

Scientists on trial Articles to prepare the role play

Take the time to read the following documents to prepare the trial.

Read the texts, read the Wikipedia article, browse by yourselves on the internet, make some notes to build your arguments for the trial.

Wikipedia article:

https://en.wikipedia.org/wiki/2009_L'Aquila_earthquake

Article 1:

Scientists on trial over earthquake deaths

NICOLE WINFIELD <http://www.stuff.co.nz>

Seven scientists and other experts have gone on trial on manslaughter charges for allegedly failing to sufficiently warn residents before a devastating earthquake that killed more than 300 people in central Italy in 2009.

LATEST: The case is being closely watched by seismologists around the globe who insist it's impossible to predict earthquakes and dangerous to suggest otherwise since seismologists will be discouraged from issuing any advice at all if they fear legal retaliation.

Last year, about 5200 international researchers signed a petition supporting their Italian colleagues and the Seismological Society of America wrote to Italy's president expressing concern about what it called an unprecedented legal attack on science.

The seven defendants are accused of giving "inexact, incomplete and contradictory information" about whether smaller tremors felt by L'Aquila residents in the six months before the April 6, 2009 quake should have constituted grounds for a quake warning.

"We all know well that earthquakes cannot be predicted. This is not in the point here," said Vincenzo Vittorini, a relative of a victim, who attended the trial.

Rather, he said, because of the failure of the scientists to say a significant quake could be possible, victims and their relatives missed a chance to take preventative measures.

Prosecutors focused on a memo issued after a March 31, 2009 meeting of the Great Risks commission which was called because of mounting concerns about the months of seismic activity in the region.

According to the commission's memo — issued one week before the big quake — the experts concluded that it was "improbable" that there would be a major quake though it added that one couldn't be excluded.

Commission members also gave largely reassuring interviews to local media after the meeting which "persuaded the victims to stay at home," the indictment said.

The defendants' lawyers have insisted on their clients' innocence and stressed the impossibility of predicting quakes.

The 6.3-magnitude temblor killed 308 people in and around the medieval town of L'Aquila, which was largely reduced to rubble. Thousands of survivors lived in tent camps or temporary housing for months.

Tuesday's (overnight, NZ time) hearing was largely taken up with procedural details to inscribe the dozens of plaintiffs in the civil portion of the case, which will be heard alongside the criminal case. The plaintiffs are seeking some €50 million (NZ\$83 million) in damages, the ANSA news agency said.

"We are looking for justice, that's all," prosecutor Alfredo Rossini told reporters before the hearing, ANSA said.

The only one of the seven defendants in the chamber was Bernardo De Bernardinis, then-vice chief of the technical department of Italy's civil protection agency. Another defendant, Enzo Boschi, then-head of the National Institute of Geophysics and Volcanology, was not present.

The judge set the next hearing for October 1.

In addition to the memo issued after the Great Risks commission, prosecutors focused on interviews De Bernardinis and other members of the commission gave to local media stressing the impossibility of predicting quakes and that even six months worth of low-magnitude temblors was not unusual in the highly seismic region.

In one now-infamous interview included in the prosecutors' case, De Bernardinis responded to a question about whether residents should just sit back and relax with a glass of wine.

"Absolutely, absolutely a Montepulciano doc," he responded, referring to a high-end red. "This seems important."

The indictments sent shudders throughout the international earthquake community, which responded to a call for support by Italy's geophysics institute with 5200 signatories of professors, seismologists, postdocs and researchers from New Zealand to Costa Rica, Japan to Martinique.

"Pursuing legal action against members of the seismological community after an earthquake is unprecedented and reflects a misunderstanding of the science of earthquakes," the president of the Seismological Society of America, Rick Aster wrote President Giorgio Napolitano.

Efforts should instead focus on working to better communicate earthquake risks to the public and boosting preparedness by retrofitting old and dangerous buildings, he said.

A lawyer representing families of the victims denied that science was on trial.

"The science is not on trial here, as they say, this is not the trial of Galileo Galilei, but it is a trial to judge if there were responsibilities, mistakes, or incorrect behavior by those scientists who held the meeting in L'Aquila before the earthquake happened," said lawyer Wania della Vigna.

The American Geophysical Union warned that the trial would have the effect of harming efforts to understand natural disasters.

"Risk of litigation will discourage scientists and officials from advising their government or even working in the field of seismology and seismic risk assesment," the group said in a statement.

Many of the structures that collapsed in the 2009 quake were not properly built to standards for a quake-prone area like the central Apennine region of Abruzzo. Among the buildings which cracked and crumbled was L'Aquila's hospital, just as it was struggling to treat about 1500 injured.

Nobody inside the hospital, which was built in the 1970s, was killed or injured in the quake.

Manslaughter charges are not unusual in Italy for natural disasters such as quakes, but they have previously focused on violations of building codes in seismic regions.

In 2009, for example, an appeals court convicted five people in the 2002 quake-triggered collapse of a school in southern San Giuliano di Puglia that killed 27 children — including the town's entire first-grade class — and a teacher. Prosecutors had alleged that shoddy construction contributed to the collapse of the school.

Article 2 :

Should scientists be held accountable if their predictions are wrong?

By Carolyn Y. Johnson www.boston.com

Last fall, a former government official and six Italian scientists were [found guilty of manslaughter](#) in a trial centered on information they provided about earthquake risk just prior to the 2009 L'Aquila earthquake. The ruling, [now being appealed](#), sent waves of alarm through the scientific community, sparking concerns that researchers around the world could be held accountable for giving governments advice about natural disasters, which are inherently unpredictable.

This [Wednesday at the MIT Museum](#), a panel including an Italian architect, a seismologist from MIT, and a specialist in dispute resolution from Harvard Law School will discuss at an open public event what happened in Italy and what its ripple effects could be on planning, policy, and scientists' advisory role to governments and planners.

Robert van der Hilst, head of the department of Earth, Atmospheric, and Planetary Sciences at MIT and a member of the panel, said the case attracted international attention because it could have a chilling effect on scientists' communications with the public. If scientists feel they are really on the hook for predicting uncertain events, for example, they may bow out when asked to help policy makers and planners make informed decisions.

"It's very much in good faith. ... You try to do your best, working with the data you have, looking at all the uncertainties," said van der Hilst. "It may discourage people from giving proper advice to people when asked. Expanding that, extrapolating further, it may even discourage people to go into those areas, and in the long term, it will have a really negative effect."

There is currently no way to predict earthquakes, but seismologists are often asked the question.

In Italy, a scientific panel was asked what to make of tremors that occurred prior to the devastating L'Aquila temblor. The scientists did the right thing, van der Hilst says: They assessed the likelihood of a large, devastating earthquake, and found it extremely low. However, the message given to the public was deemed too reassuring by the Italian judge.

"The concern was not so much they did not predict the earthquake, but that they were rather cavalier in what they said," van der Hilst said. For example, the BBC reported that a government official advised the public to go home and have a glass of wine, even specifying the type: "[Absolutely a Montepulciano](#)."

It's not easy to communicate uncertain risks to the public. For example, no scientist can guarantee that there is no possibility a massive earthquake will hit Boston this week. So should government officials send out a warning about a tiny, but non-zero risk of a catastrophic earthquake? It would not make sense for people to take protective actions and leave the area. And if every high-risk but extremely-low-frequency event were to be treated like a serious short-term risk, the credibility of governments and scientists would rapidly wither. Van der Hilst said that scientists and professional societies are talking about what can be done to help scientists and policy makers communicate uncertain risks to the public accurately — without falsely reassuring them, and without inciting a panic. The obvious thing to do is to take long-term preventive steps: create buildings that will not fall down and kill people, for example. Another idea, he said, is to take a page from weather forecasting and issue regular seismic forecasts.

People are used to uncertainty with the weather forecast — they don't sue the meteorologist if he or she is wrong about the high or the low temperature.

"People know it is uncertain; there's a very high level of familiarity with that notion," van der Hilst said. A seismicity forecast could "get people used to the background seismicity; there's always activity going on." But the issue at the heart of the court battle over the L'Aquila earthquake also reverberates beyond the challenge of predicting earthquakes. Other complicated systems that evolve over time, such as the climate and the economy, present prediction challenges for scientists.

Learning to communicate both what the findings are in those areas — and their inherent uncertainties — might help protect scientists from landing in court if their predictions turn out to be wrong. That also might help insulate scientists from the wrath of the public, which too often assumes that if a prediction is wrong, science doesn't work and is corrupt.

Article 3:

Wave a banknote at a pundit and he'll predict anything

[Simon Jenkins](#) www.theguardian.com

Of course it is outrageous to jail scientists for honest errors, but it is legitimate to hold them to some account.

On the evening of 5 April 2009, Luigi Guigno of [L'Aquila](#) in Italy was phoned by a sister terrified by tremors under their village. He told her not to worry. Government experts in "the forecasting and prevention of major risks" had just been on the news declaring there to be "no danger" of an earthquake. They need not go out into the street. A few hours later an earthquake struck and Luigi, his pregnant wife, their son and 300 others were crushed to death.

This week a local judge jailed six of the scientists, not for failing to predict the quake but for giving what he regarded as reckless reassurances. He fined them £6m and disbarred them from public office.

World [scientists condemned the verdict](#) as inquisitorial and medieval. Britain's [Lord May](#) said it ignored the basic nature of scientific inquiry. Luigi's relatives disagreed. A local official said simply: "Some scientists didn't do their job."

When a forester fails to predict that a tree might fall and it kills someone, he is arrested. The same goes for a train mechanic who fails to repair a carriage, a cook who poisons a customer and a builder whose house collapses. They didn't mean to kill, but they failed to forecast what might ensue from their defective expertise.

Why does the same not apply to the professional scientists, experts and pundits on whose predictive genius so much of our life depends? The answer is that they claim protection, either through (usually weak) self-regulation or by pleading Lord May's fifth amendment, that the nature of scientific inquiry exonerates them of harmless mistakes.

This week agriculture ministers were left floundering by conflicting scientific guidance on bovine TB and badgers. Transport ministers were humiliated by statisticians failing to predict revenue on the west coast railway. The Totnes MP, Sarah Wollaston, called attention to the hysterical 2009 swine flu "forecast", which panicked Whitehall into blowing £500m on dubious Tamiflu, whose test results it refused to disclose. Yesterday we were told that the nation was recovering from a second "dip" in a recession, which its forecasters had failed to predict. This is despite government economists being served by ever more powerful computers and mathematical models. No one, to the best of my knowledge, has been called to account for this failure.

Science has rarely enjoyed greater status. Schools are in thrall to it. Broadcasters grovel at its feet, with hours of programmes devoted to children gazing adoringly at scientific researchers, depicted as funny, garrulous, lovable role models. Science has taken the place of religion in a cocoon of uncritical certainty. Those who claim the title "scientist", be it natural or social, expect to combine the immunity of diplomats and the infallibility of popes. Science is merging into scientology.

Of course, Lord May is right, that academic inquiry must proceed uninhibited by risk from error. That is what universities are for, and why they should stay independent of the state. But the Italian geologists were not doing research: they were paid to apply their expertise to keep the public safe. They were not researching, but advising. They failed catastrophically.

The truth is that there is one law for the officer class and another for the poor bloody infantry. When experts trained to detect seismic phenomena fail, their fraternity does not criticise or review their work, but treats them as innocent and relieves them of blame. If an ordinary worker miscalculates the risk, if trains crash, trees fall, rivers are polluted or foodstuffs rot, he goes to jail. The difference is not in class of error but in class of person.

Since the dawn of time, people have craved prediction against uncertainty. They have paid soothsayers, witchdoctors, stargazers and palmists. They ask journalists at parties: "Who is going to win the American election?" and seem cheated if the reply is "I just don't know."

Some people are paid to forecast. Their job is to make assertions about the future, assessing likelihood over a spectrum of certainty. When a scientist says this or that "will happen", we expect it to have greater credence than if he had merely gazed into the entrails of a sacred goose.

The worst offenders are meteorologists. A Devon entrepreneur, [Rick Turner](#), declared last month that he would sue the Met Office for inaccurate and "persistently pessimistic" forecasts, which had cost his region millions of pounds in lost revenue. I hope he wins. The gloomy Met Office, seemingly in the pay of the outbound tourism trade, is reckless with other's people's livelihoods. The weather on the Welsh coast this summer was not ideal, but it bore not the slightest resemblance to the daily "forecast" of it on the radio. The sun shone for far more hours than it rained, yet the forecast kept people away in droves. And there was never any hint of correction or apology.

Prediction matters to people. If the variables are too great, science should shut up, rather than peddle spurious expertise. But you can wave a banknote in a pundit's face and he will predict anything you like. Of course, it is outrageous to jail scientists for honest errors, but it is not outrageous to hold them to some account. When did Lord May's Royal Society last inquire into a scientific scandal? Journalists, like bankers, are getting hell these days for their mistakes. Why let seismologists off the hook?

Article 4:

Could Scientists Have Prevented the Fukushima Meltdown?

Understanding risk and responsibility after a nuclear disaster.

By [JESSICA M. MORRISON](#) SLATE.COM

Three-Eleven is what they call the disaster. On March 11, 2011, all hell broke loose when a 9.0 magnitude earthquake struck the eastern coast of Japan. As if that weren't enough, a massive tsunami followed about an hour later, churning over everything in its path for some 200 square miles.

Entire cities were lost. Some 16,000 people died. But it wasn't over yet. The disaster would further its assault on locals and send chills down spines worldwide once the floodwaters receded and people realized the disaster that was unfolding in the seaside prefecture of Fukushima.

The tsunami topped a seawall and knocked out the power and backup generators at Fukushima Dai-Ichi nuclear power plant. That killed the pumps that bathed radioactive fuel rods in water and kept them from

melting. The cores in three reactors melted down. Seawater was used for emergency cooling and was highly contaminated; unknown amounts escaped into the environment. The promise of safe, limitless power flickered around the world.

Before the disaster, about 600,000 people lived within 30 kilometers of the Fukushima Dai-Ichi nuclear power plant. By the end of March 2011, more than half of that population had been evacuated. Many will never return to their homes.

In October 2011, the Science Council of Japan organized a committee to rethink reconstruction with an eye toward the social responsibility of science and scientists. Little more than a year later, I visited Tokyo for a conference on the impact of Fukushima on the ocean and the future of nuclear power in Japan.

“Science and technology enable us to make more use of the natural environment,” said Takashi Onishi, a professor of engineering and current president of the Science Council of Japan. “Then, we have been bringing people closer to the danger that a natural disaster may cause.”

Standing before a conference room filled with jet-lagged international scientists and reporters, Onishi explained that seawalls intended to protect against tsunamis gave residents a false sense of security. In another time, would people have lived so close?

Some people have said that Japan should have known better. The earthquake and tsunami were unprecedented, but they weren’t out of the question. Others have accused the nuclear industry of being too friendly with their regulators.

There is a myth in Japan that nuclear power plants are so safe that to suggest safety improvements would be illogical, said Onishi. “[The accident] showed that nuclear power plants are not safe, although the myth of absolute safety of nuclear power plants has been dominating the policies of this country.”

Japan has a complicated history with the split atom. Forever scarred by the sinister side of nuclear fission, the island nation has also relied on nuclear power to build its economy.

The Fukushima accident caused political fallout. First came reports that Japan would try to phase out nuclear power entirely by 2040, the New York Times reported in September 2012. Similar talk of nuclear phase out took place in Belgium, Germany, and Switzerland. By December, the tide seemed to turn as Japan’s new prime minister, Shinzo Abe, hinted at nuclear growth. Even after one of the worst accidents in nuclear history, Japan cannot give up nuclear power.

What is the responsibility of Japan’s scientists? To overcome the safety myth, scientists and policymakers need to strike a delicate balance of proximity and distance. This balance was lost in the case of Fukushima, said John Crowley, leader of UNESCO’s Social Dimensions of Global Environmental Change team.

“The experts were far too close to the decision makers ... the expertise was not independent enough,” said Crowley. “If scientists are too far from the policy process, then science cannot meaningfully contribute to it, but if they are too close, then it distorts and perverts the science.”

An independent review of the accident carried out by a Japanese council during the first six months of 2012 found a tangled mess of government agencies responsible for both promoting and regulating nuclear power. The report called the accident “man-made,” accusing lawmakers, regulators, and the utility company of

negligence. It's not clear what role nuclear scientists played before the accident, but the situation had the precarious proximity-to-distance balance of a 4-year-old in stilettos.

Finding balance can be tricky, and there is no universal consensus on the social responsibilities of scientists, let alone how far these responsibilities should go.

In the life sciences, concerns about how new information or technologies could be used for harm has shined a light on the larger ethical and social responsibilities of scientists. Similarly, psychologists and anthropologists are debating their roles in aid of military objectives. Should psychologists aid in interrogations? Do embedded anthropologists diffuse cultural conflict or reveal targets for attack?

In the 1950s, Congress addressed the risks and benefits of civilian use of radioactive material, said Scott Burrell, a spokesperson for the Nuclear Regulatory Commission. "Right from the get-go, the concept of incorporating social responsibility into the civilian use of radioactive material has been there."

The NRC is charged with ensuring the responsible use of nuclear materials and maintaining public safety when nuclear materials are in use, especially in the event of an accident. The agency relies on its own staff of experts, the scientific community, and concerned citizens to inform decisions.

"There is an expectation that is strongly embedded in society that there are people with certain expertise who we count on as a society to provide guidance and advice," said Mark Frankel, director of the Scientific Responsibility, Human Rights, and Law Program of the American Association for the Advancement of Science. "If there is a major policy issue before the U.S. Congress, one could say scientists have a responsibility to use their expertise in a way that helps our Congress to make better scientifically based and informed decisions." If you know something, society expects you to come forward, he said.

But that's an undertaking easier said than done for most. One of the great miscommunications between scientists and the lay public is about the nature of risk. Why? Well, risk is hard to explain.

For the public, the word uncertainty often implies a lack of knowledge or unpredictability. For scientists, this isn't the meaning at all. "If scientists say there is uncertainty, people assume that means they don't know, but in many areas of science ... it's completely the other way around," said Crowley. "The ability of scientists to put a figure on uncertainty isn't a sign of ignorance. It's a sign of how much they know."

Anticipating the risk of some future event—earthquakes, nuclear accidents, finances and economies—requires transparency in risk assessment that includes an estimation of the uncertainty, said Stephen Sparks a volcanologist at the University of Bristol. "Decision makers, politicians, and members of the public can find probabilities difficult to handle and explain ... but we haven't got any other choice."

An Italian court found six scientists guilty of manslaughter after their expert earthquake counsel gave L'Aquila residents a false sense of security. The sheer absurdity of the case rocked the scientific community. Would L'Aquila set a dangerous precedent of criminalization of scientists? If too much were expected of scientists, if the personal risks were too high, would they stop talking?

Let's hope not.

Four million people live within 10 miles of a nuclear power plant in the United States. Expand the range to 20 miles, and that number grows to 18.5 million.

At the end of 2011, 435 nuclear power reactors were in operation worldwide and 65 new reactors were under construction.

It may be scary, but nuclear power is here to stay. So how do we finally come to terms with a technology rife with potential yet shrouded in tragedy? We rely on the masters of the atom, the gods of fission, the lords of radiation on high—nuclear scientists—to make it all make sense.

Across the science community, including the nuclear sciences, the discussion of social responsibility has begun. If Fukushima has taught us anything, it's that those in the know are best equipped to keep the industry honest and the public safe.