

Research suggests marine invasive species benefit from rising CO2 levels

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Ocean acidification may well be helping invasive species of algae, jellyfish, crabs and shellfish to move to new areas of the planet with damaging consequences, according to the findings of a new report.

Slimy, jelly-like creatures are far more tolerant of rising carbon dioxide levels than those with hard parts like corals, since exposed shells and skeletons simply dissolve away as CO2 levels rise.

The study, conducted by marine scientists at Plymouth University, has found that a number of notorious 'nuisance' species – such as Japanese kelp (*Undaria pinnatifida*) and stinging jellyfish (*Pelagia noctiluca*) are resilient to rising CO2 levels. They show why global warming and changes in seawater chemistry can help the spread of hundreds of damaging marine organisms.

The study, published in *Research and Reports in Biodiversity Studies*, notes that in the tropics, coral reefs face a host of interconnected problems (bleaching, corrosion, disease, spreading seaweed, invasive species) that are all caused by rising CO2 levels.

"We are witnessing the spread of [marine life](#) that cause problems – such as toxic jellyfish blooms and rotting algal mats," said Professor Jason Hall-Spencer, lead author of the report. "Based on a synthesis of evidence available to date, we predict the problems associated with harmful marine life will get worse in response to rising CO2. Pathogens like cholera don't recognise national borders so seawater warming is a

health issue for cities like London, and nobody knows what organisms will spread and cause problems as Arctic shipping routes open up."

The study arose from observations at volcanic sites in the Mediterranean, where Professor Hall-Spencer has led expeditions to record what forms of marine life cope well with higher CO₂ levels. They found that invasive species of algae and jellyfish thrive at levels of carbon dioxide predicted to occur this decade. Their extensive review of laboratory experiments reveals stand-out cases such as so called 'Killer algae' (*Caulerpa taxifolia*), which is spreading world-wide, that benefit from higher CO₂ but are so toxic that native herbivores die of starvation rather than eat it.

The report highlights the American slipper limpet, *Crepidula fornicata*, as an example of [ocean acidification](#) both helping and hindering a species, with evidence to show it has spread to Europe to become one of the 100 most [invasive species](#), while at the same time, the species' larvae has been placed at greater risk of predation due to reduced shell growth. Similarly, both the Red King Crab, which has invaded the Barents Sea, and the predatory snail *Urosalpinx cinerea*, which has moved from the north west Atlantic to the north east Atlantic and Pacific, impacting upon oyster and scallop aquaculture in the process, have also demonstrated a marked reduction in larval survival and growth.

"Observations show there will be winners as well as losers as CO₂ levels ramp up, just as there were in previous mass extinctions," said researcher Ro Allen. "The spread of harmful marine organisms should be factored into risks of rising CO₂ emissions."

More information: Jason Hall-Spencer et al. The impact of CO₂ emissions on 'nuisance' marine species, *Research and Reports in Biodiversity Studies* (2015). [DOI: 10.2147/RRBS.S70357](https://doi.org/10.2147/RRBS.S70357)

Provided by University of Plymouth

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