

## Was there a Great Flood in the Black Sea?

The book of Genesis from the *Bible* tells the tale of how God sent a Great Flood lasting 40 days to punish human beings for their sins. Warned by God in advance, Noah built a giant boat (the Ark) for his family and a pair of each animal species on Earth, who were all saved.

Some think there really was a huge flood in the Black Sea a few thousand years ago which swept Noah's ark to the top of Mount Ararat and that vestiges of the boat remain there today. The scientific evidence, however, clearly shows that the flood waters were never higher than 20 m below present sea level and that the biggest flood took place just after the Ice Age, thousands of years before the first towns and farms were settled.

Two hypotheses situate a Great Flood in the Black Sea basin, both at a time when it was a lake. The first hypothesis is proposed by A.L. Chepalyga (2007), who situates the Great Flood just after the Ice Age between 17 000 and 14 000 years ago with no link to the biblical story. According to Chepalyga, the brackish Black Sea filled rapidly with the overflow from the Caspian Sea via the Manych Spillway shortly after the Last Glacial Maximum when ice cover was melting rapidly.

The second hypothesis, or 'Noah's Flood', is proposed by W. Ryan *et al.* (2003). They claim that the climate became drier immediately after the Younger Dryas and that the resulting evaporation caused the Black Sea to drop to 95 m below the present level. As the climate warmed and ice cover melted in Europe, sea level rose in the Mediterranean, causing a catastrophic flow of salt water into the Black Sea 8 400 years ago.

If a catastrophic flood did occur in the Black Sea, there should be a record of it. An IGCP project searched for traces in sea-bottom sediments, fossils, landforms, old coastlines and so on. Here is what it uncovered.

### *How low did the Black Sea sink?*

Ryan *et al.* claim that dry climatic conditions caused the water in the Black Sea to evaporate to 95 m below the present level. Yet, we know from pollen records that the exposed shelf and immediately adjoining coasts were covered by moisture-demanding forest trees such as deciduous oak, linden, beech and elm, together with shade ferns, aquatic and swamp plants. These plant species are indicative of warm winters and year-round rainfall of between 600 mm and 1000 mm.

The last time the level of the Black Sea basin dropped to 95 m lower than today was during the Last Glacial Maximum. At the beginning of the Holocene period about 10 000 years ago, the Black Sea, a lake at the time, gradually rose from 40 m to 20 m below the present level, owing to the inflow of Mediterranean water. Could such an insignificant rise in water level cause catastrophic flooding?

### *Was the Black Sea a freshwater lake?*

If the Black Sea contained freshwater suitable for drinking, as Ryan *et al.* claim, why do all the fossils discovered in the lake sediments belong to organisms that thrived in brackish water? And if the lake water was potable, why would people have chosen to settle instead in the valleys of small rivers, as supported by numerous archaeological sites?

### *Were prehistoric settlements submerged by the Great Flood?*

Ryan *et al.* claim that, before the Great Flood, people inhabited not only today's coast but also that part of the present sea bottom (called the shelf) which was dry land at the time. Despite decades of searching for submerged prehistoric habitations on the previously exposed shelves of the Black Sea, there have been no definite finds below a water depth of 10 m.

### *Was there farming in the Black Sea region at the time?*

The pollen records reveal no evidence of grain production around the Black Sea before 5 718 years ago. The sparse nature of traces in shelf cores of charcoal particles from burned grasslands and fungal spores grown on animal dung in crowded enclosures discredit the idea that animal husbandry was practiced on the exposed shelf. This absence contrasts with the archaeological evidence for animal husbandry as early as 8 000 years ago found at Ilipinar south of the Sea of Marmara.

### *The evidence points to gradual sea-level rise in the Black Sea*

The hypothesis of a Great Flood in the Black Sea 8 400 years ago captured the public's imagination but what most media failed to mention was that geologists and archaeologists from Ukraine, Russia, Canada and elsewhere had found no evidence of catastrophic flooding of the Black Sea. Rather, the evidence points to a gradual reconnection with the Mediterranean Sea from about 9 500 to 8 000 years ago.

For Chepalyga, the Great Flood of 17 000–14 000 years ago is not the one described in the Bible. He argues that catastrophic floods would have endured in the collective memory for thousands of years, until they were consigned in ancient Aryan scriptures such as the Rigveda (Hindu) and Avesta (Indo-Iranian). The story of a Great Flood was also told by the ancient inhabitants of Mesopotamia.

This research was part of a joint project involving the IGCP and International Union for Quaternary Research between 2005 and 2011 on sea-level change and human adaptive strategies in the Caspian–Black–Mediterranean Sea Corridor.

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