American researchers have recently found that temperature strongly affects marine larval dispersal, a key component in conservation and management of fish, shellfish and other marine species. They have developed a new model that shows that the distance marine larvae travel varies with ocean temperature. This model could be useful for evaluating the ecological and evolutionary consequences of temperature changes in the world's oceans.

Temperature controls the rate of fundamental biochemical processes in organisms, and consequently, changes in the environmental temperature can influence population, species and community-level processes. In the marine environment, temperature can alter the number and diversity of adult species in a certain area by changing larvae development time. Nevertheless, to date, the influence of temperature on larval duration has only been studied for specific species, and therefore the generality of the temperature-dependence of larval duration remains untested. Knowing the larval dispersal distance, which is believed to be influenced by the duration of the larval period, is a critical component for managing commercially important or invasive species.

Recently, American researchers have studied the effect of temperature on larval development using data from 72 marine species, including cod, herring, American lobster, horseshoe crabs and clams. The researchers first used a multilevel model to estimate parameters that describe the influence of temperature on the development of marine larvae. Then, they used the results to develop a model that predicts the effect of temperature on dispersal and survival.

The researchers found that the distance larvae travelled varied with ocean temperature. They observed that larvae from the same species travel far less in warmer waters than in colder waters. In particular, mean dispersal distance differs greatly (20 versus 225 km) as temperature varies from tropical conditions (30 °C) to cold temperate waters (5°C). The authors argue that this is due to the fact that larvae in cold waters develop more slowly and drift further before beginning their next development stage because colder temperatures cause sluggish metabolisms.

For endangered species, the survival of some animals may depend on whether offspring from parents in one protected area can get to another area where they are safe from harvest. Consequently, in warmer waters, marine protected areas may need to be closer together than in colder water, since in warmer water dispersal distances tend to be shorter.

Moreover, they found that the predictions made by the developed model hold true for virtually all marine animals with a larval life cycle.

In the context of global warming and associated changes in ocean temperatures, it is important to understand how fish populations are affected by changes in temperature. The current study provides new insights in this regard that may be useful in marine ecology and conservation. The model developed by the authors could represent a useful tool for studying larval movement with knowledge about ocean temperature. It may make it possible to predict what large-scale changes in ocean temperature may mean for adult populations.


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Theme(s): Marine ecosystems

Additional Information: The contribution of the EC's LIFE programme to the conservation of Europe's highly endangered marine species and habitats is the subject of "LIFE and the marine environment", the latest issue of the successful LIFE Focus series. This beautifully illustrated publication highlights key EU policy actions in the area and provides examples of good practice Natura 2000 projects focusing on the marine environment.

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