# Urban environments promote adaptation to multiple stressors in aquatic species

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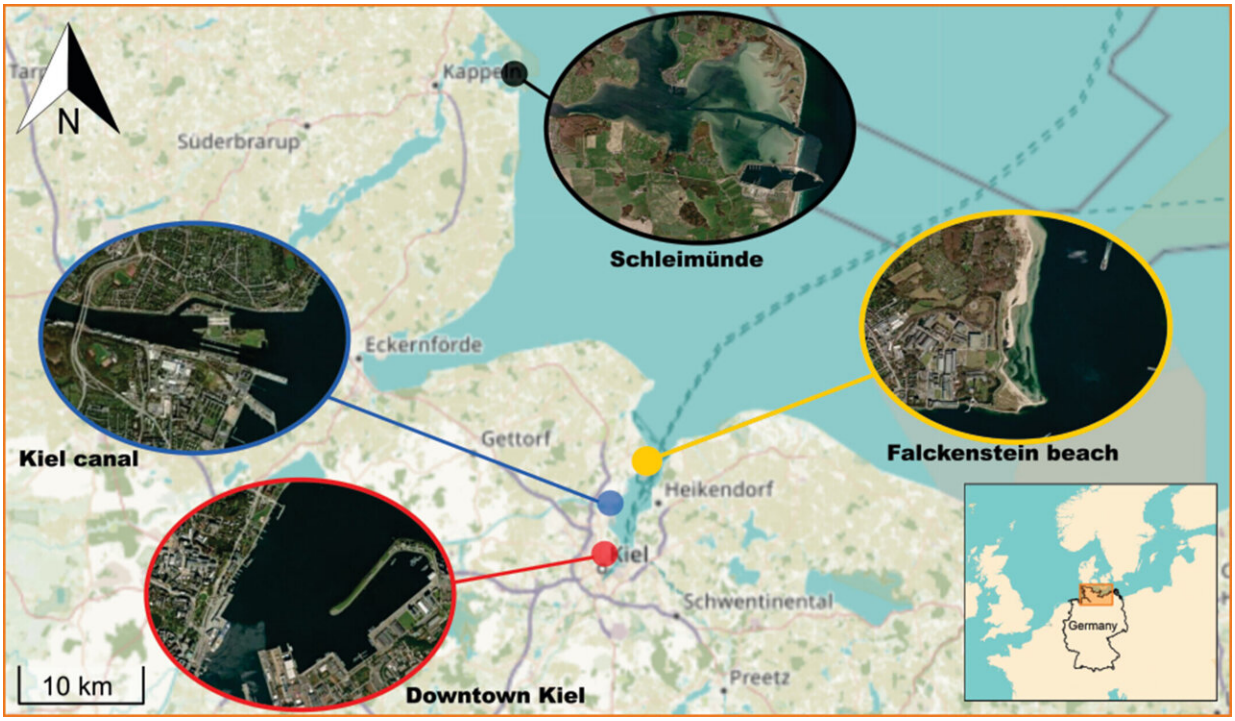


Sampling locations used in the study, where individuals of species populations were collected. Credit: *Ecology Letters* (2025). DOI: 10.1111/ele.70074

Urban habitats are very different from natural habitats and pose new challenges for animals and plants. Until now, little was known about how populations of the same species evolve in habitats with and without human influence.

An international team of researchers led by Dr. Elizabeta Briski, a marine biologist at the GEOMAR Helmholtz Center for Ocean Research in Kiel, Germany, has now investigated how conditions in urban areas affect the populations of three aquatic species (one bivalve and two crustaceans). Her study shows that these populations adapt to a disturbed environment and thus become more resilient to environmental change. The results are published today in the journal *Ecology Letters*.

For their study, the researchers compared populations of blue mussel (Mytilus sp.) and amphipods (Gammarus locusta and Gammarus salinus) from the Kiel Fjord, which is heavily influenced by humans, with those from the Schlei, which is less exposed to environmental changes.

"Just some of the differences between these locations are the concentrations of heavy metals in sediment, as well as temperature" explains Briski. "Cities are heat islands where animals already have to endure higher temperatures than in natural habitats that are largely unaffected by humans."

To test their adaptability, the researchers exposed animals from both water bodies to a range of stressors under laboratory conditions. The stressors reflected current and predicted environmental conditions in the Baltic Sea, such as rising temperatures, salinity changes and increased carbon dioxide in the water, leading to acidification. The team documented mortality of the animals over a period of 30 days.

## Urban populations are more resilient

The results show that populations from urbanized habitats tend to be more robust to these environmental stressors, and are already adapting to changing conditions when compared to their counterparts from protected habitats.

"These populations could serve as potential 'rescue populations' for endangered populations," says Briski. At the same time, their greater tolerance to future environmental changes could make it easier for them to conquer new habitats, warns Briski. "This makes them potential invasive species spread by human trade and transport between urban centers."

The results of the study support the hypothesis that urban habitats can provide important clues about how animals will adapt to future environmental changes. "Our results show that populations of species differ in their susceptibility to stressors associated with urbanization," says Briski.

This has important conservation implications: "Urban populations could support natural habitat's populations because they are more resilient to environmental change." However, it remains to be seen whether these adaptations can keep pace with human-induced environmental changes.

Future research should investigate how other stressors, such as heavy metals or light pollution, affect adaptation and whether these adaptations offer advantages in new habitats.

**More information:** Elizabeta Briski et al, Urban Environments Promote Adaptation to Multiple Stressors, *Ecology Letters* (2025). DOI: 10.1111/ele.70074

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