Chapter 7: Disaster Anthropology

7.1. They were all humans... Witnesses, survivors and victims of archaeodisasters

Our ancestors lived in highly active volcanic environments since the Lower Pleistocene. Generally speaking, there are more than 60 ancient hominid track sites, ranging in age from 3.7 Ma to less than 2.5 Ka, recorded from all continents except Antarctica, but no ichnotaxonomic names have ever been formally proposed for hominid tracks. Unfortunately, the hominid track site sample includes only about a dozen sites where footprint preservation is good enough to show details of diagnostic foot morphology and typical track way morphology (Grattan and Torrence, 2007; Kim, et al, 2008).

Three and a half million years ago (geologic dating), in a location now known as Tanzania, the Sadiman palaeovolcano erupted, covering the area with ash (Zaitsev, et all, 2011). The rain that followed the event created a natural type of cement which fossilized the footprints of any species that may have walked over the wet ash (Agnew, Demas and Leakey, 1996). One of these species happened to be a hominid. The Laetoli track way was discovered in volcanic ash sediments. This fossilized footprint pattern indicated that the animal was a bipedal animal, turning this evidence into a tremendous discovery, which uncovered when, in hominid history, our ancestors began walking on two legs. Fossils of the hominid *Australopithecus afarensis* dating to 3.8 to 3.6 Ma were found in the

surrounding areas, thus the scientists were able to identify these tracks. Scientists have also found even more evidence for bipedalism in *A. afarensis*, because he had a special anatomy of the shin bone that indicated an upright posture. Unfortunately, these footprints are in danger of being destroyed, although they represent the earliest direct evidence of kinetically hominin bipedalism, showing that extended limb bipedalism evolved long before the appearance of the genus Homo. Since extended-limb bipedalism is more energetically economical than ape-like bipedalism, energy expenditure was likely an important selection pressure on hominin bipeds by 3.6 Ma (Raichlen, et al, 2010; for other footsteps of Pleistocene era, see also Bennett, et al., 2009 and Ashton, et al., 2014).

Humans also left tracks (20 cm each) in the volcanic ash of the Roccamonfina volcano of Southern Italy (41.3 N, 14.9 E), initially dated between 385-325 Ka, but with a refined 40 Ar/39 Ar technique, at 348-340 Ka. Just to the north of the city of Naples, in the province of Caserta, is the Roccamonfina Regional Park, the most prominent part of which is the Roccamonfina volcano, the oldest volcanic complex in the Campania region of Italy. It had three main eruptive periods: (1) 630-400 Ka; (2) 385 and 230 Ka; (3) a period that ended in 50 Ka, just as the better known eruptions to the South (e.g. the Archiflegrean caldera and, later, Mt. Vesuvius) were about to start. There are 56 such impressions on the slopes of the volcano; they were footprints made during its second eruptive period. The prints display raised arches and ball and heel impressions; they were left by a small band of individuals, from 3 to 6 persons. The prints and length of stride indicate that they were under five-feet tall. The scientists measured the dimensions of the tracks and estimated that the individuals who made them were no taller than 1.5 meters in height.

These footprints were made awfully close to the Climatic Termination IV, a time at which the global ecosystem was in transition between a glacial maximum and the sudden establishment of warmer conditions. Initially, scientists believed that the individuals belonged to a pre-human species, probably to the hominid ancestor, *Homo heidelbergensis,* the direct ancestor of both *Homo neanderthalensis* and *Homo sapiens*. If these assessments are correct, they are the oldest prints of the *Homo* genus ever found. But, if the estimation of the size of the individuals is correct, they were somewhat shorter than the typical adult *Homo heidelbergensis.* Paolo Mietto, of the University of Padua, and his colleagues think that the Campanian tracks were made by early *Neanderthalensis,* maybe a group of children. Remains of this species have

been found in several places in Italy, including Circe's grotto, a site north of Campania, where the legendary witch of that name is supposed to have lived (Mietto, et all, 2003). Although they were first reported reliably and scientifically just a few years ago, in 2003, the prints had been known to locals for centuries and have earned the name in folklore as the 'Ciampate del Diavolo' (the Devil's footprints). Whoever they were, they were scrambling downhill (there are also hand prints to indicate that they reached down to steady themselves on the steep terrain), running through molten lava. Most likely they were fleeing an eruption, as they descended the treacherous side of the volcano... We don't know if they finally made it.

During another Palaeolithic eruption, ca 40 Ka, the fallen ash (type of volcanic tuff which is known as Xalnene) trapped and fossilized human footprints. In AD 2003, British scientists found them in central Mexico, in an abandoned quarry close to the subaqueous, monogenetic Cerro Toluquilla volcano (near Puebla, Mexico City). The "Toluquilla footprint layer" contains both human and animal footprint traces preserved on the upper bedding planes of the ash, which was deposited in the shallow Pleistocene Lake Valsequillo. The footprints were made and preserved during the latest stages of deposition of the ash, and are present in several layers in the top 20 cm of the ash succession, where they are interbedded with lake sediments (Gonzalez, et al, 2003; Gonzalez, et al., 2006 a & b). The Xalnene Ash was exposed on lake shorelines during low stands in the water level, associated with either water-displacement during the volcanic eruption, or due to climatically-driven fluctuations in the water balance. This date indicates that humans were in the Americas 25 Ka before the coalescence dates from the most recent genetic studies, and 27 Ka before the Clovis culture (in addition to this, check the evidence from Stanford and Brandley, 2012).

Late Ice Age human footprints (more than 700!) were also discovered in the area of Willandra Lakes (southeastern Australia), dated at ca 20 Ka. They show aboriginal children, teenagers, and adults walking around in what was once a wetland swamp, but now is a dried-up lake bed. The Willandra Lakes Region is an extensive area that contains a system of ancient lakes formed over the last two million years, most of which are fringed by a crescent shaped dune or *lunette.* Aborigines lived on the shores of the lakes for at least 50 Ka, and the remains of a 40 Ka old female found in the dunes of Lake Mungo are believed to be the oldest ritual cremation site in the world. It was one of 15 World Heritage places included in the National Heritage List on May 21, 2007 (Bowler, et al., 1970; Barbetti, 1972; Thorne, et al., 1999; Bowler, et al., 2003; O' Connell and Allen, 2004). The

opalised cranium and partial skeleton found in dune deposits near Lake Garnpung, one of the Willandra lakes in New South Wales, Australia, aka WLH 50, dated to ca 26 Ka (37.4-16.5 Ka), belonging to a very robust and archaic male species with a 1540cm^3 cranial capacity, presents another paleoanthropological challenge to the scientists studying Australian prehistory (Wolpoff and Sang-Hee, 2014).

Moreover, in the late 1990's, South Australian social anthropologist/archaeologist Dr Colin Pardoe (1991 & 1995) investigated the colossal assemblage of skeletons scattered on the southeastern corner of Lake Victoria (dated to ca 10 Ka), which were unearthed when Lake Victoria was partially drained. Recent interdisciplinary research in the area connects the catastrophe features (e.g. geomorphologic features of lunettes, aboriginal tales, palaeoanthropological material, remains of extinct mega-fauna) with an archaeodisaster caused by 'electroblemes' (Mungo Excursion, Coronal Mass Ejection and lethal Aurora Australis, plasma discharge, SN explosion, etc), comparing Australian Lakes Mungo and Victoria with the fate of Sodom and Gomorrah (Peter Mungo Jupp website http://www.ancientdestructions.com/; the event online at: http://www.youtube.com/watch?feature=playerembedded&v=6yh8FUT8rvI).

Finally, in the area of Vesuvius, Italy, there occurred a volcanic catastrophe even more devastating than the notorious AD 79 Pompeii eruption. According to scientists, the 3780-kyr Avellino plinian eruption produced early violent pumice fallouts and a late pyroclastic surge sequence that covered the surroundings of the volcano as far as 25 km away, burying land and villages. Palaeoanthropological evidence shows that a sudden, mass evacuation of thousands of people occurred at the beginning of the eruption, before the last destructive column collapse. Although most of the fugitives likely survived, the desertification of the total habitat caused a socio-demographic collapse and the abandonment of the entire area for centuries (Mastrolorenzo, et al., 2006).

At present, at least 3 million people live within the area destroyed by the Avellino Plinian eruption. Comments by Roman authors (Strabo, V.4.8; Vitruvius II.6.1-2) indicate the existence of a memory of Vesuvius' eruptions which were probably pre-Roman. Volcanological and archaeological evidence identify the last prehistoric eruption in the early 1st millennium BCE. Later written reports indicate that eruptions occurred in the 2nd, 4th, 9th and 17th centuries AD and in the early and mid-20th century, but the eruption of Vesuvius on August (? October) 24, AD 79, during the

early Roman Empire, remains the most notorious of all. The AD 79 eruption of Mt Vesuvius had a devastating effect on the populations of Pompeii, Herculaneum, Stabiae, and the rural villas which lay to the west and southwest of the mountain. Apart from the heat and the gas poisoning which killed instantly many people, the pyroclastic flow (six distinctive pyroclastic surges have been identified) of ash and mud trapped many victims, preserving them within ghostly body-shaped tombs. Suffocated, blasted or cooked, the poor victims are now amongst the most notorious exhibits of worldwide disasters. Researchers estimate that the temperature, able to light gasoline and other fuels under certain conditions, but not high enough to ignite clothing, ranged form 250◦ to 300◦ C, and the time of exposure was about 30 seconds or so. Death would have occurred during the first few seconds of that timespan. Much of the material remains of these populated areas have been completely and irretrievably covered by the volcanic debris. These material remains were preserved largely intact for nearly 2 Ka, before being revealed to the modern western intellectual world in the early to mid-18th century (Mastrolorenzo, et al., 2006 & 2010).

Furthermore, plagues that devastated entire empires left behind millions of victims since antiquity. Few of them have been identified by archaeologists and thoroughly studied by interdisciplinary teams. Apart from the mummy of Ramesses IV (with the smallpox signs on his skin) and the mass burial pit at Kerameikos district where victims of the Athenian Plague had been buried (see Ch.5.3 Climatic Changes), another notorious example is the 1,500 victims of the Black Death found in a mass grave on Lazzaretto Vecchio, an Italian island of the Venetian lagoon, just a few miles away from Venice's Piazza San Marco. The island was the site of a hospital in the mid-1800s when the Plague struck the city, but it had been used for isolating Plague victims as far back as the 15th or 16th century CE. In fact, it is considered to be the world's first lazaret (a quarantine colony intended to help prevent the spread of infectious diseases). Later graves are just huge pits where "monatti," or "corpse carriers," were upended with great loads of bodies. Since 2004, the year of the initial discovery, the remains of thousands more are still expected to be found, as the death-toll reportedly reached 500 per day in the 16th century (Valsecchi, 2007).

Moreover, there is also a fascinating folklore aspect in the case of the Fontanelle cemetery in Naples, an ossuary located in a cave - it once held some 8 million human bones and extended over 30,000 m2 - in the tuff hillside in the Materdei section of the city. Many Neapolitans insisted on being interred in their local churches even after the Spanish arrival in

the early 16th century CE ordered to make space in the churches for the newly interred. Undertakers started removing earlier remains outside the city to the afore-mentioned cave, to which in AD 1656 thousands of anonymous corpses, victims of the great plague of that year, were added. The last great case of dead corpses seems to have been in the wake of the cholera epidemic in AD 1837. After having undergone an extensive restoration, the place is now open to the public on a fulltime basis (Regina, 1994; Puntillo, 1994; Liccardo, 2000).

On the other hand, few of earthquakes victims from archaeodisasters are now discovered by archaeologists. 'Doreen', a female smashed skeleton found in AD 1992 by archaeologists during the excavation of Tell Dor, 25 km West of Megiddo (Phoenician city), was an earthquake victim (Nur and Burgess, 2008). The event was dated to ca 1050 BCE. Widespread devastation contemporaneous with that of Dor was testified at other sites, too (Akhziv, Tell Keisan, Tell Abu Hawam, Tel Mikhal, Yokneam, Afula, Bet Shean). They were all destroyed together within seconds by a magnitude 5.5-6.5 earthquake on the nearby Carmel fault, or magnitude 6.3-7.0 on the more distant Dead Sea fault. The excavator, Andrew Stewart (University of California, Berkeley) describes the scene: *"She seems frozen in surprise and fright. Her body is twisted and her hands cover her face. The earthquake apparently sent a six-foot stone wall tumbling down on her and on a storage bin full of pottery. Two boulders crushed Doreen's skull, and a jagged pottery fragment pierced her head as she fell. A rock struck her right hand and drove a finger into her nose. Her spinal column was pushed up into her brain case"* (Stewart, 1993; see also The Tell Dor Archaeological Expedition online at: http://arf.berkeley.edu/projects/teldor/index.htm; for Dead Sea fault earthquakes, see: Begin, et al., 2005; Alfonsi, et al., 2012).

The huge archaeological site of Kourion just outside Limassol in Cyprus is one of the most important historical areas on the whole island, being the centre of one of the 12 ancient kingdoms of Cyprus. The great earthquake, known as the July 21, AD 365 event, caused devastation across the Eastern Mediterranean, as part of the Early Byzantine Tectonic paroxysm (EBTP: mid-4th to the mid-6th centuries CE). The first skeletons were unearthed at the 'earthquake house' (on the South-East facing slopes overlooking the Mediterranean coast) in AD 1934. Decades later, archaeologists found the three embraced skeletons, a skeleton of a couple with their baby, crushed under their collapsed house while asleep (David Soren, University of Arizona, 1985). The excavator, Caterina Dias, found the

woman, estimated to be about 19 years old, clutching her small child of about 18 months to her chest. Her arms were raised to protect the child's head, which was tucked under her chin. The man shielded the woman with his body, stretching his left arm across her to hold the child's back and putting his left leg up over hers (Soren, 1988).

The Archanes case includes one of the most famous worldwide archaeological skeletal finds, related to both devastating earthquake activity and highly disputed human sacrifice practices. Archanes is a municipality in the Heraklion Prefecture, Crete, Greece. It is also the archaeological site of an ancient Minoan settlement in central Crete. Since AD 1966, Archanes has been excavated by the Greek Archaeological Society under the supervision of John and Efi Sapouna-Sakellaraki. Anemospilia (meaning 'caves of the wind') was first excavated in 1979 by J. Sakellarakis. The temple was destroyed by earthquakes, the same earthquakes which destroyed the Old Palaces at Knossos and Phaistos at that time. Traces of ash and charcoal were found on the ground, and from this, one can postulate that the building burned down. The temple is set out, with three chambers and one annex leading into them. It is located at the northern end of Mount Juktas (legendary birthplace of Zeus). Modern Heraklion can be seen from the site (about 7 km from Knossos). It was on a hillside facing north towards the palace complexes of Knossos. Apart for a very crushed and burned unidentified skeleton, in the western chamber, two skeletons were found on the floor. One body was of a 28 year old female (high priestess). The other skeleton was that of a male in his late thirties, about 180cm tall and powerfully built; he was lying on his back with his hands covering his face, as if to protect it. His legs were broken and his body was found near the centre of the room next to a platform, at the base of which was a trough. On top of the platform another body was found, one of an 18 year-old male; he was found in the foetal position, lying on his right side. Among the bones was found an ornately engraved knife. His legs were forced back so that his heels were almost touching his thigh, indicating that they were tied there. His jaw was closed. The priest and priestess seemed to be only half way through the ceremony when the body caught fire. The human blood sacrifice is now considered an unequivocal archaeological evidence relating to the environmental upheaval of those days (17th century BCE, end of the First place period MMII), when savage earthquakes were rocking the island of Crete, and to the socio-cultural reaction to it, an extreme measure to appease the deities (Gesell, 1983; Hughes, 1991; Sakellarakis & Sapouna-Sakellarakis, 1992; Dickinson, 1994; Spencer, 1995; MacGillivray, 2000).

The sacrificial rituals per se are considered by many anthropologists, sociologists and archaeologists, as a behavioural modernity of *Homo sapiens*, along with symbolic thought and behaviour, language, art, religion, burial, myth-making, cooking, game playing and jokes, others claiming that the afore-mentioned expressions and activities are the mentifacts of a gradual accumulation of knowledge, skills and culture occurring over hundreds of thousands of years of human evolution (Diamond, 1992 & 1999; McBrearty and Brooks, 2000; Ehrlich, 2002; Skoyles and Sagan, 2002; Oppenheimer, 2004; Buller, 2005; Klein, 2008).

Especially, times of natural disasters, such as droughts, earthquakes, volcanic eruptions and comets were always seen, by ancient cultures, as a sign of anger or displeasure of the gods and ritual sacrifices were made to appease the divine ire. In ancient Japanese legends, we have Hitobashira ('human pillar'), according to which maidens were buried alive at the base or near some constructions as a prayer to ensure the buildings against disasters or enemy attacks (Triplett, 2004). Sacrifices of this kind can be practised on a number of different occasions and in many different cultures, and even if they can be found in 'equilibrated' societies, they have also turned into "blood frenzy" and mass killings many times in human history. A notorious example is the Thuggee cult of the goddess - of death and destruction - Kali, in India (Pinchman, 1994; Russell & Lai, 1995; McDermott and Kripal, 2003; Dash, 2005), responsible for approximately 2 million deaths.

Worth mentioning also is the pagan Roman law which, in its *Twelve Tables*, contains provisions against evil incantations, and spells intended to damage cereal crops. In 331 BCE, 170 women were executed as witches, and responsible for an epidemic illness. In 184 BCE, about 2,000 people were executed for witchcraft (veneficium), and in 182-180 BCE another 3,000 executions took place, again triggered by the outbreak of an epidemic. These persecution of witches continued in the Roman Empire until the late 4th century CE. But the Roman tradition expressed via the *Lex Cornelia de sicariis et veneficiis* by Lucius Cornelius Sulla in the 2nd century BCE became an important source of late Medieval and early Modern European law on witchcraft (Garnsey and Saller, 1987; Luck, 1985; Bradley, 1997; Rives, 2003; Behringer, 2004). This socio-cultural phenomenon was always related to human psychic reactions under stressful environmental conditions (e.g. during Black Death outbreaks). Later on, it became known as the witch hunt orgy of massacres in Europe and North America during the Early Modern period (ca AD 1480 to 1750), resulting in an estimated

40,000 to 60,000 executions; the witch-hunts sponsored by the Roman Catholic Inquisition began only in the Late Middle Ages (Cohn, 1993; Barry, et al., 1996; Purkiss, 1996; Sagan, 1996; Mormando, 1999; Summers, 2003; Wallace, 2004; Levack, 2006; Jensen, 2007; Thurston, 2007; Fraden and Fraden, 2008; Ankarloo and Clark, 2010; Gaskill, 2010).

Moreover, some of the most famous forms of ancient human sacrifice were performed by various Pre-Columbian civilizations in the Americas. Among the most notorious were: (1) the Incas, who performed child sacrifices (children were considered to be "pure" beings) during or after important events, such as the death of their emperor (Sapa Inca) or during/after a famine, eclipse, earthquake or epidemics, (2) the Teotihuacano culture, where burials of children have been uncovered at the four corners of the Pyramid of the Sun and skeletons of newborn have been associated with altars, and (3) the Aztecs, who practiced human sacrifice on a large scale (by the thousands). The most dreadful, combined with anthropophagy, were those in which they offered human victims to the god Huitzilopochtli to restore the blood he lost, as the sun was engaged in a daily battle, as well as the human sacrifices which prevented the end of the world that could happen at the end of each 52-year cycle. The preparation of Tlacatlaolli (a Nahuatl word roughly meaning 'maize-and-man stew' or alternately 'human stew') was the culmination of an elaborate Aztec ritual of human sacrifice, described in the *Codex of Mendoza*. There is a rich bibliography on this controversial topic, with anthropological, ecological, socio-cultural, political, religious and psychological perspectives (Codex Ixtlilxochitl by Fernando de Alva Cortés Ixtlilxochitl; Harner, 1977; Harris, 1991; Serrano Sanchez, 1993; Kahaner, 1994; Clendinnen, 1995; Hassig, 1998; Winkelman, 1998; Reinhard, 1999; Carrasco, 2000; Smith, 2000; Aldhouse-Green, 2001; de Mause, 2002; Stuart, 2003; Godwin, 2004; de Sahagún, 2006; Bremmer, 2007).

Another controversial issue is the survival cannibalism evidence at Anasazi sites of southwestern USA. In fact, it is one of the great prehistoric puzzles: what pushed those people who created one of the most sophisticated civilizations in North America (their modern-day descendants are the highly spiritual Hopi, Zuni and Pueblo peoples), to abandon their beautiful stone dwellings in the mid-12th century CE in great haste, leaving behind even food cooking over fires and sandals hanging on pegs? In Chaco Canyon, Chimney Rock Archaeological Area, and Mesa Verde, researchers have already discovered at least 38 sites with evidence of cannibalism. Population pressure and environmental factors seem to be the main trigger mechanism for the onset of such behavior, and for their subsequent demise

as well (White, 1992; Askenasy, 1994; Pe Blanc, 1999; Billman, et al., 2000; Marlar, et al., 2000; Turner II and Travis-Henikoff, 2008; Constantine, 2009; Turner II, 2011).

Even more controversial remain the cannibalistic rituals among Neolithic and Palaeolithic tribes (Arens, 1979; Reeves- Sanday, 1986; Villa, 1992). There is archaeological evidence of human sacrifice in Neolithic to Eneolithic Europe. For example, in modern southwestern Germany (Herxheim), archaeologists unearthed clear evidence of mass cannibalism; even children and unborn babies were on the menu (dated to ca 7 Ka), during a time when the first European farming society may have been collapsing in upheaval and violence. Although cannibalism, either for survival or aggressive, is a behaviour which has occurred since the beginning of human history, we can't tell for sure if it had been 'usual' among *Neanderthals* and archaic hominids, too (Bulestin, et al., 2009).

Among stone core-choppers, chipping debris and the bones of bison, deer, wild sheep and other animals, scientists dug up the butchered remains of at least 6 human children and adolescents, from the cave called Gran Dolina (Sierra de Atapuerca, northeastern Spain), one of the oldest human sites in Europe - only Dmanisi in Georgia being older. The human bodies were decapitated, the brains had been eaten and the bones smashed to get the nutritious marrow inside. This oldest layer, called the Aurora stratum (or TD6), was dated using electron spin resonance to approximately 780 Ka or a little earlier. This evidence of butchering, including dismembering, defleshing, and skinning of the hominids is the oldest proof of human cannibalism found to date. Furthermore, anthropologists claim that the human remains belong to a hominid ancestor called *Homo antecessor*, or perhaps *Homo erectus*. The whole evidence spans a period of around hundred thousand years, indicating that the practice was not just confined to times of food crises (Carbonell, et al., 1995; Bermúdez de Castro, et al., 1997; Bermúdez de Castro, et al., 2012).

On the other hand, among rock art murals and a total of 333 lithic artefacts, including side scrapers, denticulates, a hand axe, and several Levallois points, scientists recovered the remains of at least 12 *Neanderthal* individuals (3 men, 3 adolescent boys, 3 women and 3 infants), in the Sidrón Cave (Piloña municipality, Asturias, northwestern Spain). In this case, the cannibalism is characterized by scientists as a response to severe episodes of extreme scarcity, at ca 43 Ka. The skeletal remains also revealed that there were at least two differentiated groups of *Neanderthals* (according to their bone structure), coinciding with their North-South geographical

distribution: (1) southern *Neanderthals* from the Iberian Peninsula, the Balkans, the Middle East and Italy, and (2) northern *Neanderthals* from populations living north of the Pyrenees, the Alps, portions of Asia and central and eastern Europe (Kuhn and Stiener, 2006; Rosas, et al., 2006).

The most highly disputable human skeletal remains, though, are those excavated at Krapina (Croatia), dated to ca 130 Ka. The almost 900 fragments, and several investigations resulted in contradicting interpretations, probably coincide with ritual behaviour (ritual defleshing in secondary burial site) rather than cannibalism (Pathou-Mathis, 2000; Cole, 2006a & b; Frayer, 2006; Orschiedt, 2008). All the same, the fluid nature of Palaeolithic research expands its finds every year.

Usually, anthropologists categorize cannibalism into several typologies, such as dietary, ceremonial, and obligatory, or emergency ration cannibalism (Nickens, 1975); gastronomic, ritual or magical, and survival cannibalism (Arens, 1979); famine, competition or revenge, mortuary, cannibalism as a "behavioural referent of a mythical charter for society and, with other social and cosmological categories, as a condition for the maintenance and reproduction of the social order", cannibalism as "part of the cultural construction of personhood" (Reeves- Sanday, 1986); survival, ritual, and preferential cannibalism (Sagan, 1974); endophagy, exophagy, ritual, and famine cannibalism (Tannahill, 1975); dietetic, famine, fertility, gluttony, magic, pietistic, punishment, revenge, shipwreck, and siege cannibalism (Hogg, 2007), etc. In a plethora of cases, environmental stress on human populations can lead to cannibalism as a coping mechanism/adaptive response for restricted or fluctuating environmental resources, to maintain equilibrium with the carrying capacity of the local surroundings (Schorr, 1970).

Generally speaking, there is a deluge of articles and books, popular and specialized, dealing with this intriguing topic. Ancient mythologies and folklore are also full of similar phenomena that still remain a human taboo. In addition, the topic of human blood sacrifices has been related to the origins of religions and ancient political systems.

Among various anthropological, archaeological, philological and ethnographic evidence, one should mention Theophrastus' estimation (*On Piety*, 12.122-123; in Porphyry's work *on Abstinence*) about the origins of blood sacrifices in Greece: "..in times when unusual hardships came upon our race, were living beings [dedicated] to sacrifice", and Augustine's statement (*De Civitate Dei*, 18.12) about the origins of priest-kingship and a flood cataclysm: "In those times [after the flood of Deucalion], the kings of Greece initiated the worship for the pagan gods which were to rekindle

in annually renewed festivities the memory of the Flood and the salvation of the people, as well as the difficulties of the life of those who were at first resettled into the mountains, then into the plains".

In addition, games, festivities and warlike dances, e.g. in the honour of mortal Castor (both the Dioscuri were considered as the inventors of war dances, spirits of light and protectors of sailors) it seems to represent the war of the [celestial] giants. Athenaeus, mentioning Menippus the Cynic's statement in his *Banquet*, writes about a dance which was called the 'burning of the world'. According to the ancient Greek sacrificial ritual, holocausts were apotropaic rituals, intended to appease the spirits of the Underworld, including the Greek heroes (spirits of the dead); and the malign powers, such as the Keres and Hecate (See, also: Deipnosophists, XIV.27 in C.D. Yonge, ed.; Burkest, 1972; Harrison, 1991; Rind, 1996).

7.2. 'Angry Earth', Adaptation process and modern perspectives

According to the complicated theoretical framework of Disaster Studies, Archaeology, Sociology, Anthropology and Earth Sciences intersect each other. But Disasters as a *sui generis* study object seem to be historically neglected by anthropologists. Only since the 1980s, have researchers understood their dynamics, viewed them as a cultural phenomenon, and considered them as an emerging field destined to become a major issue of academic enquiry in the 21st century. Although fieldwork anthropologists and cultural geographers always encountered natural hazards that turned into disasters for local societies, as well as the cultural response to them, mainstream anthropology was focused on 'normal daily life'; anthropologists seem to agree that the early anthropological contributions to disaster studies came about by chance, as disasters were treated either as catalyst factors for change, or as indicators of human adaptation to the natural environment. Gradually, historical, economic, political, ecological and other parameters came into the anthropological play. Furthermore, disasters have a remarkable ability to bring forward social relations and power structures that were otherwise hidden in the social fabric. Thus, disasters can be seen not as natural phenomena and isolated, unexpected, unprecedented and uncertain events, but as social and historical processes.

Anthropology, in a holistic and comparative way (through contemporary, historic and prehistoric case studies), focuses on how cultural systems (e.g. beliefs, behaviours, and institutions characteristic of a particular society or human group) interrelate with a society's vulnerability to disaster, its preparedness, mobilization, and prevention measures, by examining its cultural, social, political, economic, and environmental domains. Consequently, it searches for the influence of risks/crises/catastrophes on human ecosystems, contributing to the complete life cycle of disaster from issues of vulnerability and risk perception, individual/social responses and coping strategies, to relief and recovery efforts (e.g. Vayda and McKay, 1975; Hewitt, 1983; Ortner, 1984; Barth, 1989; Shipton, 1990; Oliver-Smith and Hoffman, 1999; Redman, 1999; Bawden and Reycraft, 2000; Bankoff, 2001; Hoffman and Oliver-Smith, 2002; Bankoff, 2003 & 2004; Henry, 2005; Grenfell, 2008).

In addition, Blaikie et al. (1994) developed a very influential, interdisciplinary applied approach to disaster research, a conceptual tool, and to some extent a method, aimed both at social scientists and disaster practitioners. This approach has specific and detailed definitions concerning the vital terms of disaster studies: (1) Disaster: A disaster consists of three interrelated factors; hazard (H), vulnerability (V), and risk (R). These three factors relate to each other via the equation R = H + V, which is the definition of a disaster; (2) Hazard: A hazard is the physical agent in a disaster. A hazard can be forecast via probability studies. However, the statistical likelihood of a given hazard to occur says very little of the actual level of risk a given society or segment of a population is subjected to; (3) Risk: The risk concept is somewhat more problematic as it is hard to separate it analytically from the concept of disaster as *" risk is a compound function of this complex (but knowable) natural hazard and the number of people characterised by their varying degrees of vulnerability who occupies the space and time of exposure to extreme events"* ; (4) Vulnerability: the people's vulnerability derives from a spectrum of historical processes, and it is the people who must cope with disasters, not disembodied systems.

The afore-mentioned research framework is called the Pressure and Release Model (PAR-model), which takes into account the series of vulnerability creating processes (with three interrelated causal phases: Root Causes, Dynamic Pressures, Unsafe Conditions) and natural or man-made hazards. At present, though, the scientific community speaks about anthropological trends and not models: (1) ***The Archaeological/Historical Approach.*** How the physical and social processes lead to disaster events,

and which adjustments and adaptive factors are involved in cultural survival or demise (Bolin and Stanford, 1999, Moseley, 1999; Oliver-Smith, 1999; Garcia Acosta, 2002; Oliver-Smith, 2002, etc); (2) ***The Political Ecology Approach.*** A combination of cultural ecology and political economy focusing both on the human use (economic structures, policies, forces, and overall ideologies) of the natural environment and the adaptation process of human societies to their natural environments (Smuck-Widmann, 1996; Moseley 1999; McCabe 2003, etc); (3) ***The Applied/Practicing Approach.*** Prediction, mitigation, and prevention of humanitarian disasters, e.g. warning systems, traditional adaption to the natural environment, local technical knowledge, relief efforts, the actual relief work and situation, and the political and practical implications of relief aid (Hendrie, 1997; Rajan, 2001; Haug, 2002) (4) ***The Socio-cultural/Behavioural Approach.*** It is related to the social realm, according to which cultural and social issues do not deal directly with the environment (Dyer and McGoodwin, 1999; Oliver-Smith and Hoffman, 1999; Rashid and Michaud, 2000, etc). Not surprisingly, Disaster Archaeology includes all the above-mentioned approaches, embracing the broadest spectrum of perspectives.