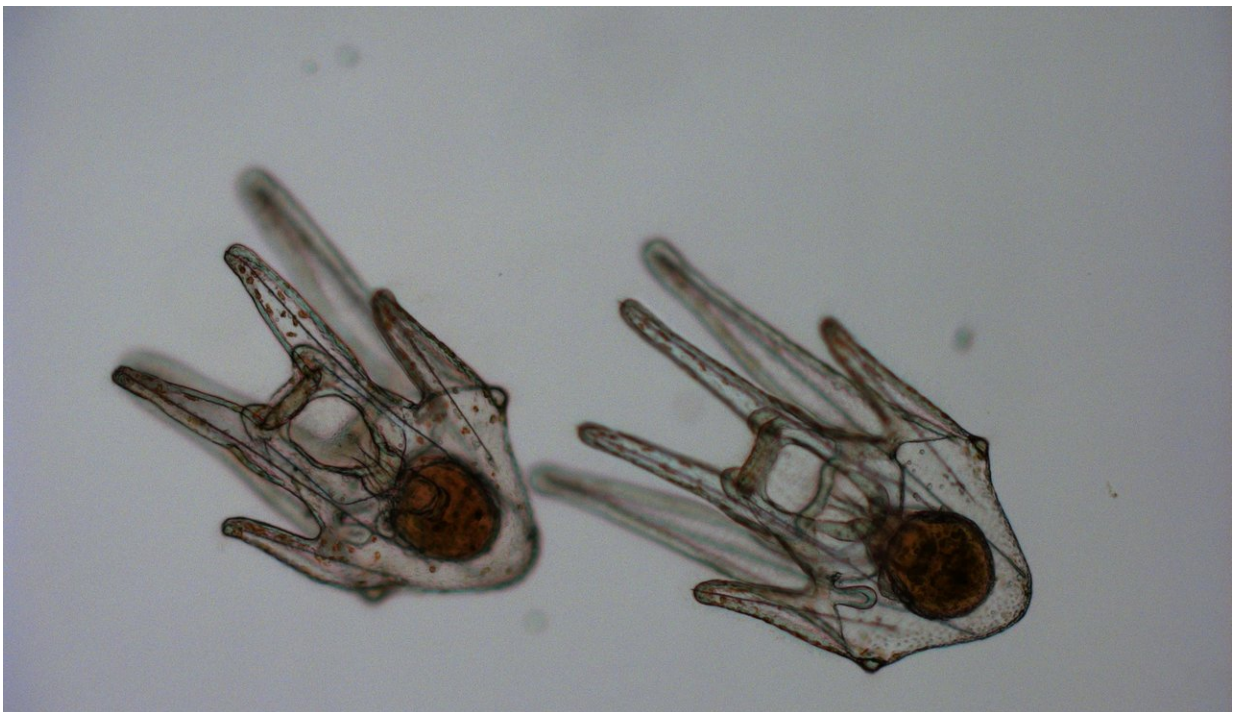


Combined local and global actions could lessen impacts of change in marine environment

November 26 2018, by Alan Williams



Larvae of the green sea urchin (*Strongylocentrotus droebachiensis*). Credit: NORCE Norwegian Research Centre

Increased oil and gas activities could combine with ocean warming and acidification to have a significant negative impact on marine organisms, a new study suggests.

A team of researchers led by Dr. Renée K. Bechmann at the NORCE Norwegian Research Centre conducted one of the first studies to explore the [impact](#) of multiple stressors in the [marine environment](#).

The study's lead author, Dr. Maj Arnberg, carried out the [research](#) as part of her Ph.D. under the supervision of Professor John Spicer and Dr. Piero Calosi, both affiliated to the Marine Biology and Ecology Research Centre at the University of Plymouth, together with Dr. Sam Dupont at the Department of Biological and Environmental Sciences (BioEnv) at the University of Gothenburg.

Writing in *Scientific Reports*, a journal published by the Nature group, they say that effective management of local issues such as oil exposure from a spill situation could mitigate the detrimental impact of future global environmental changes.

And they believe international recognition of this fact would in turn empower and encourage local decision makers to act, increasing natural populations and environment resilience in the process.

Their working hypothesis was that while exposure to global and local drivers individually would significantly negatively affect larval early developmental stages, combined exposure would lead to a more severe impact than observed for single drivers.



The northern shrimp (*Pandalus borealis*). Credit: Dr Renée K. Bechmann (NORCE Norwegian Research Centre)

The study employed a scenario-based, collapsed design to investigate the impact of one local acute stressor (North Sea crude oil) and two chronic global drivers (pH for ocean acidification and temperature for ocean warming).

It then explored the individual and collective impacts on aspects of the larval stages of two key invertebrates, the northern shrimp (*Pandalus borealis*) and the green sea urchin (*Strongylocentrotus droebachiensis*).

Both shrimp and urchin larvae were negatively impacted by ocean acidification and [ocean](#) warming resulting in decreased growth, while acute exposure to oil also reduced growth, feeding and activity in larvae of both species.

Researchers say the study highlights the importance of adjusting regulation associated with oil spill prevention to maximize the resilience of marine organisms to predicted future global conditions.

Dr. Arnberg, now a Research Scientist at NORCE, said: "This paper shows that both local and global drivers had negative effects on the larval stages of two keystone species, northern shrimp and green sea urchin. No interactions were observed between local and global drivers and the combined effects, of the two [drivers](#) are approximately equal to the sum of their separate effects. It is therefore important to reduce the risk of environmental effects from local pollution to protect the marine ecosystem in a high CO₂ world."

MBERC is one of the world's leading research centres examining the impact of multiple stressors on [marine organisms](#) and environments, and undergraduate and postgraduate students are regularly involved in that research.

Professor of Marine Biology John Spicer, an author on the current paper, said: "The findings of our study suggest that when it comes to environmental protection Patrick Geddes' famous phrase, 'act local, think global' may be extended to 'act local, act global'. Local and global challenges face life in our oceans and it is probably inappropriate to consider them as independent from one another."

More information: Maj Arnberg et al, Effects of oil and global environmental drivers on two keystone marine invertebrates, *Scientific Reports* (2018). [DOI: 10.1038/s41598-018-35623-w](https://doi.org/10.1038/s41598-018-35623-w)

Provided by University of Plymouth

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