

# Global warming and pollution have similar impact on coral reef fish

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A Manini larva (*Acanthurus triostegus*) just before entering the reef with the typical transparency of a pelagic larva. Credit: Marc Besson

An international collaboration has shown for the first time that human-caused stresses of global warming and pollution affect coral reef fish development and survival via the disruption of an endocrine pathway.

In a study published in *Nature Communications*, researchers from Griffith University, PSL Research University, the Oceanological Observatory of Banyuls-sur-Mer and the Insular Research Center and Environmental Observatory of Moorea, separately exposed convict surgeonfish larvae to temperature increase and pesticide.

"Fish face a variety of human-induced stressors including increasing [water temperatures](#) and pollution from agricultural pesticides," says Dr William Feeney, from Griffith University's Environmental Futures Research Institute.

"Both a three-degree temperature increase and exposure to pesticide led to a decrease in the amount of thyroid hormones in exposed fish," said

Dr Marc Besson, lead author, from PSL Research University, Paris.

"These hormones control the development of sensory structures such as the retina, the nostrils and the lateral line, which enables fish to detect nearby water movement.

"This matters because animals use their sensory systems to inform ecologically important behaviours, such as their ability to identify and respond to predators," Dr Feeney said.

The researchers used different hormone treatments and aquaria experiments, as well as imaging of sensory tissues, in the field and in the laboratory, to understand the importance of thyroid hormones in the development of the sensory structures.

The fish exposed to these different stresses all showed impaired sensory development and greater vulnerability to predation.

"When the fish were given supplementary thyroid hormone it reversed these effects, suggesting that for both temperature stress and pollution stress it is the drop in these hormones which causes changes in the sensory organs and increases their vulnerability to predators."

Since they act via similar processes, the exposure to different types of human-caused stress may compound [negative effects](#), the authors argue.

"This means even exposure to low amounts of temperature change or pollution, which on their own have little to no detectable effect, may disrupt [hormone](#) processes when experienced together," Dr Feeney said.

"Basically, exposure to multiple stressors, such as climate change and pollution, may be much worse in the developmental stage of coral fish, than exposure to a single stressor alone.

"The survival of larval fishes is essential for the renewal of fish stocks and the maintenance of biodiversity more generally. The negative effects of anthropogenic stressors on sensory development in larval fishes that we observed is worrying because it affects a baseline process that underpins entire [fish](#) assemblages."

**More information:** *Nature Communications* (2020). [DOI: 10.1038/s41467-020-17450-8](https://doi.org/10.1038/s41467-020-17450-8)

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