

Shark-tooth weapons reveal lost biodiversity

Three shark species once found in the central Pacific Ocean are now missing.

Ed Yong

13 August 2012

For centuries, the people of the Gilbert Islands in the central Pacific Ocean have crafted weapons from shark teeth. Joshua Drew, a conservation biologist at Columbia University in New York, has used these teeth to show that the waters around the islands — part of the Republic of Kiribati — were once home to three species of shark that no longer live in the area.

“This is shadow biodiversity,” said Drew, presenting his results at the 2012 Ecological Society of America Annual Meeting in Portland, Oregon, last week. “Three sharks disappeared from these reefs before we even knew that they existed there.”

J. Drew/Columbia Univ.

Weapons from the Gilbert Islands contain the teeth of shark species no longer found in the area.

Drew analysed 124 shark-tooth weapons housed in the collection of the Field Museum of Natural History in Chicago, Illinois. The artefacts included swords, tridents and a 4-metre-long lance, dating back over 120 years. All are built in the same way: the islanders drill hole in the teeth and lash them to buttresses of wood with cords made from coconut leaves. All the teeth in one weapon usually come from one species, but Drew found several blades in which the penultimate tooth belonged to a rare species of blue shark (*Prionace glauca*) — possibly the signature of a single artisan.

Sharks can be identified from their teeth, so these weapons provide a clear record of the species that once swam around the Gilbert Islands. Drew used field guides and high-resolution photos to identify the teeth. “If there was any ambiguity,” he says, “I just dropped down to the ichthyological holdings, pulled out the species I was looking at and literally got the answer from the shark’s mouth.”

Lost species

Drew found that the teeth in the weapons came from 19 species of shark, and that three of these — the spottail shark (*Carcharhinus sorrah*), dusky shark (*Carcharhinus obscurus*) and bignose shark (*Carcharhinus altimus*) — are no longer found in waters close to the islands. The spottail and dusky sharks were among the four species most commonly used to make the weapons, but records suggest that they are no longer found within a few thousand kilometres of the Gilbert Islands.

It is unlikely that the teeth of these three missing species were brought in by trade. Sharks feature heavily in the Gilbert Islanders’ culture and were already being fished locally when the weapons were made. “There is no ethnographic, linguistic or archaeological evidence for long-distance trade with people who now live in the areas where the sharks are found,” says Drew.

It is not clear why the species vanished but Drew says it is “absolutely possible that humans had a role in these declines”. Shark-finning — the practice of hunting sharks for their fins alone, which kills sharks in much greater bulk than ordinary fishing — was first recorded in the area in 1910. However, by that time the practice was probably already well established.

Sean Connolly, a marine ecologist at James Cook University in Townsville, Australia, says that historical studies such as Drew’s are crucial, because there is a lack of good ecological data on shark populations before humans started to change the oceans significantly. “Such data are essential for the reconstruction of realistic ecological baselines against which we can compare the current status of the world’s marine ecosystems,” he says.

“When we set up modern conservation plans, we shouldn’t sell ourselves short,” says Drew. “We might not recapture the vivid splendour of those super-rich levels, but this information argues for setting up management plans to protect what sharks are there.”

Nature | doi:10.1038/nature.2012.11160