

Simulation-Based Pedagogy and Ocean Acidification

Vishakha Shingala*

SVKM's Mithibai College of Arts, Chauhan Institute of Science and Amrutben Jivanlal College of Commerce and Economics (Empowered Autonomous) Affiliated to University of Mumbai, India

Riva Vinde

SVKM's Mithibai College of Arts, Chauhan Institute of Science and Amrutben Jivanlal College of Commerce and Economics (Empowered Autonomous) Affiliated to University of Mumbai, India

Nia Diwecha

SVKM's Mithibai College of Arts, Chauhan Institute of Science and Amrutben Jivanlal College of Commerce and Economics (Empowered Autonomous) Affiliated to University of Mumbai, India

Vandita Bhatt

SVKM's Mithibai College of Arts, Chauhan Institute of Science and Amrutben Jivanlal College of Commerce and Economics (Empowered Autonomous) Affiliated to University of Mumbai, India

Umasa Warsi

SVKM's Mithibai College of Arts, Chauhan Institute of Science and Amrutben Jivanlal College of Commerce and Economics (Empowered Autonomous) Affiliated to University of Mumbai, India

Abstract

Educational and outreach programs related to ocean acidification can help in raising awareness about the variation in ocean chemistry and the possible effects it might have on marine organisms. The laboratory experiment simulating natural environment could provide an effective way of demonstrating the impact, thereby allowing learners to have an idea of what could occur if the aquatic environment deviates from normal in terms of its pH. The experiment in the present study was designed with the aim of relating the effect of ocean acidification in laboratory conditions and demonstrating the potential effects of decreasing pH on marine shellfish. For this experiment, an acidification model using vinegar mimicking dissolved carbon dioxide was used. The selected species for this experiment included the green mussel (*Perna viridis*) and the clam (*Meretrix casta*). Observations were made in terms of alteration in pH, shell appearance and weight. There was an evident reduction in pH levels with an increase in the percentage of vinegar present; the lowest pH level was observed at 75% vinegar. Changes in the state of the shells were observed to occur with the increase in the acidic nature of the vinegar. The *Perna viridis* showed signs of shell degradation, reduction in shell, and thinning at higher acid levels. *Meretrix casta*, on the other hand, had minimal changes at low acid levels. The controls did not suffer any significant effect. In general, the results seem to indicate that acidic environment has deteriorating effect on the shells of the shellfish in the marine environment. This simulation-based approach offered a cost-effective way to decipher the influence of ocean acidification in a laboratory setting and generated awareness among the learners of changing marine environment due to acidification.

Index Terms

Simulation, Pedagogy, Ocean Acidification, Shellfish, Awareness