italy, the whole process will take so long that a 'statute of limitations' will be reached and it will be impossible to proceed further with either carrying out the sentence or formally absolving the defendants. Meanwhile, there are some indications that they may be joined in being prosecuted by Dr Guido Bertolaso, the former head of the DPC, who is also quite heavily implicated in the matters covered by the trial.

The sentence is a document of 800 pages that presents and sums up the case against the defendants and describes the processes enacted during the trial. The prosecution was enacted on behalf of 37 people who died and five who were injured in the earthquake, and the plaintiffs were 68 relatives of these people. Limiting the trial in this way simplified the need to demonstrate that there was a direct connection between the actions of the defendants and the death of injury of residents of L'Aquila. The sentence also includes seismic records (for example, data on the 2008–2009 earthquake swarm) and expert testimony by independent seismologists who noted that large, damaging tremors had been experienced before during Central Apennine earthquake swarms.

The sentence includes a meticulous chronicle of scientific and administrative actions taken in relation to the L'Aquila earthquake swarm of 2008–2009 and of the role of the defendants in those actions. Minutes of meetings, transcriptions of interviews and a complete transcription of the trial are included. There is much discussion of how seismic energy is released and what impact this had, or should have had, on the kind of scientific information released to the public. The document states:

L'oggetto della riunione, invece, era indubbiamente e dichiaratamente più ampio: fornire alla popolazione del territorio interessato dallo sciame sismico un'informazione completa, approfondita, scientificamente attendibile sul rischio sismico e sulla possibile evoluzione del fenomeno in corso.,,

“The object of the meeting [of 31 March 2009] was..., undoubtedly and as stated broader [than merely discussing the situation]: it was to provide the population of the area affected by the seismic sequence with the most complete, in-depth and scientifically reliable information on [local] seismic risk and on the possible evolution of the phenomena that were underway.” (Tribunale di L'Aquila 2012, p. 148)

The court judged that the defendants had a legal duty to do this that they had not fulfilled and had instead misled people who as a result died. The debate and the evidence are immensely complex, but the conclusion proved robust in the face of legal and scientific argument. The case that the prosecution prepared also included a considerable amount of social and anthropological argument that was prepared by a researcher at the University of L'Aquila who later published it, lock, stock and barrel, as a book (Ciccozzi 2013). In short, no one can doubt the thoroughness with which the trial was pursued.

During the aftermath, other trials are being prepared. Several scandals refer to the provision of transitional housing for about 45,000 of the homeless survivors of the earthquake (Özerdem and Rufini 2013). Colossal sums of money were spent on this with minimum accountability. Laws on urban planning, environmental conservation and pollution prevention were ignored, patents were infringed, and through the use of inefficient seismic isolators on base-isolated housing units, it is alleged that a new situation of high vulnerability to earthquakes has been created in the transitional settlements. At the very least, the recovery policy has led to a situation of urban and regional dysfunctionality in which rational reconstruction is unlikely to happen (Alexander 2012).

The positive side of the L'Aquila case is that the earthquake was an occasion for a massive outpouring of national solidarity, and here and there around the affected area, there are modest but remarkable examples of resilience, entrepreneurialism and innovation. However, the disaster can be said to have opened a Pandora's box of ills which impede a rational consideration of what went on during the aftermath.

7 Further considerations

One question to resolve is why it took more than 40 months to bring the “L'Aquila Seven” to trial? One reason is that the case was meticulously researched, as the prosecutors, Roberta D'Avolio and Fabio Picuti, were well aware that they had to provide a strong case in order to pursue such a controversial and high-profile trial. Another possible reason is that it required the end of Berlusconi's government to provide the Italian judiciary with conditions in which they could pursue such activities without constant political interference. Finally, the Italian judicial system is notorious for its slowness and the enormous backlog of cases with which it has to deal.

A second question is whether the misinterpretations of the trial that proliferated and persisted in the mass media and scientific circles were deliberate, or in other words motivated by the desire to paint a particular picture of the event rather than arrive at the essential truth? Two days after the sentence was emitted, the highly regarded investigative journalist Marco Travaglio published a short article in the daily newspaper *Il Fatto Quotidiano*, in which he pointed out, with heavy irony, that most Italian newspapers were continuing to adhere to the views that “science had been on trial” and the “L’Aquila Seven” had been condemned for failing to predict an earthquake (Travaglio 2012). Travaglio summed up as follows:

“This is what the seven scientists did: they said there would be no earthquake. Thus, they failed to act as scientists. In perfect synchrony with a country in which politicians don’t do politics and journalists don’t do journalism.”

Studies of journalism and disaster show that it is often convenient for the mass media to oversimplify complex arguments (Moeller 2006; Miles and Morse 2007). Moreover, the massive boost that information technology has given to modern journalism has enhanced the prevailing tendency towards increasing the selective use of facts to support political viewpoints (Alexander 2010b). However, using Occam’s razor, the most likely interpretation of the Italian news media’s stance suggests a mixture of laziness regarding the facts of the case and reluctance to publish anything that might harm the country’s institutions and hence the media’s standing in relation to the sources of power. Spalletta and Ugolini (2011), who conducted a full analysis of this problem, see it as embodying a crisis of legitimacy for Italian journalism:

“...the journalist is not perceived as an expert, but as the accomplice, the supporter, the intermediary (and not the mediator) between public and power (whether political or economical, social or cultural, etc.). Spalletta and Ugolini (2011, p. 183).

In an international study that included Italy, Porlezza et al. (2012) found high levels of inaccuracy in news reports and concluded that “newspaper inaccuracy transcends national borders and journalism cultures”. They added that accuracy is not adequately rewarded in journalism.

The international reaction essentially followed the Italian coverage of the trial. Scientists interviewed expressed shock and disbelief (Carlidge 2012), but of what? I would suggest that they were reacting to the received version of the trial produced by the mass media, aided and abetted by Italian scientists connected with the establishment in Italy, who saw the whole process as threatening to their position and were quick to mobilise support from among colleagues and friends abroad. In any case, there is no indication from the pronouncements of foreign scientists, mainly British and American, that they were familiar with the subtleties of the trial or the social and political context in which it took place. I would agree with any critic who wishes to argue that legal proceedings need to be thoroughly separate from political considerations, but they are *never* separate from the weight of history.

8 Summing up and conclusions

One of the most knowledgeable authorities on the L’Aquila trial is Dr Antonello Ciccozzi, an anthropologist at L’Aquila University, who was hired by the prosecution to provide ethical and cultural motivations for the trial (Ciccozzi 2013). Dr Ciccozzi lost his home in

the earthquake and now lives with his family in the transitional housing. He argued (Ciccozzi 2009, p. 234) that, although the earthquake was relatively kind to Abruzzo, it did throw the region into a state of anguish and hysteria.³ Regarding the significance of Galileo, Ciccozzi (2012, p. 1) commented as follows: “The international community cries about a mediaeval process in a mediaeval city. If Galileo were alive now, he would be a witness for the prosecution. The defence adopted a mediaeval approach by insisting on the fatalism of the inevitable”.

According to Dr Ciccozzi, one member of the Major Risks Commission admitted to having attempted to alter the minutes of the L’Aquila meeting 1 week later during the hours after the earthquake disaster had struck. In his view, this compounded a felony. Dr Ciccozzi can be credited, I believe, with introducing the term *rassicurazionismo* into the Italian language. This neologism is hard to translate adequately into English, but it means something like “reassurance as a way of life”. He added:

“Between ‘failure to warn’ and ‘disastrous *rassicurazionismo*’ there is a cardinal difference: the absence of information must be distinguished from the wrong information.” (Ciccozzi 2010)

In essence, the trial can be seen as a surrogate for decades of malpractice and the common, and not entirely erroneous, public perception that science in Italy serves the interests of commerce and political power to the detriment of living standards, health, safety and environmental protection (Newton and Norris 1999, p. 10).

Looked at from one possible perspective, the trial of the “L’Aquila Seven” was an attempt to bring some sense of morality, responsibility and accountability into Italian public life. It was neither hasty nor ill-conceived. It was, however, a rather partial attempt: arbitrary simply in terms of how it chose to pursue one path from among many that could have led to prosecutions. It was a trial about the culpability of being superficial in matters of life and death. The defendants were tried as public officials, not as scientists. Manslaughter may have been a somewhat excessive accusation, and the link between public information and behaviour of citizens leading to their death or injury is rather hard to prove, but many observers now believe that the trial did have a solid basis of reasoning (for example, the Rector of the University of L’Aquila approved of it—*Il Centro* 2012b).

While those Italian scientists who strongly opposed the trial may have had particular positions in Italy to defend, the reaction of scientists internationally is perplexing and may betoken a double standard. While one knows one must adopt a scrupulous, informed and objective approach to one’s own field or laboratory data, it seems that such prudence could be abandoned in the case of making moral judgements on events involving scientists in a foreign country. This calls to mind the boycott by British academics of their Israeli colleagues under the aegis of the 2004 Palestinian Campaign for the Academic and Cultural Boycott of Israel (Rose and Rose 2008). This ill-conceived initiative did harm to scientists and scholars who had done nothing to deserve it. In my opinion, it also harmed international understanding. One wonders whether the scientists who argued so vociferously that the Italian Inquisition was about to paralyse applied science would have continued to hold that line if they had made themselves aware of more of the facts of the case. Another analogy is with the description of modern Western intervention in the Middle East as ‘crusading’, when it has no basis of Christian ideology (Salt 2008).

³ “L’Abruzzo aquilano è ora un angolo di Occidente contagiato dall’angoscia e dall’isteria, portate da una ponderatamente clemente apocalisse locale che ha il nome di terremoto.”.

Clearly, the trial of the “L’Aquila seven” had some rather different implications in Italy and abroad. At home, it was a brave and concerted attempt to restore seriousness to the judicial system, bring morality back into public life and redefine the role of science in the management of hazards in Italy. Abroad, it was seen in a more schematic way as a fight between the legal and the seismological professions. In some of my previous work on the disasters in Italy, I noted how the same phenomena (flooding: Alexander 1980, terrorism: Alexander 1995) can generate radically different interpretations depending on the context in which they are seen. ‘Context’ in this case means the preoccupations of who is doing the interpreting, and on behalf of what audience. In the journalistic studies cited, the Italian domestic mass media cared about domestic issues of a political, economic and social nature, while the foreign media were mostly concerned about culture and vacations. In the L’Aquila case, a different kind of politics—and a different kind of scientific culture—is at work in the domestic and international debates. The former was more pragmatic and banal, and the latter more abstract and philosophical.

In a coda to the L’Aquila trial, the Major Risks Commission resigned on mass in protest at the sentence. Its leader, Professor Luciano Maiani, argued that “the situation created by the sentence made it impossible for the Commission to work with the organs of the Italian State in a position of tranquillity and efficiency” (RAI 2012). The resignation was rescinded a few days later in order to cope with the earthquake emergency that was then in progress in the Pollino, an area of northern Calabria and southern Basilicata Regions. It is interesting to note that, this time, the DPC and Commissione Grandi Rischi were absolutely exemplary in the quality and accuracy of the information that they issued to the public of these two regions.

Acknowledgments I would like to acknowledge the support of the EC FP6 Project MICRODIS and the Centre for Research in the Epidemiology of Disasters, Catholic University of Louvain, in the early stages of my work in L’Aquila and the Earthquake Engineering Field Investigation Team (EEFIT), associated with the London-based Institute of Structural Engineers, in later work. I thank Dr Antonello Cicciozzi for fruitful discussions on the subject matter discussed here and to wish him good fortune in his excellent work on behalf of seismic safety in Abruzzo region.

References

- Alexander DE et al (2011a) Summary statistical briefings. MICRODIS project, Centre for Research on the Epidemiology of Disasters, Catholic University of Louvain. <http://www.microdis-eu.be/content/press-citations/>. Accessed 27 Dec 2012
- Alexander DE (1980) The Florence floods: what the papers said. *Environ Manage* 4:27–34
- Alexander DE (1995) Newspaper reporting of the May 1993 Florence bomb. *Int J Mass Emerg Disasters* 13:45–65
- Alexander DE (2010a) The L’Aquila earthquake of 6 April 2009 and Italian Government policy on disaster response. *J Nat Resour Policy Res* 2:325–342
- Alexander DE (2010b) News reporting of the January 12, 2010, Haiti earthquake: the role of common misconceptions. *J Emerg Manag* 8:15–27
- Alexander DE (2011) Civil protection amid disasters and scandals. In Gualmini E, Pasotti E (eds) *Italian politics: much ado about nothing?* Berghahn, New York and Oxford:180–197; *La protezione civile tra scandali e disastri naturali. Politica in Italia 2011: i fatti dell’anno e le interpretazioni.* Il Mulino, Bologna: 187–206
- Alexander DE (2012) An evaluation of the medium-term recovery process after the 6 April 2009 earthquake in L’Aquila, central Italy. *Environ Hazards* 11:1–13
- Alexander DE, Magni M (2013) Mortality in the L’Aquila (central Italy) earthquake of 6 April 2009: a study in victimisation. *PLoS Currents Disasters*, 7 January 2013, 26 pp. <http://currents.plos.org/disasters/article/dis-12-0009-mortality-in-the-laquila-central-italy-earthquake-of-6-april-2009/>

- Augenti N, Parisi F (2010) Learning from construction failures due to the 2009 L'Aquila, Italy, earthquake. *J Perform Constr Facil* 24:536–555
- Cartlidge E (2012) Prison terms for L'Aquila experts shock scientists. *Science* 338:451–452
- Cavalli A (2001) Reflections on political culture and the “Italian national character”. *Daedalus* 130:119–137
- Cello G, Mazzoli S, Tondi E (1998) The crustal fault structure responsible for the 1703 earthquake sequence of central Italy. *J Geodyn* 26:443–460
- Chubb J (2002) Three earthquakes: political response, reconstruction and the institutions: Belice (1968), Friuli (1976), Campania (1980). In: Dickie J, Foot J, Snowden FM (eds) *Disastro! Disasters in Italy since 1860: culture, politics, society*. Palgrave, New York, pp 186–233
- Ciccozzi A (2009) Aiuti e miracoli ai margini del terremoto de L'Aquila. *Meridiana* 65–66:227–255
- Ciccozzi A (2010) Il valore dei termini: “mancato allarme” o “rassicurazione disastrosa”? La città nascosta 13 June 2010. www.lacittanascosta.blogspot.it. Accessed 27 Dec 2012
- Ciccozzi A (2012) La parte di Galileo. *La città nascosta* 24 October 2012. www.lacittanascosta.blogspot.it. Accessed 27 Dec 2012
- Ciccozzi A (2013) Parola di scienza: il terremoto dell'Aquila e la Commissione Grandi Rischi. Un'analisi antropologica, Derive Aprodì, Rome
- De Guttry A, Pagani F (1999) La Crisi albanese del 1997: L'azione dell'Italia e delle organizzazioni internazionali : verso un nuovo modello di gestione delle crisi?. Franco Angeli, Milan
- Dell'Osso L, Carmassi C, Massimini G, Daneluzzo E, Di Tommaso S, Rossi A (2011) Full and partial PTSD among young adult survivors 10 months after the L'Aquila 2009 earthquake: gender differences. *J Affect Disord* 131:79–83
- Di Lorenzo C, Palangio P, Santarato G, Meloni A, Villante U, Santarelli L (2011) Non-inductive components of electromagnetic signals associated with L'Aquila earthquake sequences estimated by means of inter-station impulse response functions. *Nat Hazards Earth Syst Sci* 11:1047–1055
- Erbani F (2010) Il disastro. L'Aquila dopo il terremoto: le scelte e le colpe. Laterza, Bari
- Euronews (2012) Italy: scientists horrified by L'Aquila earthquake verdict. *EuroNews* 23 October 2012. www.euronews.com/2012/10/23/italy-scientists-horrified-by-l-aquila-earthquake-verdict/. Accessed 27 Dec 2012
- Ferri D (2010) Bertolaso e quella casa in via Giulia. *Giornalettismo* 14 May 2010. <http://www.giornalettismo.com/archives/62982/bertolaso-quella-casa-giulia/>. Accessed 27 Dec 2012
- Fidani C (2010) The earthquake lights (EQL) of the 6 April 2009 Aquila earthquake in Central Italy. *Nat Hazards Earth Syst Sci* 10:967–978
- Galli P, Galadini F (1999) Seismotectonic framework of the 1997–1998 Umbria-Marche (Central Italy) earthquakes. *Seismol Res Lett* 70:417–427
- Grant RA, Halliday T (2010) Predicting the unpredictable; evidence of pre-seismic anticipatory behaviour in the common toad. *J Zool* 281:263–271
- Guano E (2010) Taxpayers, thieves, and the state: fiscal citizenship in contemporary Italy. *Ethnos. J Anthropol* 75:471–495
- Guarnieri C (2011) Magistratura e politica: un'integrazione difficile? *Democrazia e Diritto* 2011(3–4):27–38
- Hall SS (2011) At fault? *Nature* 477:264–269
- Il Centro (2012a) Grandi Rischi, tutti gli imputati condannati a sei anni, risarcimenti da oltre sette milioni di euro. *Il Centro L'Aquila* 22 October 2012. <http://ilcentro.gelocal.it/laquila/cronaca/2012/10/22/news/processo-grandi-rischi-oggi-la-storica-sentenza-1.5903944>. Accessed 27 Dec 2012
- Il Centro (2012b) Grandi rischi, il rettore dell'Aquila: “È una sentenza giusta”. *Il Centro L'Aquila* 28 October 2012. <http://ilcentro.gelocal.it/laquila/cronaca/2012/10/28/news/grandi-rischi-il-rettore-dell-aquila-e-una-sentenza-giusta-1.5936081>. Accessed 27 Dec 2012
- Jordan TH, Chen Y-T, Gasparini P, Madariaga R, Main I, Marzocchi W, Papadopoulos G, Sobolev G, Yamaoka K, Zschau J (2011) Operational earthquake forecasting: state of knowledge and guidelines for utilization. (Report by the International Commission on Earthquake Forecasting for Civil Protection). *Ann Geophys* 54:316–391
- Kerr R (2009) After the quake, in search of the science—or even a good prediction. *Science* 324:322
- L'Espresso (2009) Verbale riunione della Commissione Grandi Rischi, L'Aquila, 31 marzo 2009. *L'Espresso*, Rome, 17 April 2009
- L'Occidente (2012) La sentenza della discordia dell'Aquila fa divampare le polemiche. *L'Occidente*, 23 October 2012. <http://www.loccidentale.it/node/119158>. Accessed 27 Dec 2012
- Miles B, Morse S (2007) The role of news media in natural disaster risk and recovery. *Ecol Econ* 63:365–373
- Moeller SD (2006) “Regarding the pain of others”: media, bias and the coverage of international disasters. *J Int Aff* 59:173–196

- Molin D, Mucci L, Rossi A (1997) Terremoto del Fucino (Abruzzo) del 13 gennaio 1915: distribuzione del numero e della percentuale delle vittime. Gruppo Nazionale di Geofisica della Terra Solida. Atti del 16 Convegno Nazionale, Rome, 11-13 November 1997
- Newton K, Norris P (1999) Confidence in public institutions: faith, culture or performance? American Political Science Association Annual Conference, September 1999, Atlanta, Georgia
- OECD (2010) Review of the Italian National Civil Protection System. OECD Reviews of Risk Management Policies, Organisation for Economic Co-operation and Development, Paris, pp 173
- Oliveto G, Liberatore L, Decanini LD (2010) Evoluzione storica della normativa sismica italiana alla luce degli effetti causati dal terremoto dell. Aquila del 2009, Associazione Nazionale Italiana di Ingegneria Sismica (ANIDIS), 14th Conference “L’Ingegneria Sismica in Italia”, Bari, September 2011
- Özerdem A, Rufini G (2013) L’Aquila’s reconstruction challenges: has Italy learned from its previous earthquake disasters? *Disasters* 37:119–143
- Pidgeon N (1997) The limits to safety? Culture, politics, learning and man-made disasters. *J Conting Crisis Manag* 5:1–14
- Plastino W, Povinec PP, De Luca G, Doglioni C, Nisi S, Ioannucci L, Balata M, Laubenstein M, Bella F, Coccia E (2010) Uranium groundwater anomalies and L’Aquila earthquake, 6th April 2009 (Italy). *J Environ Radioact* 101:45–50
- Porlezza C, Maier SR, Russ-Mohl S (2012) News accuracy in Switzerland and Italy. *Journal Pract* 6:530–546
- RAI (2012) L’Aquila, dopo la sentenza dimissioni a pioggia. *Giornale Radio Rai* 3, 23 October 2012
- Ropeik D (2012) The L’Aquila verdict: a judgment not against science, but against a failure of science communication. *Scientific American* guest blog 22 October 2012. <http://blogs.scientificamerican.com/guest-blog/2012/10/22/the-laquila-verdict-a-judgment-not-against-science-but-against-a-failure-of-science-communication/>. Accessed 27 Dec 2012
- Rose H, Rose S (2008) Israel, Europe and the academic boycott. *Race Class* 50:1–20
- Rumiz P (2011) Catastrofi d’Italia, la lunga storia che non insegna. *La Repubblica* 27 November 2011
- Salt J (2008) The unmaking of the Middle East: a history of Western disorder in Arab lands. University of California Press, Berkeley
- Salvi S, Cinti FR, Colini L, D’Addezio G, Doumaz F, Pettinelli E (2003) Investigation of the active Celano-L’Aquila fault system, Abruzzi (central Apennines, Italy), with combined ground-penetrating radar and paleoseismic trenching. *Geophys J Int* 155:805–818
- Spalletta M, Ugolini L (2011) Italian journalism and the credibility issue: a comparative analysis. *Media Res* 17:177–198
- Stella GA, Rizzo S (2007) *La casta: così i politici italiani sono diventati intoccabili*. Rizzoli, Milan
- Todaro V (2008) *Nuove norme tecniche per le costruzioni*. Exeo Edizioni, Piove di Sacco
- Travaglio M (2012) Rischi per fiaschi. *Il Fatto Quotidiano* 24 October 2012
- Tribunale di L’Aquila (2012) Sentenza nella causa penale contro Barberi Franco, De Bernadinis Bernardo, Boschi Enzo, Selvaggi Giulio, Calvi Gian Michele, Eva Claudio, Dolce Mauro. Tribunale di L’Aquila, L’Aquila, Italy
- Tsolis GS, Xenos TD (2010) A qualitative study of the seismo-ionospheric precursors prior to the 6 April 2009 earthquake in L’Aquila, Italy. *Nat Hazards Earth Syst Sci* 10:133–137
- Violi M (2010) *La libertà dei servi*. Laterza, Bari