Knowledge of larval fish just a drop in the ocean

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Fish larvae collected in the Red Sea by Isari's team during the year-long survey. Credit: 2017 Stamatina Isari

A year-long survey of the taxonomic diversity of Red Sea fish larvae has revealed how the community changes throughout the year and has also established a baseline for future studies.

Researchers used a fine net to collect fish larvae from a near-shore and an off-shore site in the Red Sea every month for a year. The team from KAUST, working with two Spanish institutions, used conventional morphological analysis to approximately identify the fish larvae followed by DNA barcoding to pin down the species.

"There are no descriptions of most of these species as larvae," says Stamatina Isari, a plankton ecologist who led the study. "In a way, I was teaching myself. Once I had the barcode of a larva and identified its species using reference databases, then I knew how the larvae of that species looked." This enabled Isari to identify samples she saw later, based solely on their morphology: eventually these descriptions could form the basis of a larval identification key.

The stock of fish larvae was found to vary through the seasons. A larger stock of fish larvae was observed at the near-shore site during the colder months, though the abundance at the two sites was similar in the warmer part of the year.

There were also differences noted in the community structure, with the near-shore site harboring a higher number of species of certain reef families and greater overall diversity, particularly during the colder months. Meanwhile the offshore site was home to deeper depth-adapted species that were absent from the shallower, near-shore site. The team also measured environmental variables at the two sites and found that temperature was the major driver of changes in the communities during the course of the year.

"Exploring larval distribution patterns in space and time will help us understand the factors affecting fish population dynamics" says Isari, adding that "the majority of collected larvae appeared to be species not commonly seen as adults in the area."

A complete picture of Red Sea fish calls for an understanding of the larval communities as well as the juvenile and adult communities. Many of the barcoding sequences didn't have a match in DNA databases, highlighting the scant knowledge of Red Sea fish communities and the need to establish a reliable database of Red Sea fish taxonomic data.

This study also highlights the value of plankton net tows in estimating fish biodiversity. It also provides an important baseline and a reference database for future work. Using this database, Isari is now studying the diversity of fish larvae at different latitudes in the Red Sea.

More information: Stamatina Isari et al, Exploring the larval fish community of the central Red Sea with an integrated morphological and molecular approach, *PLOS ONE* (2017). DOI: 10.1371/journal.pone.0182503

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