Increase in ocean acidification could lead to lost fish larvae in quiet reefs

January 13 2016, by Bob Yirka

A school of sardines in Italy. Credit: Wikimedia / Alessandro Duci

(Phys.org)—A small team of researchers has found evidence that suggests that as the oceans acidify due to increased carbon dioxide levels, some fish larvae may become lost while looking for a home. In their paper published in the journal *Biology Letters*, Tullio Rossi, Ivan Nagelkerken, Jennifer Pistevos and Sean Connell, all with The

University of Adelaide describe their study of a natural environment that mimics oceans of the future and their experiments with larvae exposed to increased acidification levels

Many studies have been done with the goal of better understanding what will happen in the ocean as acidification occurs, but few if any have looked into the possible impact due to changes in sound dispersal. Prior research has shown that fish larval dispersion and then the subsequent finding of a home, is tied very closely to sound—marine life living on a coral reef makes a lot of noise and can serve as a beacon. Fish larvae have evolved an ability to use the noise to find their way home after riding currents for days, weeks or months. But, the researchers wondered, what will happen if the reefs become quieter due to the existence of less marine life in a more acidic ocean?

To find out, they ventured first to an undersea carbon dioxide vent off the coast of New Zealand where acidification levels are close to what many believe will become the norm over the next hundred years—they sank microphones and recorded underwater sounds and found that there was much less natural noise than in nearby areas where acidification levels were normal. That suggested that an increase in acidification would indeed mean a quieter underwater world.

Next, the researchers went back to their lab and tested mulloway fish larvae responding to changes in acidification—first they exposed a test group to high levels of carbon dioxide for nearly a month, then they put them in a tank to see if they would make their way using acoustic cues, to what should be their natural environment. They did not, they instead avoided them—larvae reared in a normal environment responded positively, as expected. The team also tried putting the damaged larvae in a tank where the conditions were similar to that around the natural carbon dioxide vent and found that they tried to avoid that environment as well. Their simple experiments indicate, the team suggests, that some

fish larvae in the future might have to find another way home, or perish.

More information: Lost at sea: ocean acidification undermines larval fish orientation via altered hearing and marine soundscape modification, Published 13 January 2016.DOI: 10.1098/rsbl.2015.0937 , rsbl.royalsocietypublishing.or … ontent/12/1/20150937

Abstract

The dispersal of larvae and their settlement to suitable habitat is fundamental to the replenishment of marine populations and the communities in which they live. Sound plays an important role in this process because for larvae of various species, it acts as an orientational cue towards suitable settlement habitat. Because marine sounds are largely of biological origin, they not only carry information about the location of potential habitat, but also information about the quality of habitat. While ocean acidification is known to affect a wide range of marine organisms and processes, its effect on marine soundscapes and its reception by navigating oceanic larvae remains unknown. Here, we show that ocean acidification causes a switch in role of present-day soundscapes from attractor to repellent in the auditory preferences in a temperate larval fish. Using natural CO_2 vents as analogues of future ocean conditions, we further reveal that ocean acidification can impact marine soundscapes by profoundly diminishing their biological sound production. An altered soundscape poorer in biological cues indirectly penalizes oceanic larvae at settlement stage because both control and CO_2-treated fish larvae showed lack of any response to such future soundscapes. These indirect and direct effects of ocean acidification put at risk the complex processes of larval dispersal and settlement.

Citation: Increase in ocean acidification could lead to lost fish larvae in quiet reefs (2016,