

## Marine Biology: A Very Short Introduction

By Philip V. Mladenov

### Questions for Thought and Discussion

- What constitutes the oceans' "invisible forest"? In what key ways does primary production in the oceans differ from that on land? What are the factors that limit primary production in the oceans?
- What is the role of the micronutrient, iron, in the oceans? Why have scientists been experimenting with "fertilising" the oceans with iron? Does your group think this is a worthwhile area of research?
- What factors drive coastal upwelling in the marine environment? Why are upwelling zones so important in terms of energy flow in the oceans?
- Why are the oceans becoming more acidic? Why is it a problem? Does your group think that we will be able to manage this issue over the next 50 years?
- Tropical oceans are often referred to as marine deserts? Why? How do coral reefs, one of the most productive marine systems on the planet, manage to thrive in tropical oceans?
- Do you believe that coral reefs are good indicators of the environmental health of the oceans? Explain. Can your group make some predictions of what coral reefs will be like 50 years from now?
- Kelp forests are very productive but unstable marine communities. Discuss some of the factors that contribute to this instability.
- Discuss the difference between infaunal and epifaunal marine benthic animals. How does each group typically obtain its food?
- Why are seagrasses often referred to as "turtle grass"? Does your group think that seagrass habitats are important to human society? Why?
- What are the factors responsible for the creation of coastal "dead zones" around the world? Does your group think that it will be possible to reverse the trend of increasing size and number of dead zones?
- What is a harmful algal bloom? What causes such blooms? Do you believe that harmful algal blooms are more common in the oceans now than in the past? Explain.
- What is an "exotic marine species"? Give some examples of such species. What is causing the spread of such species and why is it a problem? Does your group think it will be possible to better manage this problem in future?
- What is the Great Pacific Garbage Patch? What effects does it have on marine life?
- What kinds of organisms live in polar sea ice? How do they manage to survive in ice? Discuss the importance of sea ice for sustaining polar marine food webs.
- Discuss the role of krill in the Antarctic marine system.
- The Southern Ocean is often referred to as the planet's last pristine marine system. Does your group agree with this description? Explain?
- What are the sources of food in the deep ocean? Would you consider food to be abundant or scarce? Explain?
- Seamounts are often referred to as biological "hotspots" in the deep ocean. Does your group think this is an appropriate description and why?
- What are some of the commercial fish species associated with seamounts? Does your group believe that seamount fisheries are being managed sustainably? Be prepared to defend your position?
- Is all primary production in the oceans driven by the energy of sunlight? Explain?
- What is meant by "vertical zonation" of the marine intertidal? Do you think that vertical zonation is a result of physical or biological factors? Explain.

- Where do members of your group stand on the issue of the use of bottom trawls for commercial harvesting of marine food resources? Do you think this method of fishing will exist 50 years from now?
- What is the evidence for the over-exploitation of commercial marine fish stocks? What steps would your group promote to reverse the trend and begin to restore marine fisheries?
- What contribution do you think the oceans will make in providing food for the 9 billion people that will live on our planet in 2050?

Other books by Philip V. Mladenov

(Editor, with Robert D Burke, Philip Lambert, and Ronald L Parsley) *Echinoderm Biology* (Balkema, 1988)

Further Reading

George Karleskint, Jr, Richard Turner and James W Small, Jr, *Introduction to Marine Biology* 4th edn. (Cengage Learning, 2013)

Tom Garrison, *Oceanography: An Invitation to Marine Science* 8<sup>th</sup> edn. (Cengage Learning, 2013)

Callum Roberts, *The Unnatural History of the Sea*, (Island Press, 2007)

A D Rogers and D d'A Laffoley. *International earth system expert workshop on ocean stresses and impacts*. Summary report (IPSO Oxford, 2011)

Anonymous, *The State of World Fisheries and Aquaculture 2010*, (Food and Agriculture Organization of the United Nations, 2010)

Jackson, JBC. *The future of the oceans past* (Philosophical Transactions of the Royal Society of London B 365: 3765-376; 2010)