

# Science for Environment Policy

## Rising temperatures and acidification in the oceans spell danger for shark populations

**Increasing temperatures and rising ocean acidification could reduce the health and survival of young sharks**, new research has shown. Bamboo shark embryos incubated under ocean temperatures and acidity predicted for 2100 showed survival rates of 80% compared to 100% survival under present-day conditions. Once hatched, survival measured at 30 days was only 44% for those under predicted climate change conditions, again compared to 100% for those experiencing current temperature and acidity.

**As levels of CO<sub>2</sub> continue to rise, the atmosphere will warm, affecting every ecosystem on the planet.** Rising CO<sub>2</sub> levels have a dual effect on the oceans: temperatures will increase and levels of acidity will also rise. Research has shown that this acidification can have a damaging effect on many [marine](#) species, especially creatures with shells.

However, to date there has been little work done on how these [climate change](#) effects will impact sharks. This is a concern as sharks are among the most threatened groups of marine species, mainly as a result of overfishing and habitat loss. Furthermore, they may not be able to evolve to adapt to the changing conditions, as they tend to mature late, and have low reproductive rates.

For this study, researchers examined the effects of both temperature rise and increased acidity on the development and survival of the bamboo shark, *Chiloscyllium punctatum*. Sixty embryos were collected from the Philippines and incubated under different conditions. These included current temperature and acidity (26°C and pH 8.0); ocean temperatures predicted by 2100 and current pH (30°C and pH 8.0); pH change expected by 2100 and current temperature (pH 7.5 and 26°C) and finally both impacts of climate change (30°C and pH 7.5).

The results showed that survival of the embryos was reduced from 100% under current conditions to 89% under elevated temperature alone and 80% under elevated temperature and increased acidity. Embryo development also quickened under climate change conditions, decreasing from an average of 98 days under current conditions to 81 days.

Immediately after the embryos hatched, a measure of health was taken based on weight and length. This showed that those incubated under elevated temperature and acidity were in a worse overall condition. Furthermore, 30 days after hatching, survival was only 44% for those under increased temperature and acidity, compared to 100% of those raised under current conditions. For those raised under increased acidity but normal pH survival was 61%, and for those under increased temperature alone it was 71%.

Metabolic rate was also affected, with 30-day old sharks showing significantly increased metabolic rates when under elevated temperatures.

Currently, the impacts of climate change on sharks have been discussed in terms of loss of habitat, such as coral reefs, or changes in prey populations. However, these results indicate that sharks may be vulnerable to the dual effects of climate change on a fundamental level, affecting both development and survival.



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