Noah's Flood: The Genesis Story and Natural Disasters in Early Modern Times[1]

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ABSTRACT

Different interpretations of the biblical deluge give us an idea of various modes of perceptions of natural disasters in the seventeenth and eighteenth centuries. In analysing these interpretations we learn much about early modern European ways of thinking about nature, mankind and the relationship between both. In this way such an analysis becomes an important part of an ambitious project of environmental history that deals with relationships between man and nature in history.

KEYWORDS

Noah's flood, deluge, natural disaster, relationship between man and nature, perception, world-makers, Thomas Burnet, Johann Jakob Scheuchzer, history of the earth, diluvium, diluvialism, catastrophism, uniformitarianism, physico-theology

Share with me the common disaster ...
The Cowboy Junkies

INTRODUCTION

Since the dawn of time mankind has been troubled by earthquakes, floods and storm tides, drought, hail and forest-fires. Today, natural disasters are often associated with the question of global climatic change, caused, or at least partially caused, by humankind. In history, we find different ideas about what should be termed a natural disaster. For example, in the sixteenth century solar eclipses and comets were seen as catastrophes, because they were interpreted as

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signs of divine anger against human sins, as were earthquakes and volcanic eruptions. Thus, a disaster is defined by man and not by nature. We perceive catastrophes as a part of our reality. These perceptions are the product of certain world-views that are culturally defined. If we understand culture as the construction of reality, natural disasters become a part of the cultural history of mankind. The most famous natural catastrophe in Christian culture is the biblical deluge. The different early modern interpretations of the said disastrous event form the topic of this article.

In this paper, I shall try to concentrate on two important points: firstly, that interpretations of the deluge refer to diverging conceptions of what is meant by the term natural disaster; and secondly, but more importantly, that these conceptions show us different views of nature and different views of the relationship between mankind and nature. This will demonstrate to us an important task that must be included in a self-reflexive environmental history. The paper is divided into three parts. I shall begin with a general and very rough sketch of various interpretations of the deluge in Europe from the sixteenth century to the present day. In the next part I shall focus in more detail on the period around 1700. The third and main part is an investigation of the different perceptions of natural disaster, and of nature and its relationship to mankind, on which interpretations of the deluge were based. Finally, I shall demonstrate consequences from that for a comprehensive environmental history project.

I.

Since antiquity, no other natural disaster of the Christian tradition has inspired the human imagination in art, literature and science more than the world-wide inundation, which is described by Moses in Genesis 6-9.[2] Throughout the history of western thinking there have been several changes in interpretation of the biblical deluge. In the sixteenth century Noah's flood was often considered a crucial step in a continuing process of decay in the world.[3] This view was held, for example, by the German reformer Martin Luther in his commentaries on Genesis from 1540 to 1545.[4]

Luther said that the Fall of Adam affected not only man but also nature. The whole of creation was degenerated to 'natura corrupta', a corrupted nature.[5] Concerning Genesis 3,1 etc. Luther explained: 'All these things are deformed after the (original) sin, so that all creatures, even the sun and the moon looked as if they were put in a sack ...'[6] With the destruction of the world by the deluge it became even worse. Since then the decay of nature and humankind has continued. Man's lifespan has been shortened. There are now more earthquakes, thunderstorms and frosts than ever before.[7] The world has aged like an old man. Such a view of the flood as a catalyst for speeding up the world's decay was very common in Renaissance thinking, especially in the tradition of pessimistic cosmologies seeing the earth as a senescent world.[8]

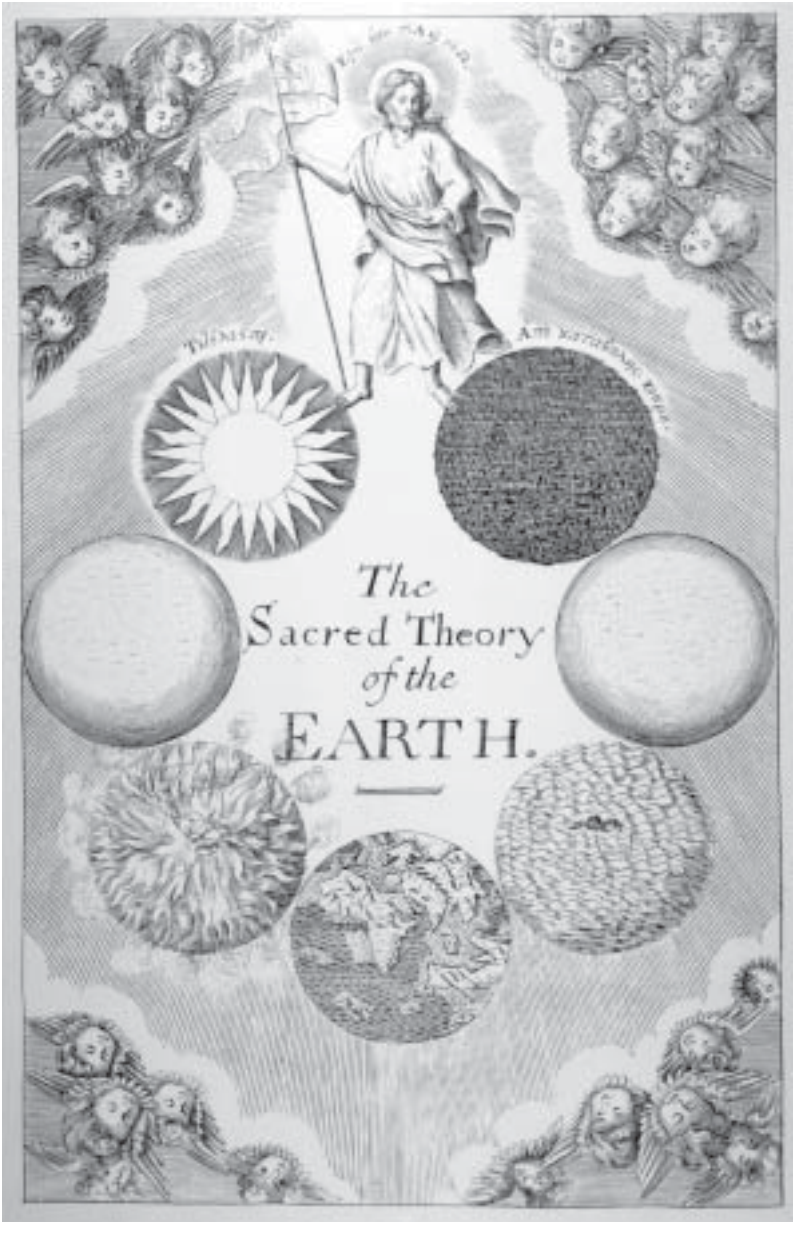

FIGURE 1. The frontispiece (engraving) of Thomas Burnet's *The Sacred Theory of the Earth* (1691, second edition). The picture shows the seven periods of Burnet's cosmology (from the left foot of Jesus to his right one): chaos, paradise, the deluge, the present state of the earth, conflagration, the millennium, the last judgement and the transformation of the earth into a star.

This image of the world also included the belief that contemporary floods and storm tides were a divine punishment for man's sins as was the deluge of the bible. In German they were often called a 'Sündenfluß' or a 'Sündflut' (meaning roughly 'flowing or flooding of sin'). One example is the so-called 'Thüringische Sündflut' from 1613, a thunderstorm with heavy rain and hail that killed people and destroyed houses around Weimar.[9]

The analogy of the biblical flood was very often used in the sixteenth and seventeenth century; for instance in some interpretations of the All Saints' flood on the first day of November 1570, when more than 3,000 people were killed by a tremendous storm tide in the Low Countries.[10]

In Early Modern Times Noah's flood was not only connected to recent or actual flood disasters, but also to catastrophic events in the future. Between 1521 and 1524 there was a Europe-wide debate about whether an unusual astrological conjunction should be interpreted as an omen for an imminent apocalyptical flood.[11]

In the seventeenth century the deluge became an object of study for the new empirical and mechanical sciences. In one of the most famous books of that time, the *Telluris theoria sacra* of 1681, Thomas Burnet (1635?–1715), an Anglican churchman, explained the flood in both religious and scientific terms.[12] A first edition in English was published 1684, and before 1759 the *Sacred Theory of the Earth* was republished seven times. Burnet's *Sacred Theory*, to be found in many private libraries of prominent authors from that period,[13] triggered an international cosmological debate that lasted until the end of the eighteenth century (Figure 1). This debate produced countless scientific accounts of the biblical flood.

Meanwhile, these flood theories became a popular object of satirical ridicule, as a poem from 1719 by an unknown artist about a 'deluge-menu' demonstrates:

> Thus I've observed, pro re nata
> A Kitchin-Wench of Bread lay Strata,
> Eggs, Suet and Plums in plenteous Store;
> But, in a Moment of an Hour,
> Milk in a Deluge vast coming flowing,
> And dissipates all she'd been doing:
> But when the Streams began t'asswage,
> And quiet grow, and free from Rage;
> Then, to my Sorrow have I spy'd
> Whole Troops of Plums with speed subside.[14]

One eminent contributor to this debate was the Swiss naturalist Johann Jakob Scheuchzer (1672–1733). Noah's flood gave him the answer to the puzzling question of why fossil shells and mussels were found even in the highest Swiss mountains. A huge fossil of a gigantic salamander was declared by Scheuchzer as a proof of the deluge; he named it a human eye-witness of the flood, the 'Homo

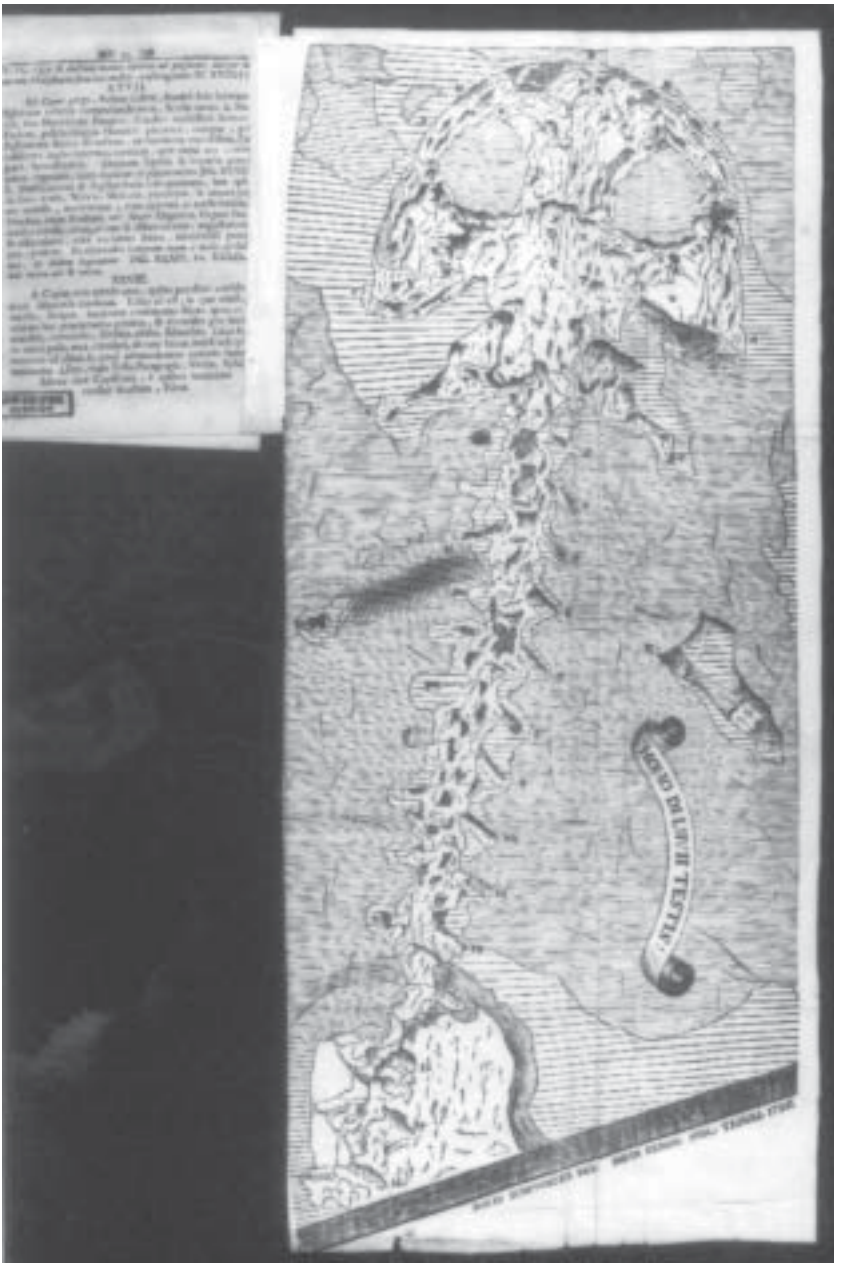

FIGURE 2. The 'Homo Diluvii Testis'. Woodcut in Scheuchzer's *Homo Diluvii Testis* of 1726 (Zentralbibliothek Zürich).

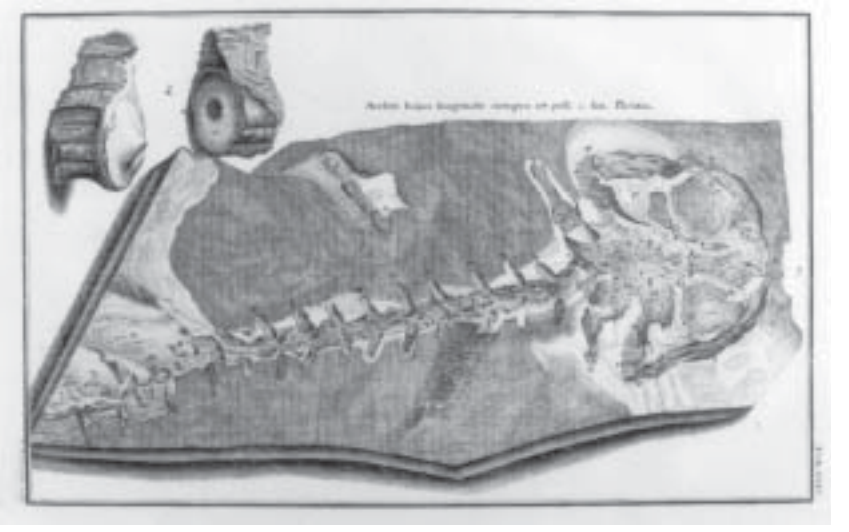

FIGURE 3. The 'Homo Diluvii Testis'. Engraving in Scheuchzer's *Physica Sacra*, 1731, vol. 1 (Zentralbibliothek Zürich).

diluvii testis' (Figures 2 and 3).[15] Scheuchzer reported his discovery to Hans Sloane, the successor to Isaac Newton as president of the Royal Society in London. In 1726, Sloane printed parts of the letter for the *Philosophical Transactions*.[16]

In the work of Scheuchzer and others the inundation described by Moses was the key to explaining the history of the earth.[17] In fact, the birth of modern geology came, so to speak, out of the waters of Noah's flood.[18] As the main event of geology in its early period as a new science the deluge formed the paradigm of so-called diluvialism (from the Latin word 'diluvium' for deluge).

Towards the middle of the eighteenth century the paradigm in geology changed from diluvialism to the more general catastrophism, which included other floods, earthquakes and volcanic eruptions. More and more, the earth scientists discovered the dark past of the planet and began to stare into an opening 'abyss of time'.[19] For Georges-Louis Leclerc Buffon (1707–88) nature was divided into different epochs by disastrous events. Catastrophists like Georges Cuvier (1769–1832) described the process of history as a sequence of destructive disasters, in each case turning the world upside down.[20]

In the early nineteenth century catastrophism was superseded by the uniformitarianism of Charles Lyell (1797–1875), Charles Darwin's teacher. Lyell declared in his *Principles of Geology* in 1830 that slow, smooth, gentle

movements are the decisive forces in nature. These long-term changes gave the earth's history its deep past.[21] Natural disasters were no longer held as an important force in the history of the earth. The word 'diluvium' survived as a term describing the primordial period of the ice age.

To this day, some geologists believe there may be a historic nucleus behind the myth of the deluge.[22] However, Noah's flood has lost its former significance for the history of mankind and nature. What is left is a metaphorical use, especially in connection with questions about man's responsibility for natural or ecological disasters. For instance, the German magazine *Der Spiegel* described the fatal avalanches of 1999 in the Austrian village Galtür as a vengeance of the mountains under the headline: 'The White Deluge' ('die weiße Sintflut').[23]

II.

The early modern period was the crucial time when the deluge began to appear in the discourse of the new sciences, Cartesian and later Newtonian mechanics. At the end of the seventeenth century this process began in the cosmological debate of Thomas Burnet's *Sacred Theory*. In response to this many philosophers began to build their own theories.

One of these 'World-Makers', as they were then called,[24] was the aforementioned Johann Jakob Scheuchzer from Switzerland. Like many others, he offered an alternative version to Burnet's history of the earth. He adopted his version mainly from the English naturalist John Woodward (1665–1728). Woodward's *Essay towards a natural History of the Earth* of 1695 was published by Scheuchzer in a Latin translation in 1704 as *Specimen geographiae physicae*. In this way, the doctor from Zürich helped Woodward to enter the Latin-speaking world of the continental scientific community. At the same time, the English naturalist helped Scheuchzer to obtain a fellowship of the Royal Society of London, the leading learned society in Europe around 1700. Over many years the two scientists corresponded intensively and exchanged boxes of fossils from England to Switzerland and vice versa. At the beginning of the eighteenth century, the correspondence of Woodward and Scheuchzer formed the 'Anglo-Swiss-Connection' of the Royal Society under the presidency of Isaac Newton.[25]

Scheuchzer's reinterpretation of Burnet's *Sacred Theory*, based on his interpretation of Woodward's *History of the Earth*, can be seen throughout his entire body of work, but mainly in his natural histories of Switzerland (1706–8, 1716–18, posthumous: 1746); in the *Itinera Alpina* (published by the Royal Society in 1708, enlarged edition 1723); in the catalogues of his collections of fossils, the *Herbarium diluvianum* (1709, 1723) and the *Museum diluvianum* (1716); and in later editions of his popular German textbook on natural sciences, the *Physica* (1711, 1729, first published 1701). Finally, Scheuchzer's cosmology can be found in different parts of the four enormous volumes of the *Physica*

Sacra, a mathematical and physical exegesis of the bible, published simultaneously in Latin, German, French and Dutch between 1728 and 1739.

His cosmology represented a world-view that was very common and widespread in the early Enlightenment. Moreover, for many natural historians in Europe Scheuchzer's interpretation of Genesis provided the key to understanding the history of mankind and nature. His diluvial theory was very influential in the early eighteenth century: it gave the so-called physico-theologists their framework, by which to explain the creation and the early period of the planet as Moses had told it.[26]

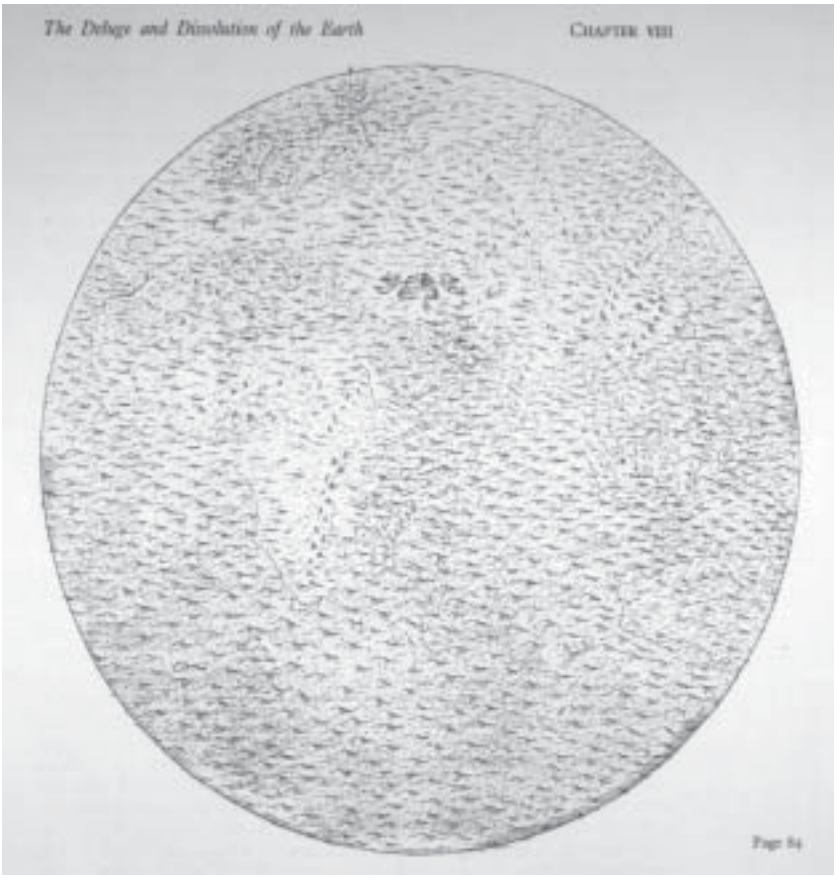

FIGURE 4. The deluge. Engraving in Burnet's *Sacred Theory*. On the picture we can see Noah's ark guided safely by two angels to the mount Ararat.

Nevertheless, Scheuchzer's view of the earth's past has to be seen as an answer to the questions that Burnet had provoked with his *Sacred Theory* in the late seventeenth century. Besides differences from Burnet, his theory of the flood shared with his opponent at least three important basic assumptions.

Firstly, both 'World-Makers' and 'Tellurists' believed in the possibility of decoding the divine plan of the history of the world. To decipher the 'blueprints of creation', as Francis Bacon had urged, was the primary aim of their efforts.[27] They claimed to base their theories on the book of scripture as well as on the book of nature.

Burnet and Scheuchzer called on the natural philosophy of their time to explain the story of Genesis. Both flood scientists took Moses not as a sacred prophet, but as the first historian of mankind. Accordingly, the deluge was considered as an ancient natural disaster like more recent examples such as the eruption of Mount Vesuvius that destroyed Pompeii in A.D. 79.

Secondly, Burnet as well as Scheuchzer took the biblical flood as the centrepiece of their theories. In each case a global natural disaster was the main event in the history of the world (Figures 4, 5, 6 and 7). Contrary to the tradition of pessimistic cosmologies both 'World-Makers' believed in the singularity of a divine flood caused by man's sin. The history of mankind *and* the history of nature joined in one single worldwide liquid disaster. The events of Genesis

FIGURE 5. The frontispiece (engraving) of Johann Jakob Scheuchzer's *Herbarium Diluvianum* (1723, second edition). The picture shows in the background on the right Noah's ark; in the front there are mussels and shells that will soon be sedimented after the deluge waters have disappeared. (Zentralbibliothek Zürich.)

FIGURE 6. The animals enter the ark: ‘Animalium in Arcam introitus’ (Genesis 7, 7-9). Engraving in Scheuchzer’s *Physica Sacra*, 1731, vol. 1 (Zentralbibliothek Zürich).

FIGURE 7. The beginning of the deluge: 'Diluvii initium' (Genesis 7, 11). Engraving in Scheuchzer's *Physica Sacra*, 1731, vol. 1 (Zentralbibliothek Zürich).

formed the knot in which both halves of global history were tied together. At the same time, the deluge provided a clear marker dividing history into distinct periods, the antediluvium and the postdiluvium. In the nineteenth century the former was still in use as a symbolic term for the pre-human period in the history of the earth. It remained as an image of a playground inhabited by giant amphibians, mighty dinosaurs and other extinct creatures 'that were perceived as "monsters" fit for a nightmare.'[28]

The third shared assumption of Burnet and Scheuchzer was that there is a strong relationship between nature and man, and furthermore, that mankind is dependent on nature. Burnet stated:

> As the Animate World depends upon the Inanimate, so the Civil World depends upon them both and takes its measures from them; Nature is the foundation still, and the affairs of Mankind are a superstructure that will be always proportion'd to it.[29]

Based on the same supposition, Scheuchzer developed a kind of 'climatic anthropology'. In his bio-geographical framework the people of Switzerland and Scotland were especially healthy, strong and intelligent because of the low air pressure at higher altitudes.[30] As a doctor of medicine Scheuchzer defined homesickness, 'nostalgia', as a specific illness of the Helvetian people. Leaving their mountains to travel in lower countries, they suffer from the high air pressure and become seriously ill.[31]

III.

Despite some agreement between the two 'World-Makers' their theories of the earth differed at a fundamental level. While Burnet's view of man, nature and natural disasters still derived partially from the tradition of Renaissance pessimism, Scheuchzer's world-view was already grounded in the optimistic belief of the early Enlightenment.

This can be demonstrated by examining the three main differences in their interpretations of the flood. Finally, these differences lead us to the question: What can we learn from analysing early modern interpretations of the flood for a modern environmental history?

The first fundamental difference between Burnet and Scheuchzer can be found in the different semantics of the deluge as a natural disaster. For the Anglican churchman the biblical flood was a total destruction of the Earth. The whole of creation had been inundated and ruined in the fatal waves of God's terrible punishment. For the Swiss naturalist the deluge was no annihilation of the antediluvian world, but rather a purification and a renovation of the earth. He interpreted Noah's flood as a second creation and the birth of a new world.[32]

Burnet, however, expected such a new world only after the outbreak of the next global disaster described in the bible, the apocalyptical conflagration. Both cosmologists saw the history of the earth as a kind of a cataclysmic evolution, but Scheuchzer did not need the hope for a future fiery disaster, because in his eyes the deluge has already realised a renewed world.[33]

The next fundamental difference follows from the different flood semantics: the understanding of natural disasters and of nature in general. This re-interpretation of the flood enabled Scheuchzer to separate a disastrous event like an earthquake or a landslip from its interpretation as a divine punishment for moral depravity. At the same time, Scheuchzer was one of the first scientists who denied the interpretation of natural disasters as bad omens that would refer to other natural catastrophes or to other calamities like wars, epidemic diseases, the death of a sovereign or the threat of a Turkish invasion. To cut off those references and relations was one important part of Scheuchzer's lifelong efforts to neutralise the fear of dangerous and perilous events and objects in nature.[34]

One exception is the 'dracones helvetici', the Swiss dragons. Scheuchzer was not sure if he should believe the numerous stories about dragons living in inaccessible areas of the mountains. On his scientific trips through the Alps he collected such stories from church books, village chronicles and oral reports of indigenous people. By that time, such creatures were no longer held as objects of fear, but as objects of curiosity. Scheuchzer treated the Helvetian dragons like other monstrous and hybrid living beings described by the early modern natural historians. 'When monsters do appear in eighteenth-century natural histories, they are treated generically and used to fill taxonomic gaps.'[35] In the same way, Scheuchzer began to classify those strange animals and to categorise them into a kind of 'taxonomy of dragons':

> Some [dragons] are winged, others without feet, which belong to the snakes, and others do have feet, which has to be compared rather with lizards. They are different in colour, scales and the figure of their parts.[36]

According to Scheuchzer, natural catastrophes were no longer seen as signs of divine anger but, instead, as parts of a stable and enduring natural order. In his *Cataclysmographia Helvetiae* (1733), a chronicle of catastrophes in Switzerland from 1271 to 1730, Scheuchzer wrote about natural causes but not about God's wrath. Catastrophes were now seen as a useful part of the order of nature. In 1731, when the so-called 'coelum triste' ('sky of sorrow'), a heavy thunderstorm in the night before 1 August, burned many houses and killed men and sheep in many parts of Switzerland, Scheuchzer explained, that storms and heavy rains are useful for wine-growing and necessary to clear the air.[37]

Here, we can see a completely different view of nature. For Burnet we live in a world that was ruined by Noah's flood – 'a broken Globe'.[38] The mountains are nothing but 'ruins of a broken world', especially the Alps only 'heaps of

stones and rubbish'. He called them 'the greatest examples of confusion that we know in nature'.[39] On the contrary, for Scheuchzer the earth is a balanced system of harmony and design, the mountains are a wise and purposeful invention of the Creator.[40]

Obviously the meaning of the earth underwent remarkable change. The evocation of decay and nostalgia was replaced by an image of the world that showed a new attitude to nature. It reflected not only a new socio-political view of order and prosperity, but also, in the case of Scheuchzer, a new kind of patriotism that grounded its code of identity not on tradition, but on nature, a supposed firm and incorruptible foundation.[41]

Although Burnet's view of nature was rather pessimistic, when he described his contemplation of the wild mountains on his Grand Tour through the Alps as 'a pleasing kind of stupor and admiration' we can find here some anticipations of the later so-called 'theory of the sublime'.[42] Within this frame of aesthetics natural disasters were soon discovered as objects of pleasing horror or terrible joy – of course, only when watching them from a safe distance.

In 1713, the controversy surrounding Burnet's *Sacred Theory* reached its climax, when William Derham from Upminster published his *Physico-Theology* to justify the design-argument for nature. Before that, he had used the 'Anglo-Swiss-Connection' to get meteorological information from Scheuchzer about the weather conditions in Switzerland. After corresponding with the naturalist from Zürich he became convinced that the Swiss mountains were useful to other countries, including England:

> Having thus considered the use of Cold to the production of Rain, I shall shut up these Remarks with one thing concerning the Alps; and that is, I cannot but think that those and all such like high Mountains, and the Snows they are covered with, are of great use to the neighbouring, yea more distant Countries, in generating their Rain, and performing other great Offices of Nature. From some Observations I have made in running over, and comparing Dr. Scheuchzer's and my own larger Tables, I have so frequently observed the Risings and Fallings of the Barometer, some of the most considerable Variations of the Wind, the most remarkable Alterations of Heat and Cold, and of wet and dry; I have, I say, so often observed many of these to precede in one place what hath follow'd in another, that I am apt to think that even England may sometimes partake of the effects of the Alpine Mountains upon the Air and Vapours.[43]

In this way, Scheuchzer was used by English 'World-Makers' as a scientific eye-witness to the Alps providing empirical information for their man-made and tinkered worlds. Besides that, his *Itinera Alpina* was used throughout the eighteenth century as a guidebook for the Alps.

Now, let us proceed to the third and, in this context, decisive difference: Although Burnet and Scheuchzer agreed in their assumption of a strong relationship between man and nature, the relationship itself was interpreted completely

differently. On the one hand, the author of the *Sacred Theory* believed that nature mirrors the moral state of man,

> that the course of Nature is exact and regular, and that even in the greatest changes and revolutions it should still conspire and be prepar'd to answer the ends and purposes of the Divine Will in reference to the Moral World.[44]

Due to this 'providential synchrony'[45] paradise reflected the state of innocence, while the ruined world of the postdiluvium reflects the state of moral corruption.

On the other hand, Scheuchzer defined the deluge as an act of rebalancing the relationship between man and nature. While the luxury of antediluvian nature seduced mankind to laziness and lewdness, the reduction of nature's fertility in the postdiluvium forced mankind to work and so enabled morality. Man had to work hard, but labour benefited mankind in bringing wealth, comfort, arts, science and industry.[46] Thus, a better life is less caused by nature than by labour. In this sense God, according to Scheuchzer, 'is producing good out of evil'.[47] Therefore, the deluge was not only the creation of a renewed world, but even more: an act of improvement, the starting point for a human history of progress.

In this way, culture has become the second nature of man. Noah's descendants seem to have been able, at least partially, to emancipate themselves from nature. This concept presupposes a deep trust in the stability of man's environment. Indeed, Scheuchzer quoted Genesis 9, verse 11: God promised Noah that there would be no further deluge in the future. As a sign of his reconciliation with man God put a rainbow in the sky (Figure 8).[48] While no global flood disaster will come, at the same time we do not have to worry about any local natural disasters, either.

> GOD has created the world, this ball of water, air and earth, our dwelling-house, through his power and omnipotence ...; the great GOD has not only divided that building most wisely, but has also made it firmly to such a degree that no forces of elements, no storms of wind, no inundations should damage it.[49]

Nature, then, cannot destroy itself. Consequently, Scheuchzer interpreted the flood not as Burnet did, as an event with natural causes, but as a miracle, a 'providentia specialis'. Natural laws are intended to stabilise nature and not to suspend its stability. Thus, God has to engage directly in nature to trigger a disaster like the deluge. The earth itself is a system that is indestructible from the inside. This concept also includes human interventions in nature because man is a part of the system, too.

Although Scheuchzer acknowledged that excessive wood clearance could cause shortages of wood, he considered turf and coal as a 'reserve-fund' of natural energy resources to recompense such a deficiency with a 'subterranean forest'.[50] Within that world-view a fundamental crisis of nature is unthinkable.[51] Therefore, the optimistic view of 'World-Makers' like Scheuchzer and others prevented and delayed the acknowledgment of the earth as vulnerable. In this

FIGURE 8. The rainbow as a sign of God's grace: 'Signum Iridis' (Genesis 9, 12-17). Engraving in Scheuchzer's *Physica Sacra*, 1731, vol. 1 (Zentralbibliothek Zürich).

way, the early Enlightenment produced one of the greatest errors in modern western thinking on ecological and environmental affairs.

Finally, it has to be asked what we can learn from such a cultural history of a natural disaster for a self-reflexive environmental history. A historical science, which deals with relationships between man and nature in history should also reflect the various interpretations of those relationships. This fact does not mean that Scheuchzer and others become 'bad guys' of environmental history. Indeed, we have to keep in mind the words of Peter J. Bowler:

> There is a danger that writers with strong political agendas may seek to use history as a means of bolstering their positions, creating a background for the modern debates based on an oversimplified model of past heroes and villains.[52]

Instead, a cultural history of environmental affairs only stresses the point that a certain attitude to nature depends on a particular world-view or view of nature that is changeable with time. Only in this way can we understand the different modes of mankind's actions on nature. In reconstructing these interpretations, environmental history simultaneously writes its own history.

NOTES

[1] Enlarged and annotated version of a paper presented at the 1st Conference of the European Society of Environmental History: 'Environmental History. Potential and Perspectives' St. Andrew's, Scotland, Sept. 5th–8th 2001. I owe many thanks to Gerald Kelly, who read this paper carefully and helped me very much with his critical comments.
[2] See Cohn 1996; Martínez and Luttikhuizen 1999.
[3] See Harris 1966.
[4] Luther, 1964. See Löfgren 1960, 120–32.
[5] Luther 1964, Vol. 42, 72.
[6] 'Haec omnia post peccatum deformata sunt, ita ut creaturae omnes, etiam Sol et Luna quasi saccum induisse videantur ...' Luther 1964, Vol. 42, 68.
[7] Luther 1964, Vol. 42, 153–4.
[8] See Williams 1948.
[9] Militzer and Glaser 1994.
[10] See Esser 1997.
[11] See Talkenberger 1990.
[12] See Gould 1987; Groh and Groh 1997.
[13] See Rousseau 1982, 236.
[14] Anonymous, Tauronamachia, 1719, cit. Beattie 1967, 191.
[15] Scheuchzer 1726a. For a detailed analysis see Kempe 2000b.
[16] Scheuchzer 1726.
[17] For the discussion of the biblical flood in the correspondence of Albrecht von Haller see the article by Martin Stuber in this volume.
[18] Rudwick 1976/1985.
[19] The term 'abyss of time' is used for the discovery of geological time by Albritton 1980; Rossi 1984.

[20] See Rudwick 1997, 253–67.
[21] See Gould 1987.
[22] For instance Pitman and Ryan 2000.
[23] *Der Spiegel*, No. 9, 01.03.1999. For the modern use of the deluge metaphor see the article by Martin Doering in this volume.
[24] See Taylor 1948; Tuveson 1950.
[25] See Kempe 2000a.
[26] For the 'diluvialists' and other physico-theologists who adopted the frame of Scheuchzer see Kempe 2000b.
[27] For the term 'the blueprints of creation' see Toulmin and Goodfield 1965, 87.
[28] Rudwick 1992, 170.
[29] Burnet 1965, 179.
[30] See Scheuchzer 1706–1708.
[31] Scheuchzer 1706–1708, vol. 1, 57–62.
[32] See for instance Scheuchzer 1731–1735, vol. 1, 33; Scheuchzer 1716–1718, vol.1, 108.
[33] For more details see Kempe 2000a.
[34] See Kempe 2000c.
[35] Park and Daston 1981.
[36] 'einige sind geflügelt, andre ohne Füsse, welche zu den Schlangen gehören, und noch andre haben Füsse, welche man mit besserm Recht mit den Eideren vergleicht. Sie sind auch an der Farbe, Schuppen, und der Figur der Theilen verschieden.' Scheuchzer 1746, vol. 2, 237.
[37] Scheuchzer 1732.
[38] Burnet 1965, 120.
[39] Burnet 1965, 111, 113, 115.
[40] See especially Scheuchzer 1706–1708.
[41] Scheuchzer's concept of identity corresponds to what Bernhard Giesen calls a 'primordial code' of collective identity. See Giesen 1999.
[42] Burnet 1965, 109–110. See also Groh and Groh 1991/1996; Nicolson 1959/1997.
[43] Derham 1709, 345. For Scheuchzer's meteorological observations see Pfister 1999, 26–27.
[44] Burnet 1965, 89.
[45] Rossi 1984.
[46] See Scheuchzer 1706–1708, vol. 1, 165; Scheuchzer 1729, second part, 166.
[47] Scheuchzer 1715, 9.
[48] See Scheuchzer 1731–1735, vol. 1, 79.
[49] 'GOTT hat die Erde, diese aus Wasser, Lufft und Erde bestehende Kugel, unser Wohn=Hauß, durch seine Krafft und Allmacht erschaffen …; welches Gebäude der grosse GOTT nicht nur höchst=weißlich eingetheilet, sondern dermassen feste gemachet, dass keine Krafft der Elementen, keine Wind=Stürme, keine Überschwemmungen demselben schaden solten.' Scheuchzer 1731–1735, vol. 2, 955.
[50] In 1708, Scheuchzer joined an official commission of the government of Zürich to explore possible funds of coal and turf nearby Zürich. To the concept of the 'subterranean forest' see Sieferle 2001.
[51] See Sieferle 1989.
[52] Bowler 1993, 13.

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