CHAPTER 10

Geomythology, Theodicy, and the Continuing Relevance of Religious Worldviews on Responses to Volcanic Eruptions

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GEOMYTHOLOGY

Geomythology is the study of oral traditions that perpetuate memories of prehistoric geological events, whereas *theodicy* is any attempt to reconcile theistic belief with the reality of human suffering. Although legends based on the writings of outside observers should be viewed with caution because cultural presuppositions and prejudices may be read into the reactions of indigenous peoples (eg, see Freeth 1993) – an issue sometimes known as *syncretism* – there are numerous examples in which myths, related to volcanic eruptions and the suffering they have caused, have been analysed by scholars. For societies that have left written records, such as Greece and Rome during the classical era, eyewitness accounts may be consulted, but these frequently contain mythological elements (eg, Duncan *et al* 2005). Interpretation of artefact suites provides a further source of information. Effigies of Popocatépetl have been convincingly interpreted as evidence of deistic propitiation on the part of ancient societies that once populated this region of Mexico (Plunket and Uruñuela 1998). In most archaeological sites, however, such evidence of human reactions to eruptions is at worst lacking and at best equivocal. In the case of the earliest known painting of a volcano on the wall of a shrine (dated at c 6200 BC) from the Neolithic town of Çatal Hüyük in Anatolia (Turkey) (Mellaart 1965, 1967: 59–60, 176–77), the artist's placement of the settlement very close to the volcano may be suggestive of anxiety about volcanic activity (Harris 2000: 1308), but could equally merely reflect the artist's aesthetic sensibility (Figure 10.1).

These notes of caution apart, there can be little doubt that in *pre-industrial societies* (White 1973) studied by historians, anthropologists,

Figure 10.1 Drawing of a wall painting from a shrine at Çatal Hüyük, Anatolia. The painting is from level VII and is dated at c 6,200 BC. The eruption depicted is possibly from Hasan Dağ volcano. (The figure was originally drawn by Mrs Mellaart and is reproduced from *Earliest Civilisations of the Near East* [1965], by James Mellaart, Thames and Hudson, Ltd, London, figure 51/52, p 82, reproduced with permission.)

and archaeologists, responses to volcanic eruptions that are couched in theistic terms have transcended place, time, and culture. Three contrasting examples – Mediterranean Europe, North America, and New Zealand – may be used by way of illustration.

During the 'classical' period in Mediterranean Europe, the Etruscan god Velkhan was primarily perceived as an agent of destruction, but was sometimes portrayed as a god of productive fire and the hearth. Hephaestos (Latin, Vulcan) was normally characterised as a constructive craftsman, and this aspect of volcanism is stressed in both Latin and Greek literature, but volcanoes are also frequently personified in the form of the destructive and angry Titan. Hephaestos, cripple and craftsman, represented both human brilliance and a reminder of human mortality and reliance on divine benevolence. Vulcan was a long-standing source of worship in archaic and classical Rome. Lucilius Junior (1st century AD) notes that on Mt Etna, people offered incense to propitiate the gods who were thought to control the mountain (Chester 2005a; Chester *et al* 2000; Doonan 1997; Hyde 1916), whilst in classical literature few islands are mentioned as frequently as Thera (ie, Santorini). The most well-known myth is that Thera may be the setting of Plato's *Atlantis*, created by Poseidon (Friedrich 2000: 13–19).

Much of the day-to-day practice of Christianity in medieval Europe was permeated by the need to placate what many saw as an arbitrary and vengeful God (Soelle 1975). Propitiation took several forms (Hanska 2002). At its most simple, many individuals carried amulets and lucky charms as a means of protection, but the medieval church also had many official and semi-official rites. Official rites were usually modelled on liturgies of Rogation and were repeated when people felt threatened by disaster. The *Sacri Congregazione dei Riti* was established

beginning in 1588. 'After any significant catastrophe such as a plague, an earthquake or a volcanic eruption, numerous requests of canonisation reached the congregation' (Hanska 2002: 97). Saints were frequently viewed as protectors, especially if they had 'miraculously' prevented losses and the same was often true of saintly relics.

In Italy from the classical era until ~1900 AD, the skull and two vials of the blood of St Januarius (San Gennaro), who was martyred in the reign of Diocletian (285–305 AD), were often appealed to by the citizens of Naples during eruptions of Vesuvius. These appeals to God included intercession and displays of the saintly relics at the fronts of lava flows during the 685, 1631, 1707, and 1767 eruptions (Fisher *et al* 1997). In 252 AD, the veil of St Agatha, who had been martyred the previous year, was used by the people of Catania in Sicily to halt a lava flow from Etna, and this and other relics were used on many future occasions (Chester *et al* 2000; Rodwell 1878). In fact, so efficacious was the veil thought to be that, following the Lisbon earthquake in 1755, some influential clergy in Portugal believed that St Agatha should be adopted as their patron saint to ward off any recurrence. In the event, the Iberian saint, Francis Borgia, was afforded this singular honour (Kendrick 1956: 72).

A second set of examples may be drawn from North America. Harris (2000: 1312–13), for instance, has argued that Native Americans may have preserved oral myths about the Mt Mazama eruption (Oregon ~7,500 BP) for around 250 generations. The Klamath tribe interpreted this great eruption as a battle between the god, Llao, whom they believed lived in Mt Mazama, and the sky god, Skell (Harris 1988: 116). These myths were eventually recorded in 1865 by a young soldier, William M Colvig, who was stationed at Fort Klamath. In the gorge of Columbia River, legends about volcanic events of unknown date were transmitted to missionaries in the 19th century, whilst in Sunset Crater volcano (northern Arizona) basaltic lava flows of mid–late 11th century AD date show corn casts. It has been suggested that the casts are indicative of ritual practices, perhaps serving to appease the divine forces responsible for eruptions (Elson *et al* 2002: 119, Chapter 6 in this volume).

A final instance of theistic appeasement comes from New Zealand, though many other examples from around the world are listed in Table 10.1. Before the European settlement, each group within Maori society had its own sacred mountain, and Te Heubeu, chief of the Ngati Tuwharetoa tribe of the Taupo district, explained to an Austrian geologist in 1859 that fire was sent from Hawaiiki (the mythical Maori homeland) in response to a call from Ngatoroirangi the high priest (Lowe *et al* 2002: 149). Maoris took advantage of the benefits of volcanic activity, but were only too aware of its dangers, always taking care to appease the volcano god.

Table 10.1 Selected examples of pre-industrial societies in which eruptions have been interpreted in deistic terms (based on Chester 2005a and the sources cited). Further examples may be obtained from Fisher *et al* (1997:179–98) and Sigurdsson (1999: 11–20)

Example	*Nature of response*
Northern Europe	a. Hekla, Iceland. In the 12th century AD and according to Cistercian monks, Hekla was the gateway to hell; a symbol to deter heresy. Such views persisted until at least the 16th century (Blong 1984: 175; Thorarinsson 1970: 6). b. In Icelandic mythology, the god Surtur was the incarnation of eruptions (Sigurdsson 1999: 17). c. One effect of the Laki eruption in 1783 was the fear of Armageddon in several European countries. In France, the reddened sun and smoky air 'alarmed the superstitious part of the people, who had been wrought on by their priests to believe that the end of the world was at hand.' Priests were forced to wear vestments to exorcise the fog (Grattan *et al* 2002: 98). In England, the hymn writer and clergyman William Cowper recorded that some people thought that the end of the world was at hand. The clergyman and naturalist Gilbert White describes a 'superstitious kind of dread' amongst many people (Grattan *et al* 2002: 98).
Africa	Societies near the Nyamuragira and Niyragongo volcanoes (Central Africa) annually sacrificed 10 of their warriors (Sigurdsson 1999: 13). In ancient Egypt, some natural catastrophes were followed by the execution of the Pharoah (Bell 1971). In the large igneous province of Ethiopia, some elder inhabitants still lay offerings at the bottom of the Serpent-God Dyke. Legend holds that Arwe, the serpent-god was a god of terror that was appeased by the annual sacrifice of maidens. The god was killed around 1,000 BC, but worship is still active in some remote areas (Mege and Korme 2004).
Central Mongolia	In the Mongolian language, the name of the little-known Har-Togoo volcano means black pot, and there is a local belief that a dragon lives in the volcano (Anon 2003a: 9–11).
Indonesia	In Java and until recent times, human sacrifice to appease Broma volcano was practised. Chickens are now substituted (Sigurdsson 1999: 13).
Japan	The Oni monster is a horned red giant, whose effigy is still to be found in souvenir shops near to active volcanoes. Many volcanic features in Japan are called *Jigoku*, a term for hell derived from Buddhist notions of an underground prison (Sigurdsson 1999: 17–18). In a study of archaeological sites in southern Kyushu, Shimoyama (2002: 336) adduced clear evidence of spiritual activity in response to an eruption. There is an example of a pot being offered to propitiate disaster during the accumulation of tephra around 1,300 BP.

(*continued*)

Table 10.1 (Continued)

Example	*Nature of response*
Hawaii	There are numerous legends about the need to propitiate the Goddess Pelé, who controls human fate (de Boer and Sanders 2002: 22–46).
Vanuatu and Fiji	In Vanuatu, volcano-related disasters 'are sometimes described in myths and legends and are usually attributed to demons or spirits who wish to punish a breach of a social or cultural taboo' (Galipaud 2002: 164; see also Cronin, Gaylord *et al* 2004). In Fiji, legends concerning the two gods, Tanovo, who presided over Ono Island, and Tautaumolau, who ruled south-western Kadalvu, may relate to known volcanic events (Cronin, Ferland, and Terry 2004b).
Central and South [America]	a. Settlements on the slopes of Popocatépetl volcano in Mexico were destroyed by a Plinian eruption around 50 BC. Excavations show shrines with effigies dedicated to the 'volcano' god, suggestive of attempts at divine appeasement (Plunket and Uruñuela 1997, 1998). b. Human sacrifices are a feature of Maya, Aztec, and Inca reactions to active volcanoes. Nicaraguans believed Cosequina would stay quiet if a child was sacrificed every 25 years, and virginal sacrifice was a feature of the society living on the flanks of Masaya (Poole and Poole 1962; Stephens 1969; Vitaliano 1973). c. In the years before the Spanish conquest, people living in the vicinity of Huaynaputina in Peru sacrificed sheep, birds, and personal clothing to the volcano. Some inhabitants even claimed that they conversed directly with the demons that supposedly controlled the mountain.

There are several historic instances of pre-industrial beliefs becoming more prominent during times of volcano-related crisis, examples from Ethiopia, Indonesia, and Hawaii being noteworthy (Table 10.1). Sometimes this trend was extremely complex and involved far more than simple reversion. Before conversion to Catholicism, residents in the vicinity of Huaynaputina volcano in Peru, for example, developed a cult that involved sacrifice of sheep, birds, and clothing to the volcano, some people even claiming that they conversed directly with the demons who controlled the mountain. Following the catastrophic eruption of 1600 AD, a number of contemporary accounts record that the inhabitants resumed their former religious practices. Processions to Huaynaputina took place, together with renewed sacrifices. Although Christian priests and pagan leaders differed in their detailed interpretation of the events and the appeasement demanded, both groups were agreed that the eruption should be interpreted, not simply as a natural event, but as a punishment for sins committed in the months and years leading up to the eruption (Jara *et al* 2000).

THE CONTINUING RELEVANCE OF THEISTIC WORLDVIEWS

It is well known from detailed psychological research – much of it involving quantitative studies of large numbers of respondents – that people from many cultures turn to deities for coping during times of stress (Paragament 1997; Paragament and Hahn 1986). From our research in Italy (Chester *et al* 1985; Chester *et al* 1999) and the Azores (Dibben and Chester 1999), it has became clear that geomythology and theodicy are not only features of ancient and present-day *pre-industrial* societies, but are also part of contemporary culture in many economically more developed volcanic regions. In the village of Furnas (São Miguel, Azores), a settlement that would be threatened by any future eruption of either the Fogo or Furnas volcano, the intrinsic fatalism of some interview respondents was clearly framed within a religious worldview, with God being seen as controlling both individual and familial futures (Dibben and Chester 1999: 140–41). On the slopes of Mt Etna in Sicily, the veil of St Agatha and other saintly relics have been placed in front of lava flows during many 20th-century eruptions, and as recently as July 2001, the archbishop of Catania celebrated Mass in the town of Belpasso to halt the progress of a lava flow; but to popular disapproval, however, he rejected the use of the martyr's veil. The archbishop explained, 'I bless this mountain and invoke the mercy of God on these craters so that they close up. … It is not the veil that will stop the lava but our prayer. … The warmer the prayer the cooler the lava'. According to Kennedy (2001: 10), a teacher claimed that 'local people still believe in miracles. If human technology can't keep the lava back, the eternal father is our only salvation.' Interesting features of these events in 2001 are that they occurred in a well-educated community; involved respected community leaders; and represented views shared by much of the population at risk. For instance about 7,000 people attended Mass in Belpasso, which is about one-third of the total population of the town.

To test how widespread these findings from Italy and the Azores are, detailed research has been done looking at human reactions to eruptions that have occurred over the past 150 years. This has involved conflating standard lists of eruptions that have caused loss of life (ie, the catalogues produced by Sigurdsson *et al* 2000; Tanguy *et al* 1998; Tilling 1989, and others) with records of events that have produced economic losses, causing human disruption but fatalities. Information has also been compiled on the ways in which the major religions of the world and local faith communities have dealt with theodicy, both in the abstract and when encountering the reality of human suffering. Although data on the theology of suffering in world religions have been relatively straightforward to compile (Table 10.2),

Table 10.2 The relationships between theodicy and eruption responses since 1852

Religious Tradition, 'Classic' Models of Theodicy and Attitudes to Human Suffering	*Examples from Eruptions over the Past 150 Years*
Judaism and Christianity	
The word 'theodicy' was first coined by Leibniz in 1712 (1952) and there are several models (Chester 1998), the principal ones being: a. Free-will (*Augustinian*). Humans have freedom. Suffering is not only a consequence of the operation of free-will, which may include sinfulness, but is also contrary to the divine purpose. Punishment is sometimes emphasised. b. Best-possible world (*Irenaean*). The world is governed by natural laws, not by divine providence. Good may come out of suffering (eg, without eruptions there would be no planetary atmospheres). The world facilitates 'soul making', and human ethical growth is expressed in helping disaster victims.	In virtually all eruptions within predominantly Christian countries, free-will theodicies have been prominent. Suffering has been viewed in terms of divine punishment, the answer being prayer and intercession. Examples include: Vesuvius 1872 and 1906; Mt Pelée 1902; Taal 1911; Parícutin 1943–52; Lamington 1951; Arenal 1968; Mount St Helens 1980; Nevado del Ruiz 1985; Galeras 1993; Montserrat 1997; Popocatépetl 1997; Nyiragongo (DRC), plus many eruptions of Etna. In many cases, an *Irenaean* response is also present, which includes relief of victims, whilst in Catholic countries the use of saintly and/or other relics has often been used as a form of divine propitiation.
Islam	
Islam means submission to the will of God. In the *Qur'an*, suffering is a punishment for sin, a test of faith and is *instrumental* to the purposes of God. Suffering must be endured as a test of faithfulness. Although it is an unfortunate component of human life, suffering should be alleviated when possible, and good works to relieve the suffering of others are commendable (Bowker 1970).	Krakatau 1883; many other eruptions in Java and the rest of Indonesia, and the Philippines.
South Asian Religions	
All hold the common belief that a person's behaviour leads irrevocably to an appropriate reward or punishment (Kogen 1987: 261; see also Pilgrim 1999) and may encourage a fatalistic attitude to disasters. *Karman* (nominative – *karma*) – means that current actions produce the seeds of future happiness or suffering. There is no theology of innocent suffering.	Bandai San 1888; Sakura-jima 1914; Agung 1963.

(*continued*)

Table 10.2 (Continued)

Religious Tradition, 'Classic' Models of Theodicy and Attitudes to Human Suffering	*Examples from Eruptions over the Past 150 Years*
In **Buddhism**, reincarnation is emphasised, meaning that sins committed in former lives are of importance. There is no notion of 'first cause' (ie, a creator and/or an almighty god). Both happiness and suffering are deserved. In **Hinduism**, there is less certainty about deserved suffering than in Buddhism, and there is a sense that the gods also participate in the conquest of evil. **Shintoism** is a syncretic religion and shows many similar features to Buddhism, plus many unique features. The most important of these is *kami* – the idea that the heart of being is ultimately mysterious and that there is harmony in creation. Humans are children of *kami* and the lives of all humans are sacred. The notion that *kami* resides in shrines, in some cases is permanently present within them, is a feature of Shintoism. Shrine worship to mountains and volcanoes such as Mt Fuji is strongly developed.	
Complex: Syncretic interactions between:	
a. Indigenous religions and world faiths.	a. Tarawera 1886; Soufriere (St Vincent) 1902; Sakura-jima 1916; Rabaul 1937; Lamington 1951; Arenal 1968; Galunggung 1982; Nevado del Ruiz 1985; Lake Nyos 1986; Pinatubo 1991; Galeras 1993; Merapi 1994.
b. Between world faiths and secular humanism	b. Virtually all eruptions to some extent. Very evident in the eruptions of: Vesuvius 1872; Heimaey 1973; Mount St Helens 1980; Unzen 1990–95 and Pinatubo 1991.

information on deistic responses to eruptions has been much more difficult to acquire. Both volcanology and hazard planning have roots in the 18th-century Enlightenment and have paid little attention to mythological and/or religious interpretations of eruptions and their consequences. Scientists and social scientists invariably explain human responses to eruptions in purely scientific and secular humanistic terms, and the notion of the 'Act of God' has long been replaced

by a perspective that views natural catastrophes as outcomes of human vulnerability and a demoralised nature (Steinberg 2000; but also see Dynes and Yutzy 1965).

The quotations in Table 10.3 show just how deep seated these secular attitudes are within volcanology and hazard studies. Reactions to disastrous events that make use of the 'languages' and modes of thought of faith communities have been virtually eliminated from official records in learned journals and eruption reports, and perspectives

Table 10.3 Examples of attitudes of volcanologists and social scientists to religious and mythological interpretations of eruption losses (based on the references cited; see also Fritscher 1998)

'The grand and striking phenomena displayed by volcanoes are especially calculated to inspire terror and to excite superstition, and such feelings must operate in preventing those close and accurate observations which alone can form the basis of scientific reasoning' (Judd 1881: 2–3).
'That such feelings of superstitious terror in connection with volcanoes are, even at the present day, far from being extinct, will be attested by every traveller who, in carrying on investigations about volcanic centres, has had to avail himself of the assistance of guides and attendants from among the common [*sic*] people' (Judd 1881: 3–4).
'Among the great writers of antiquity we find several who had so far emancipated their minds from the popular superstitions as to be able to enunciate just and rational views upon the subject of volcanoes' (Judd 1881: 4).
'Theorizing independent of the Bible began in America with the Enlightenment. In the mid-century the danger that geology represented to religious orthodoxy was apparent and, although, there were attempts at reconciliation the mechanistic view quickly became dominant' (Dean 1979: 291).
'Science is the first human craft to treat prophesy without superstition' (Jaggar 1937a: 2).
'Medieval science mingled art, religion and science. We have learned to separate the compartments' (Jaggar 1937a: 3).
'The nether regions of the Earth are inaccessible in the ordinary sense. Before the time of Newton, when evidence about them was nearly totally lacking, it was not necessarily unreasonable to describe the Earth in terms of models involving say a Hell, or a subterranean monster shaking itself to cause earthquakes. The subsequent growth of evidence has lowered the plausibility of such models' (KE Bullen 1975, quoted by Sigurdsson 1999: 11).
James Hutton (1788) made the first attempt 'to explode the myth associated with volcanic eruptions' (Sigurdsson 1999: 13).
'The beginning of the Renaissance marked the transition from centuries of intellectual domination of theology during the Middle Ages to a new era of human reason in the Western World' (Sigurdsson 1999: 84).
'The repetitiveness of impacts and forms of damage, the deliberate or inadvertent creation of vulnerability, and the gross predictability of the consequences of disaster all add up to human, not supernatural, responsibility' (Alexander 2000: 186–67).
'By the beginning of the 1830s the old, predominantly religious, ways of explaining natural disasters had become the prerogative of the decreasing ranks of fundamentalist Christians, and this continues to be the situation today' (Hanska 2002: 178).

from theodicy are frequently part of a 'hidden history'. This deficiency has been remedied recently for some eruptions – works on Parícutin, Mexico, 1943/53 (Luhr *et al* 1993; Scarth 1999), Krakatau, Indonesia, 1883 (Simkin and Fiske 1983), and Mt Pelée (Scarth 2002) are particularly noteworthy. Nevertheless, for many eruptions – even some that have occurred during the past few decades – there is no mention of human appeals to deistic explanations, even when these are well attested in anthropological studies and accounts are published in international newspapers of record, such as the *New York Times* and the London *Times*. For example, standard sociological and policy reviews of the 1980 Mount St Helens eruption (eg, Anderson 1987; Perry and Greene 1983; Saarinen and Sell 1987) do not mention theodicy although local radio preachers warned of God's anger towards blasphemers and drunkards. Other ministers in this region reportedly said 'that God was using Mount St Helens, to tell Kelso and Longview residents to be more religious, charitable and caring towards their families' (Blong 1984: 176; also see Anon 1980, 1983 and Tiedemann 1992: 338).

Additional examples come from the 1991 eruption of Pinatubo in the Philippines. An often quoted account of this eruption strongly supports the work of the Philippines Institute of Volcanology and stresses technology and planning approaches, with responses grounded in theodicy being viewed as signs of backwardness, even shame. 'We have come a long way from the passive extreme, where people viewed volcanic eruptions as expressions of God's displeasure and hence beyond man's Tayag [*sic*] power of understanding and intervention' (Tayag and Punongbayan 1994: 2). Unfortunately for the authors, this statement completely ignores well-attested reports of the highly theistic responses of the Aeta ethnic community and some Christian groups (Anon 1991a, 1991b; England 1993; Leone and Gaillard 1999: 230–31).

In the case of the Aeta community, their religion is animist in character, and the universal creator is believed to reside on Mt Pinatubo. So powerful is their attachment to their mountain and their god that 300 Aeta families refused to evacuate the region when the eruption began (Leone and Gaillard 1999: 230). In referring to these responses, some scientists and social scientists were dismissive. In a detailed survey of responses to the eruption, Tayag *et al* (1996: 94–95) grouped prayer in the same category as 'running about aimlessly and weeping', whilst Bautista (1996) classified religious responses under the heading 'psychological effects' and described 'pandemonium (with) people … screaming and crying as they (called) on their God for help and deliverance' (p 157). Christian responses to the 1991 eruption were no less complex. The Philippines is the only predominantly Christian country in eastern Asia; only an estimated 1% of the population is openly atheist or agnostic. Most people – even the then President Corazon Aquino – thought God

Table 10.4 A selection of major eruptions since 1850. **Bold type** shows eruptions that have a detailed record of human responses cast in deistic terms. *Italic type* indicates eruptions where deistic interpretations are mentioned but not discussed in depth. Only 16 eruptions (plain type) show no significant recorded religious interpretation of events

1856 Awu (Sangiha Island, Indonesia)[1]
1871–75 Hibok Hibok (central Philippines)[2]
1872 Vesuvius (Italy)[3]
1877 Cotopaxi (Equador)[4]
1883 Krakatau (Sunda Strait)
1886[5] *Tarawera (New Zealand)*[6]
1888 Bandai San (Japan)[7]
1892 Awu (Sangiha Island, Indonesia)[8]
1897 Mayon (Philippines) Blong (1984:176–77)
1902 Mt Pelée (Martinique)[9]
1902 Santa Maria (Guatemala)[10]
1902 Soufriere (St Vincent)[11]
1906 Vesuvius (Italy)[12]
1911 Taal (Central Philippines)[13]
1914 Sakura-jima (Japan)[14]
1919 Kelud (Java, Indonesia)[15]
1929 Santa Maria (Santiaguito, Guatemala)[16]
1930 Merapi (Java, Indonesia)[17]
1937 Rabaul (Papua New Guinea)[18]
1943–52 Parícutin[19]
1944 Vesuvius (Italy)[12]
1951 Lamington (Papua New Guinea) [20]
1951 Hibok-Hikok (Philippines)[21]
1953 Ruapehu (New Zealand)[22]
1963 Agung (Bali, Indonesia)[23]
1963 Surtsey (Iceland)
1966 Kelud (Java, Indonesia)[24]
1968 Arenal (Costa Rica)[25]
1971 Villarrica (Chile)
1973 Heimaey (Iceland)[26]
1977 Nyiragongo (Zaire)
1980 Mount St Helens (USA)[27]
1982 El Chichon (Mexico)[30]
1982 Galunggung (Java, Indonesia)[28]
1983 Colo (Sulawesi, Indonesia)
1985 Nevado del Ruiz (Colombia)[29]
1986 Lake Nyos (Cameroon)[30]
1990 Kelut (Java, Indonesia)[31]
1990–95 Unzen (Kyushu, Japan)[32]
1991 Pinatubo (Luzon, Philippines)[33]
1993 Galeras (Colombia)[34]
1994 Nyiragongo (Democratic Republic of Congo)
1994 Merapi (Java)[35]
1995 Rabaul (Papua New Guinea)
1995–96 Ruapehu (New Zealand)
1996 Manam (Papua New Guinea)
1997 Montserrat (Caribbean)[36]
1997 Popocatépetl (Mexico)[37]
2002 Nyiragongo (Democratic Republic of Congo)[38]
Plus: Persistent activity of Etna (Sicily)[39] **and the Hawaiian volcanoes**[40]

The table is based on information in Blong 1984 and: [1]Anon 1856; [2]Anon 1875; Alcaraz *et al* 1952a; [3]Anon 1872a, 1872b, 1872c; Hull 1892: 58; [4]Whymper 1892; [5]Simkin and Fiske 1983: 73, 74, 77, 80, 84, 85, 95, 97, 117, 132, and 134; Schlehe 1996; Scarth 1999: 145–46; [6]Keam 1988; [7]Sekiya and Kikuchi 1890: 100, 105; [8]Anon 1892; [9] Anon 1902a; Heilprin 1903; Scarth 1999: 164, 165, and 171, 2002: 51; [10]Anderson 1908a; Anon 1902b; [11]Anderson and Fleet 1903: 378, 379, 413, and 430; Heilprin 1903: 251–52; Anderson 1908b: 289; Jaggar 1931a; [12]Anon 1906a, 1906b; Perret 1924: 48; Anon 1944; Lewis 1983: 105; Tiedemann 1992: 338; Scarth and Tanguy 2001; 15; [13]Pratt 1911: 63–86; Worcester 1912: 320; [14]Koto 1916: 44, 55; Onishi 1930; Jaggar 1924: 465–66; [15]Van Bemmelen 1949: 222–24; Schlehe 1996; [16]Jaggar 1931b: 2; Mercado and Rose 1988; [17]see[15]; [18]Jaggar 1937b: 2; Johnson and Threlfall 1985; Sigurdsson 1999: 17; [19]Nolan 1979: 306–08, 322–24; Scarth 1999: 193–206; [20]Belshaw 1951; Anon 1952a, 1952b; Taylor 1958: 22; Ingleby 1966: 30–32; Schwimmer 1969: 5, 7, 71–72, 91, 123, 129; [21]Alcarez *et al* 1952a, 1952b; [22]Anon 2003b, 2003c; [23]Mathews 1965; [24]see[15]; [25]Alvarardo-Induni 1993: 21, 68–81, 113; [26]Clapperton 1973: 500; [27]Anon 1980, 1983; Perry and Green 1983: 39; Saarinen and Sell 1987: 50–51, Tiedemann 1992: 338; [28]Anon 1982; Sundradjar and Tilling 1984; also see [15]; [29]Bruce

Table 10.4 (Continued)

2001: 29, 33; Voight 1988: 22, 1990: 173–74; [30]Le Guern *et al* 1992: 173; [31]Schlehe 1996; [32]Katsuya and Takahashi 1992: 127; [33]Anon 1991a, 1991b; England 1993: 31; Newhall and Punongbayan 1996: 825; Leone and Gaillard; 1999: 230–31; Scarth 1999: 258; [34]Bruce 2001: 29, 33, 35, 121, 193–94, Williams and Montaigne 2001: 12; [35]Schlehe 1996: 391–93, 404–07; [36]Huggins *et al* 1997; Kennedy 1997; Possekel 1999; Pattullo 2000: 4, 5, 9–10, 18, 75–76, 93–95; [37]Davison 1997: 14; [38]Dummett 2002; [39]Rodwell 1878; Chester *et al* 1985: 345–65; Chester *et al* 2005; Kennedy 2001; [40]Lachman and Bonk 1960; Murton and Shimabukuro 1974; Hodge *et al* 1979.

was either testing or punishing his people, and the churches felt it expedient in some of the worst-affected areas to organise prayer meetings to counter these simple fatalistic theodicies (Bankoff 2004).

In our survey of eruptions over the past 150 years (Table 10.4), beginning with the 1856 eruption of Awu in Indonesia and ending with the eruption in 2002 of Nyiragongo (Democratic Republic of Congo) and including persistent activity at volcanoes such as Etna and those in Hawaii, detailed bibliographic research has revealed that for some eruptions there is a rich record of human responses being couched in deistic terms. These are: Vesuvius (Italy) 1872 and 1944; Krakatau (Indonesia) 1883; Mt Pelée 1902 (Martinique); eruptions of virtually all the Javan volcanoes throughout the review period; Rabaul 1937 (Papua New Guinea); Parícutin 1943–52 (Mexico); Vesuvius 1944 (Italy); Mt Lamington 1951 (Papua New Guinea); Agung 1963 (Bali, Indonesia); Arenal 1968 (Costa Rica); Heimaey 1973 (Iceland); Mount St Helens 1980 (US); Nevado del Ruiz 1985 (Colombia); Pinatubo 1991 (Philippines); Galeras 1993 (Colombia); Montserrat 1997 (Caribbean); Popocatépetl 1997 (Mexico); Nyiragongo 2002 (Democratic Republic of Congo), and many eruptions of Etna and volcanoes in Hawaii.

Although reactions vary between societies because of the differing theodicies of the particular faith communities, there are relatively few eruptions where no religious elements in human responses are recorded. For many other eruptions, there is mention of deistic interpretation but little in-depth discussion, suggesting that local archives could contain much of value if they were to be more fully interrogated. The same may also be true for some of the eruptions for which no record of theistic interpretation of events has been found within the internationally accessible literature.

Whereas until the 1970s information about attitudes came largely from third-person accounts, in recent years these have been supplemented by detailed social surveys. On the slopes of Etna in Sicily – specifically in the village of Trecastagni – Christopher Dibben concluded that 'for many (people) religious beliefs play a significant role in their representation of the volcano' (Dibben 1999: 196), whereas, after the eruption on Montserrat (Caribbean), which began in 1995, 15 out of a

representative 70 people surveyed during in-depth interviews ascribed the eruption to an 'Act of God' (Possekel 1999: 161–63). At the time of eruption Montserrat had a well-educated population, excellent health services, close links with the global economy, and established migration flows to the United Kingdom, Canada, and the United States (Possekel 1999: 88–90). Despite these features of modernity the people of Montserrat showed reactions to the eruption that were not dissimilar to those recorded in letters and other accounts from those affected by the destruction of town of Saint-Pierre in Martinique 93 years earlier (Scarth 1999: 164–65, 2002: 51). In both cases, ideas of punishment for personal sinfulness and 'fate' being in God's hands were common features, though there were detailed differences. In predominantly Catholic Martinique, there was a rush of applications for baptism and requests for confession and the last rites, whereas in the more scripturally based and denominationally diverse island of Montserrat, religious imagery such as 'first darkness' and 'Ash Monday' was commonly used to describe volcanic events (Pattullo, 2000: 4, 9–10, 75, 76; Scarth 1999: 164–65, 2002: 51).

THE CONTEMPORARY RELEVANCE OF THEODICY IN HAZARD STUDIES

The emphasis in disaster research changed during the course of the International Decade for Natural Disaster Reduction (IDNDR) (1990–2000). Understanding local culture is now considered crucially important if responses to disasters are to be successful (Chester 2005a; Chester *et al* 2002). This changing emphasis may be seen when papers and reports published at the beginning of the IDNDR (eg, Lechat 1990) are compared with those that have appeared more recently (Eades 1998; United Nations 1995). At present, policy is guided by the United Nations' International Strategy for Disaster Reduction (ISDR), which began at the start of the current decade. Specifically, the reduction of disaster risk is now viewed as 'a complex array of related political, social, economic and environmental challenges' (Hamilton 2005: 31). Concerns that are central to current research are public awareness; moving from cultures of reaction to cultures of prevention; and the necessity of identifying vulnerable groups and maintaining the sustainability of hazard prone areas (Hamilton 1999, 2005; United Nations 1999, 2002). Within this context, religious perspectives on the social construction of hazard are clearly important. There is a need for a dialogue between hazard planners and volcanologists, on the one hand, and members of faith communities, on the other.

There are two ways in which this could take place. First, it is now widely recognised that in many disasters religious organisations and their leaders have the potential to provide community as well as spiritual

leadership, aid, solace to victims, and important information on people and places in need (Alexander 2002: 123; see also Mitchell, 2003). One frequently quoted example of where this has occurred was during and following flooding in West Virginia (US) in 1985, with clergy both caring for and shaping the opinions of their congregations (Bradfield *et al* 1989). A more recent example comes from the Philippines following the 1991 Pinatubo eruption. The town of Bacolor, one of the cradles of Kapampangan culture, was amongst the settlements most badly affected, and the role of religion, in general, and the Catholic Church, in particular, was critical in restoring the morale and identity of the community, which is now located on several sites (Gaillard 2003: 81–82). These remain, however, isolated examples and for dialogue to take place, there needs to be a recognition that religious interpretations of suffering are not only widely held but should also be respected.

A second, more significant factor is that models of theodicy are now much more sophisticated than was the case in the past, offering far greater scope for incorporating the views of religious groups in the process of hazard planning (Chester 2005b). For instance, in Christian tradition, what are termed *liberationist theodicies* have emerged (Chester 1998; Soelle 1975). Strongly influenced by liberation theology (Boff and Boff 1987; Gutiérrez 1988), these theodicies hold that human sinfulness and suffering are linked. Sin is, however, collective not personal, and involves such factors as global and national disparities in wealth, poverty, power, and access to strategies of hazard reduction. By interpreting the effects of a disastrous eruption in this manner, common ground has emerged between social scientists, theologians, and members of Christian churches and their leaders.

In Montserrat, for example, a common critique of the alleged ineffectiveness of the colonial government before and during the emergency has been articulated by Christian groups (eg, Huggins *et al* 1997; Kennedy 1997), social scientists (eg, Pattullo 2000), and many journalists (eg, Masood 1998; see Figure 10.2). Some idea of the religious and cultural complexity of the response of the islanders to the eruptions on Montserrat can be appreciated from the following, almost poetic, quotation.

> In many ways the dead (*from the eruption*) came to represent all that was virtuous about Montserrat and its people. They became symbols of all old-fashioned, God-fearing society in which the values of an emancipated peasantry – individualism, independence, devotion to land and home – triumphed over the circumstances of death. … Some were reaping their crops in the fields … to feed the island; others were tending livestock (*note the biblical imagery*), and others stayed resolutely at home. In a sense, they became the heroic dead, the victims of a colonial war. (Pattullo 2000: 5, emphasis added)

Figure 10.2 Cartoonist's view on where the responsibility for the Montserrat disaster should be placed (David Brown, *The Independent* [London], 22 August 1997, p 17, reproduced with permission of the *The Independent* [London].)

Other religious traditions are also more heterogeneous in their approaches to disasters than is admitted by many Western commentators. Java (Indonesia) is a land of frequent eruption, and Schlehe (1996) has highlighted the complex, often syncretic, manner in which losses are explained by means of a conflation of Islamic, Hindu, Christian, and pre-Christian spiritual understandings. Islam literally means submission, and many Western commentators have emphasised its strongly 'instrumentalist' view of suffering: God uses disasters to bring followers back to the prophet's teaching (eg, Anon 1997: 968; Bemporad 1987; Bowker 1970: 113). Islam is much more theologically heterogeneous, however, than is commonly supposed, and there is no typical response (Dhaoudi 1992: 41).

Muslim culture has had more than a thousand years of experience to come to terms with differing social and political conditions (Al-Azmeh 1996: 44; Halliday 1994: 96), and this is expressed in considerable diversity. Although we are unaware of any overtly volcanological examples, this 'theological accommodation' may be seen after the 1992 Dahshûr earthquake in Egypt. Shortly after the disaster, the Egyptian government produced a report, *Earthquake Catastrophes and the Role of People in Facing Them*, that successfully reconciled scientific, planning, and Islamic approaches to disaster losses (Degg and Homan 2005; Homan 2001). Such an approach holds out much hope for volcanology in

volcanic regions such as Indonesia and the Philippines where Islam and Enlightenment–influenced earth and social sciences have frequently viewed disasters with mutual incomprehension.

Effective response to volcanic hazard to mitigate risk requires engagement with local communities. In most parts of the world, religious institutions are part of the fabric of society and play a prominent role during disasters. In line with ISDR strategy to take into account public awareness and the need to work with and through local community structures, bringing religious networks into play has the potential to improve interaction between scientists, civil defence authorities, and the local population. We contend that the interface between volcanology, social science, and theology is a potentially fruitful research frontier, which deserves more research.

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