Geology and Humanity in Potenza, Italy

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Figure 1. A map of ancient Italy. What was once known as Lucania is now the region of Basilicata, neighboring Campagna, Puglia, and Calabria. Potenza was then spelled "Potentia" (Williamette).
Overview

Risk and resilience in Southern Italy

Potenza is the westernmost province of Basilicata, a mountainous region in Southern Italy that borders the Tyrrhenian Sea and the Gulf of Taranto. In this book I will generally discuss the geological history and its subsequent effects on the local human population of this province, but at times I will specifically focus on its capital, also named Potenza.

The capital’s population is a modest one by most standards with 68,297 inhabitants and a density of 392.6 per square kilometer—but is bustling relative to that of the province. The province is largely rural, with a total population of 387,195 inhabitants and a density of 59 per square kilometer, the lowest population density in all of Italy, and has a dim economical portrait: for the past 500 years it has ranked alongside its sister province, Matera, as the poorest province per capita (Frascella), with no one specialty industry or agricultural product to speak of. Some olives, plums, and cereals are grown, and sheep and goats are raised, but the local climate is dry and groundwater is scarce, making for difficult farming. There is some fishing along the Tyrrhenian coast, though not to the same extent as other provinces. Commerce and tourism is minimal, transportation
limited. But despite its lackluster demographics, Potenza holds a rich history—one not lacking in the tragedy of loss and immigration, nor of resilience and recovery.

Preferring to call themselves by the ancient demonym of their region, which, prior to falling under Roman rule around 207 BC after a stubborn resistance, was called Lucania, inhabitants of Potenza are Lucanians who throughout human history have seen their city seized and leveled only to recover it so many times over. After being reduced to a military colony by the Romans, being battered to near destruction by Charles I, and suffering a thorough bombing during the Second World War, it would be a wonder if there were ruins to speak of—much less a functioning city. And that summary of destruction does not even take into account the wreckage the earth itself has wrought upon the city: In 1273, 1694, 1826, 1857, 1930, and 1980, major earthquakes devastated Potenza and the surrounding area, and minor earthquakes continue to shake the stability of towns and livelihoods in Basilicata.

Italy on the whole has forever been rattled by seismic activity and volcanic explosions. Some towns are left to be swallowed by ash and history; most others are rebuilt, and rebuilt, and rebuilt. Faced with the imminent geological risk of their land, Lucanians are a hardy people, a people who have seen destruction and reconstruction, death and rebirth, a hundred times over, because—if they do not choose to leave—they simply must.
Geology

Running north to south all of Italy is the Apennine mountain range. By process of orogeny, or severe structural damage to Earth’s crust, the Apennines were created when crust was thrust up between the Adriatic and Eurasian plates as they collided. Three mountain ranges were created from this collision: the Alps, the Dinarides, and the Apennines. The Alps were the first range created by this continental convergence, with the erection of the Apennines occurring millions of years later. They were mostly formed during the Cenozoic Era, about 65 million years ago (Britannica, “Apennines”).

Figure 2. Potenza is located in the Southern Apennine region, in the western extension zone. This figure, used in an American Association of Petroleum Geologists (AAPG) newsletter, shows the subduction of the African plate, resulting in a thrust and fold belt and a back-arc basin in the Tyrrenian Sea.
Figure 3. The west-directed subduction along the plate boundary is very steep, with subsidence rates of 800-1000 meters per million years. This steep subduction causes the extension on the western side of the Apenninic thrust front, along with some volcanism (Doglioni). Mt Vesuvius, responsible for the destruction of Pompeii, is located near Naples, some 80 miles north and west of Potenza, and Mt Vulture, now considered extinct, is only 35 miles from Potenza.
Figure 4 (A-B). The back-arc basin of the Tyrrhenian Sea, a clear site of extension and volcanism, results from the steep slab rollback as it the African plate is subducted under the Eurasian plate (Schellart).
Before being thrust up in convergence, the crust which would become the Apennines was underlying the Tethys Sea, the large ocean which was created during the Mesozoic Era when the Paleo-European and Paleo-African plates drifted apart 250 to 65 million years ago. As a result, the Apennines are almost entirely composed of marine sediments—shales, sandstones, and limestones. In Potenza, argillaceous rock types are most common. Also common are carbonate-siliceous-marly deposits and the “Sicilide Units” of the Late Cretaceous-Eocene age (Alessio et al 114). The terrain is rugged and the soils, clay-laden and dried by the moderately arid climate, do not make for fertile fields; it is said that, there, “the landscape has a thirsty and desolate appearance, with frequent erosion of the calanchi, or badlands, type” (Britannica, “Apennines”).

Though the phase of dramatic compression of crust that formed the Apennines has long since passed, the area is not by any means inactive today; shallow earthquakes occurring at depths of three to nineteen miles below ground level regularly rattle Basilicata. This is because the Apennines represent a complex process of mountain formation, with two distinct processes occurring simultaneously. The eastern side of the Apennines make up the compression zone, resulting from the subduction of Adriatic plate. To the west is the extension zone, where, as a result both of tensions from the large-scale uplifting and of steep subduction, the brittle crust has torn and rifted, creating rift valleys. This complex formation is called syn-convergent extension.
Figure 5.1 Small-scale geological map of Italy. (APAT Geological Map of Italy, 1960).
A deepset chain of faults running along the western side of the Apennines directly underlies Potenza. F. Di Luccio et al observe that “the seismotectonic setting of Apennines is characterized by NW-SE normal faults affecting the upper 15 km of the crust, and by E-W deeper strike-slip faults cutting the crystalline basement of the chain” (586). When tension is realized, devastating earthquakes shake the region, razing
livelihoods and leveling towns. And it does not stop with earthquakes; landslides are also a characteristic risk of the area.

The area is well studied for its seismic activity. Because the city of Potenza and its neighboring towns are built on clastic marine deposits from the middle and late Pliocene to the early Pleistocene—that is, sedimentary alluvium, very loose soil and sediment—infrastructure is at high risk to earthquake damage.

Figure 6. Each circle (its diameter denoting its intensity on the M.C.S. scale) shows a macroseismic epicenter for events in Basilicata from 1000 to 1980. (G. Alessio et al 115).

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Figure 7. Map showing the faults of Potenza (province). The normal faults northeast of Potenza (city) which were responsible for the 1980 quake are indicated. The directionality of those faults is NW-SE, surface normal (G. Alessio et al 116).
Humanity

*The inevitable: destruction, renewal, and dispersal*

On November 23, 1980, what is known as the Irpinia earthquake devastated the villages of Salerno, Irpinia, and Potenza. Measuring in as a 6.8 on the Richter scale, it was an earthquake that is said to have been the greatest national disaster in Italy since the Second World War, leaving 3,500 dead, 10,000 wounded, and 350,000 homeless (Cavazzani 1).

*Figure 8.* The 1980 quake made *The Telegraph’s* list of the world’s most expensive natural disasters, tolling in at an expense of $52 billion. However, due to slipshod management of relief funds, this number is questionable; it is unclear how much was actually spent on the disaster (Image: AP).
The villages struck by this earthquake are the same villages that were utterly destroyed by the 1694 quake. In this area, where earthquakes are a part of life, patterns of destruction are bound to self-repeat; the 1980 Irpinia quake joined the list of Basilicata’s recorded history of earthquakes, of devastation, and of emigration.

Figures 9.1 and 9.2 Towns in Basilicata characteristically perch atop hills along the Apennine range. These hills upon which the settlements are established are uplifted alluvial deposits—making the towns extremely vulnerable to earthquake damage. Here Potenza’s seismicity is written up in the January 1838 edition of the Illustrated London News, showing the damage done to city buildings.

Throughout this long and tragic history, political scandal, too, plays a recurring role. Mere days after the Irpinia quake leveled Potenza and its neighbors, as government officials dallied in responding to the disaster, the death toll meanwhile ticking upward and onward into the thousands, the Italian people sensed foul play was afoot. Soon accusatory headlines bustled onto the front pages of U.S. American newspapers: “Officials Charged With Bungling Quake Rescue.” This opened the government’s
delayed response to international criticism. By December, the scandal had exploded from sloth into outrageous deceit and blatant theft of relief funds. Louis B. Fleming tailed the story in an article in the *Los Angeles Sun* titled “In Italian Quake’s Wake: Agony, Guilt”:

Prosecutors suddenly became active last week rounding up people responsible for structures that fell because building codes were ignored. Many of those violations had been flagrant, sometimes encouraged by local officials who preferred the employment generated by the speculators to diligence on seismic safety. Some buildings that fell had been condemned after the 1962 earthquake in the same region.

Outrage and inner-governmental tensions forced the Interior Minister to resign. Sandro Pertini, president during the time of the quake, issued a public statement saying, “What I have been able to ascertain is that there has not been the immediate help that there should have been,” receiving applause that quickly died in the hands of the crowd, as before becoming president he had severed as the presiding officer of the Chamber of Deputies and had himself failed to motivate the implementation of the nation’s then-ten-year-old civil defense law (Fleming).

Further, as funds began to roll in to cover relief and reconstruction, it became apparent much of it had been mismanaged. The misappropriation of funds quickly earned the scandal the name Irpiniagate (following the trend after Watergate of adding the –gate suffix to far-reaching political scandals). Though there is some debate over numbers, “[i]f even a fraction of the allegations are accurate, earthquake victims were minor shareholders in this public largesse. Thousands of others apparently prospered,
including contractors, engineers, local politicians, their friends and even members of the Camorra, the Neapolitan Mafia” (Haberman). One article in the New York Times from this past year estimates that “the equivalent of $35 billion was spent on projects that were never finished—some of it on buildings that had never been damaged and on villas belonging to local officials” (Bohlen). This is spectacularly blatant scam on the government’s part which stirred attention and complaint worldwide. However, this kind of scandal following a natural disaster is so unsurprising to the Italian people that, when the prime minister Ciriacò De Mita “suggested that Irpiniagate, while deplorable, was also inevitable,” his statement was received with national resignation (Haberman).

This attitude of resignation is said to be characteristic of the Italian people; they hold their government to a resigned skepticism—and rightly so, for again and again government has failed to come to their rescue, perpetuating the reputation of a democracy in shambles. In 2009, when an earthquake of a magnitude of 5.8 on the Richter scale devastated a town called L’Aquila in central Italy, people watched as the trend of government inaction yet again manifested itself. In an article from The Guardian, the Aquila earthquake is used as a metaphor for the crippled nature of democracy in Italy. The author writes, “It is in many senses a neat metaphor for Italy itself: beautiful, but scarred and paralysed, battered by forces beyond its control, but seemingly incapable of resurrecting itself” (Hooper).
Four years after the Aquila quake, the city “still looks as though it has been subjected to a sustained artillery bombardment” (Hooper). Angelo de Nicola, L’Aquila resident and author of a book on the earthquake, said: "I still have no idea what will happen to my house. There is no plan" (Hooper). €4bn, or $5.2bn, more is needed to cover reconstruction and relief, though no one seems to know where this money will come from. This is no unfamiliar issue; it is “the dysfunctional dispersal of power between various levels of government” that is credited with the failure to implement infrastructure projects and drive economic activity back up (Hooper). Regarding the current parliamentary elections Italy faces, disenchanted L’Aquila residents report that prospects for a competent leader are dim. Meanwhile, their last resources of patience and faith worn away, many Aquilani are giving up waiting and emigrating—yet another trend in Italian history.

Between 1850 and 1930, it is recorded that 250,000 Lucanians immigrated to the US, with many thousands more emigrating to seek work in Northern Italy (Franscella). In this period, 4.5 million Italians are recorded to have immigrated to the US. Considered at face value, the numbers seem to reflect that Lucanians made up only a very small fraction of the total incoming Italians during this time.
Figure 10. In the 20th century young men emigrated from Southern Italy in crowds, seeking to build a new life in a new land instead of rebuilding an old one. The caption of this stereograph, c 1909, reads: “Going to the Land of Opportunity, Homeless Italian Earthquake Refugees on their way to America” (ECHO Molise).

However, when you consider the low population density and poverty of region, the gravity of this loss becomes apparent. Furthermore, upon closer analysis of immigration data, it appears that between 1850 and 1900 one out of seven Italians arriving to the US came from Basilicata (Franscella). When the Lucanian youth flooded out of Potenza, its vitality had been drained, leaving it even more crippled than it had already been.

Though these patterns of destruction, governmental failure, and emigration persist, Italy has not been entirely remiss in learning from the recent quakes. Given the ineluctability of earthquakes in Basilicata and the damage that follows, one of the sole progressive solutions to come out of Italy of late is a development in hazard assessment. In the past two decades, Mauro Dolce et al observe in their paper, “Vulnerability assessment and earthquake damage scenarios of the building stock of Potenza (Southern Italy) using
Italian and Greek methodologies” that there has been “a growing interest in assessing
the seismic vulnerability of European cities and the associated risk; not surprisingly this
interest was stronger in Southern Europe where the largest part of the seismic activity in
this continent takes place” (357). This recent attention paid to hazard assessment
systems is not surprising or unwarranted, as Potenza has seen a great deal of damage
in its lifetime. Some macroseismologists do not even consider risk analyses sufficient for
the challenges Italy faces; they can offer estimates of losses to damage over a specified
period of time, but for towns that can expect to face exorbitantly costly repairs every
decade or so, such estimates cannot foretell the story of destruction of so many
buildings.

As each unique land presents its unique challenges to its people, so too must its
inhabitants craft a unique language to assess these challenges, if they want their
settlement to survive an indifferent natural world. To satisfy the need to assess damage
before it has even occurred, an implicit need in Southern Italy, a new methodology has
been developed that is unique to the place and its people. This methodology consists of
four central steps: analysis of building typology; recognition of vulnerability classes;
selection of reference earthquakes; and preparation of earthquake damage scenarios
(Dolce 359). Surveyors went out and collected data on 9,000 private and public
buildings and then organized these buildings into vulnerability classes based on their
composition. Models can then be made based on this information. These earthquake
damage scenarios are useful because they “refer to a given earthquake…and provide a
complete picture of what happens when such an earthquake occurs. Combined with GIS technology they are also powerful tools to check and visualize the effects of any risk mitigation strategy” (Dolce 357).

After the damage it saw during the Second World War, the city of Potenza decided in town planning meetings to replace many buildings which had been built from stone with RCC materials (reinforced cement concrete—retrofitted to better withstand seismic waves). 35% of Potenza buildings are earthquake-resistant, 27% old masonry, and 54% RCC (Dolce 359). And following the 1980 Irpinia quake even more stone was scrapped in favor of building with RCC materials. In Potenza at least, funds and sense has caught up with them to invest in more earthquake-resistant reconstruction. Next time Potenza is hit, hopefully there will be less damage, meaning a quicker recovery time, because the next hit—and its damage to the land, to the city, to the population—is inevitable.

Italians have a double-handed sense of the inevitable: earthquakes have and always will trouble the people, and the government has and always will fail to implement speedy aid and reconstruction. The first is a given, an inborn risk to the land upon which they have so long settled. The latter is a given only so long as typical Italian characteristics such as irresponsible and corrupt handling of funds and tax-evading individualism persist. This is a problem of politic and identity, one seemingly without answer; Southern Italy is often referred to as the Mezzogiorno Problem—because it has Italy, and the rest of the world, stumped. In such a poor region that has a local climate and soils ill-suited
to agriculture and no thriving industry to speak of, and that is battered by earthquakes every five or ten years, it is difficult to implement incentives to spur on economic activity. Some effort has been made: factories were built in the Mezzogiorno to try to stir industry, but they quickly closed, becoming “cathedrals in the desert” (Armstrong). Basilicata is just too fragile to sustain a healthy economy.

And yet despite the lag time to which so many Italians seem, by now in a sad state of distrust, resigned, these towns so regularly demolished by earthquakes and humanity alike are rebuilt. Again, and again. Directly atop old ruins. Stubbornly—because there is no other choice, besides emigrating away. The hardiness of this people, of their willful continuation of life in a risk-riddled land—a land where one must rebuild their city on top of their dead, for there is no better rock to build upon, for tradition tells them they must, for they will be flooded out if they do not rebuild upon the same hills, knowing disaster can only soon recur, their ceremony of mourning incessant, inevitable—astounds. Despite the hardship they face and have faced for centuries, many Lucanians stay. Many thousands leave, but they still bear their ancestry with them on whatever shores they land. This is their inheritance.
Notes

Cover image


Armstrong, George. “As the Cabinet Dines, the Shattered Earth of Italy Reaps a Black Harvest in the Mezzogiorno.” Los Angeles Times. 30 Nov 1980.


Schuyler, Eugene. “Italian Immigration into the United States.” Political Science Quarterly. 4.3 (1889): 480-495.


