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Sample assessment 2020

Multiple choice question book

Marine Science

Paper 1



Queensland
Government



Queensland Curriculum
& Assessment Authority

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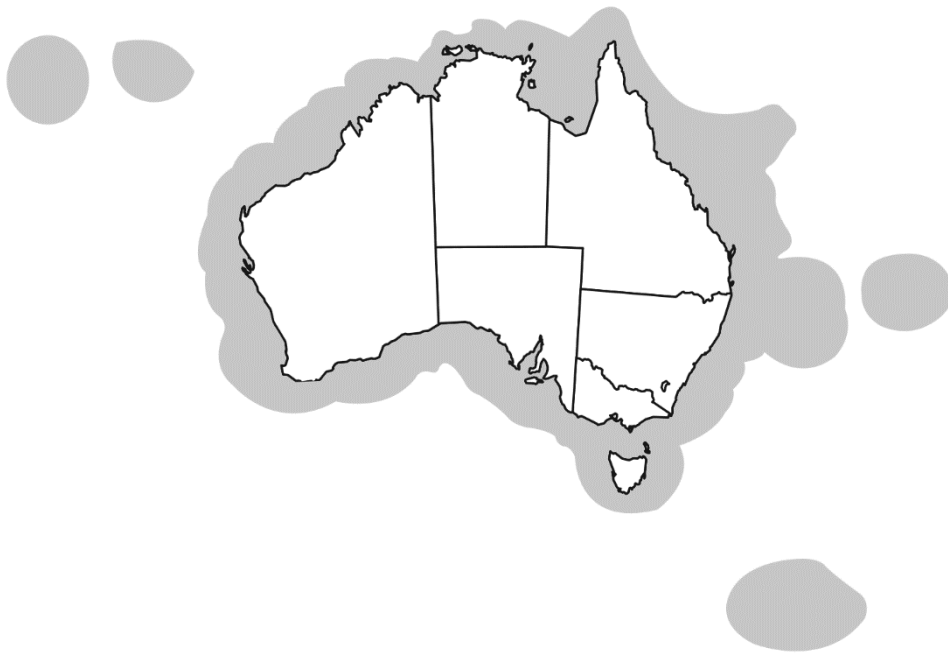
Section 1

Instructions

- Answer all questions in the question and response book.
 - This book will not be marked.
-

QUESTION 1

The map shows maritime boundaries in Australia.



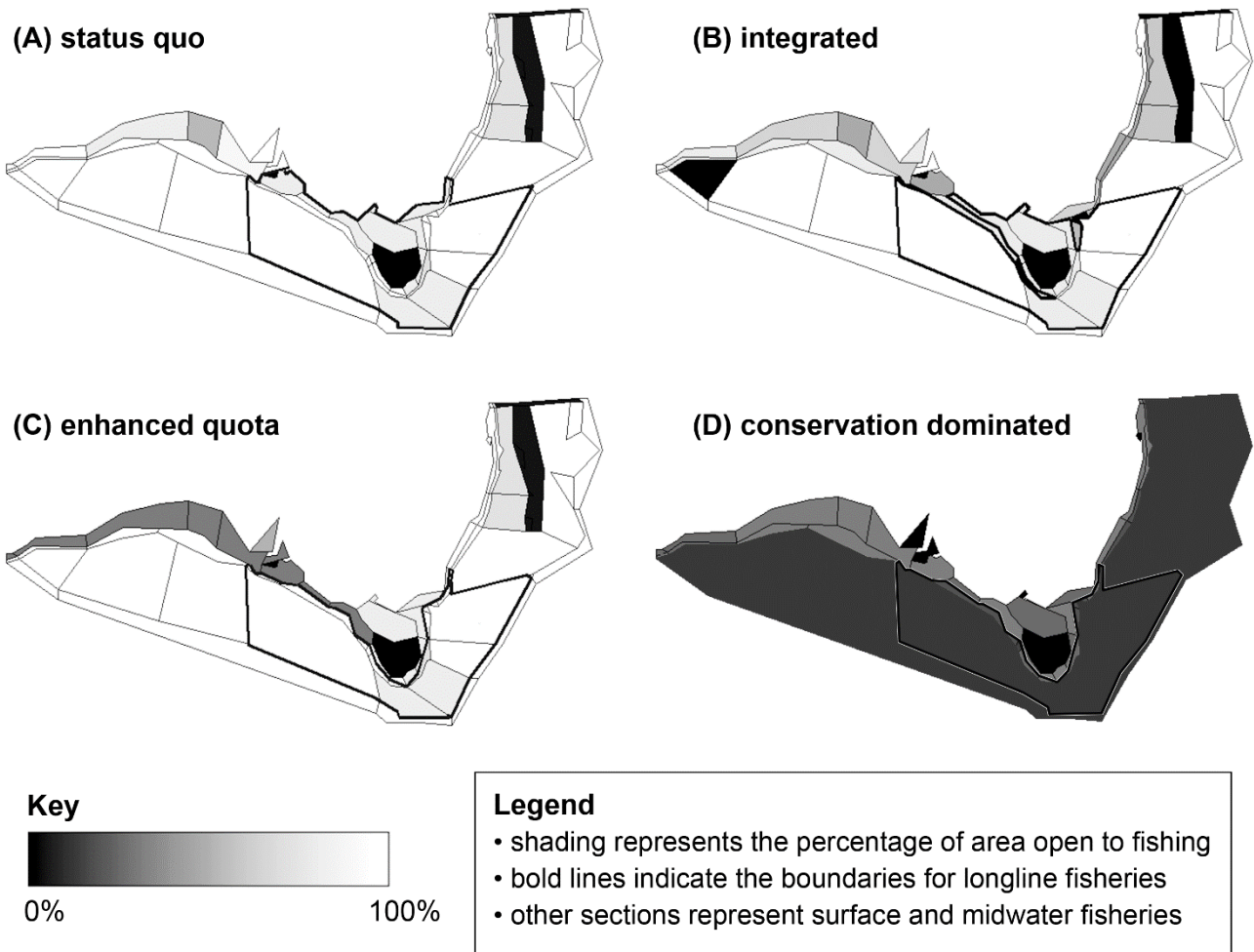
These boundaries represent the

- (A) territorial sea.
- (B) contiguous zone.
- (C) continental shelf.
- (D) Australian fishing zone.

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QUESTION 2

Maps of four different spatial management strategies are shown below.



Select the management strategy that depends on the most extensive use of spatial monitoring.

- (A) status quo
- (B) integrated
- (C) enhanced quota
- (D) conservation dominated

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QUESTION 3

An experiment was conducted exposing the coral *Montipora tuberculosa* to realistic levels of organically enriched (OE) water and heat stress for 90 days.

At the conclusion of the recovery period, it was found that:

- 100% of the coral exposed to OE water at 25 °C survived
- 56% of the coral exposed to OE water at 31 °C survived.

Using Shelford's law of tolerance, select the condition set that best describes the exposure of the coral *Montipora tuberculosa* to OE water at 31 °C.

- (A) maximum
- (B) minimum
- (C) optimum
- (D) stable

QUESTION 4

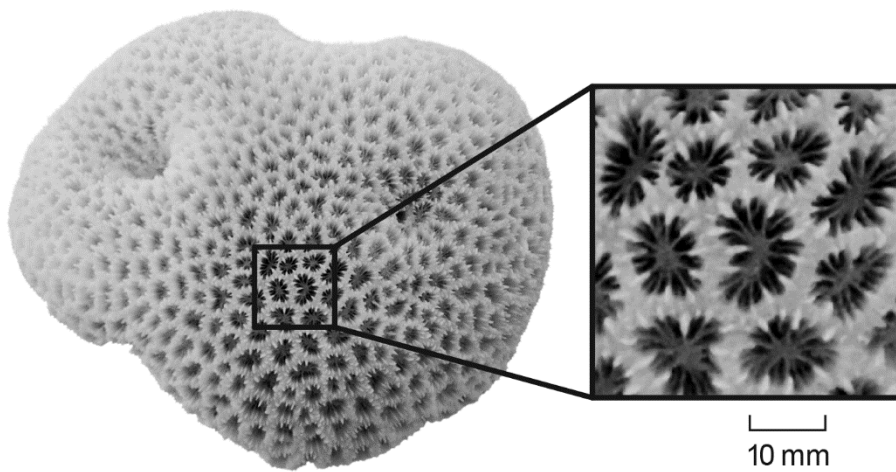
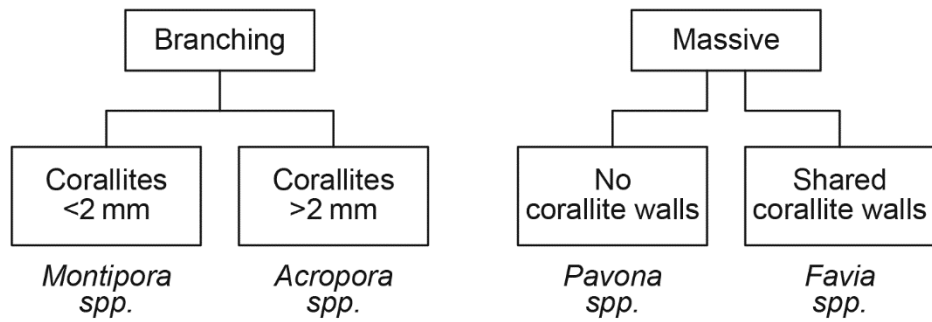
An inshore reef near a highly populated area experienced increased levels of coastal runoff. The long-term reduction in coral cover experienced by the reef was most likely caused by an increased

- (A) availability of light.
- (B) population of macroalgae.
- (C) frequency of coral disease.
- (D) frequency of bleaching susceptibility.

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QUESTION 5

Coral identification key



The coral identification key correctly classifies the coral specimen shown into the genus of

- (A) *Favia*.
- (B) *Pavona*.
- (C) *Acropora*.
- (D) *Montipora*.

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QUESTION 6

Approximately 20% of calcium carbonate produced in the ocean falls onto portions of the sea floor above the carbonate saturation horizon. The remainder, which falls below the horizon, would be

- (A) saturated.
- (B) dissolved.
- (C) preserved.
- (D) accumulated.

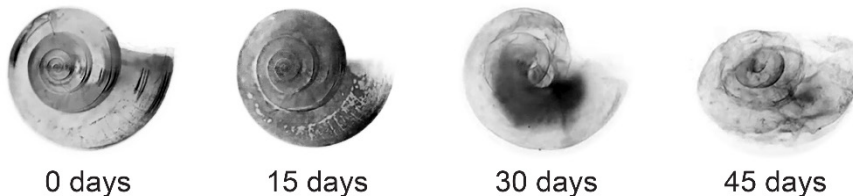
QUESTION 7

Which of the following issues is **not** associated with aquaculture?

- (A) biosecurity
- (B) waste removal
- (C) output pollution
- (D) overexploitation

QUESTION 8

The figures below show the time sequence of a shell-based planktonic organism.



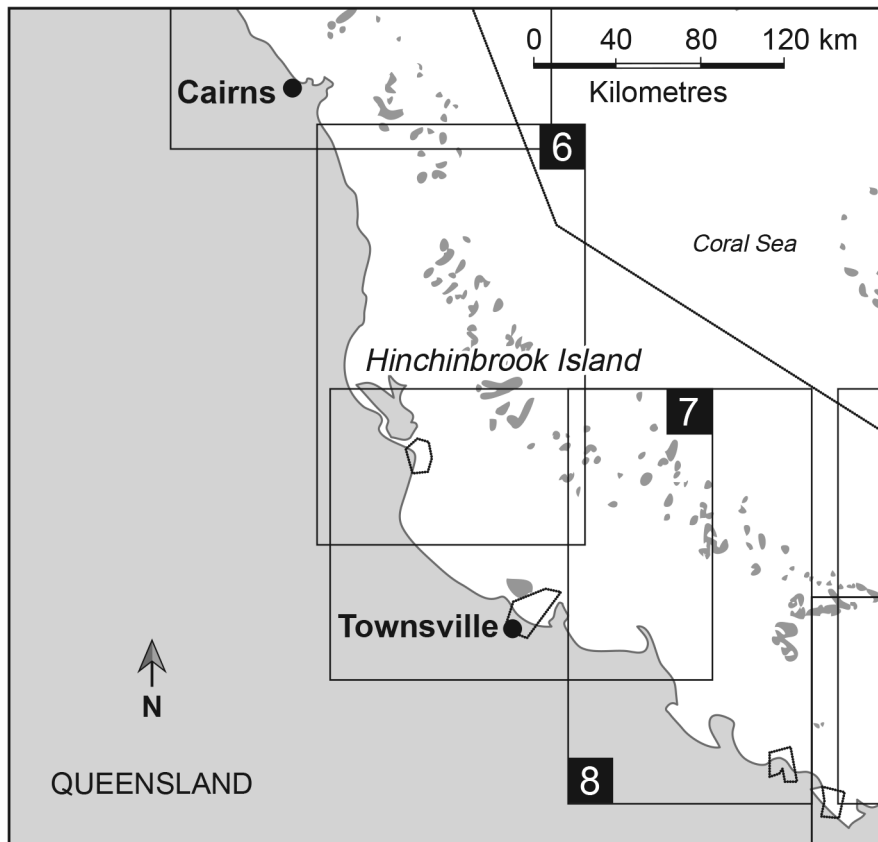
Identify which factor most likely caused the change in the shell.

- (A) ocean pollution
- (B) global warming
- (C) ocean acidification
- (D) declining water quality

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QUESTION 9

The figure below shows a management strategy used to support ecosystem health.



The strategy shown is

- (A) threat management.
- (B) zoning management.
- (C) longitudinal monitoring.
- (D) plan-based management.

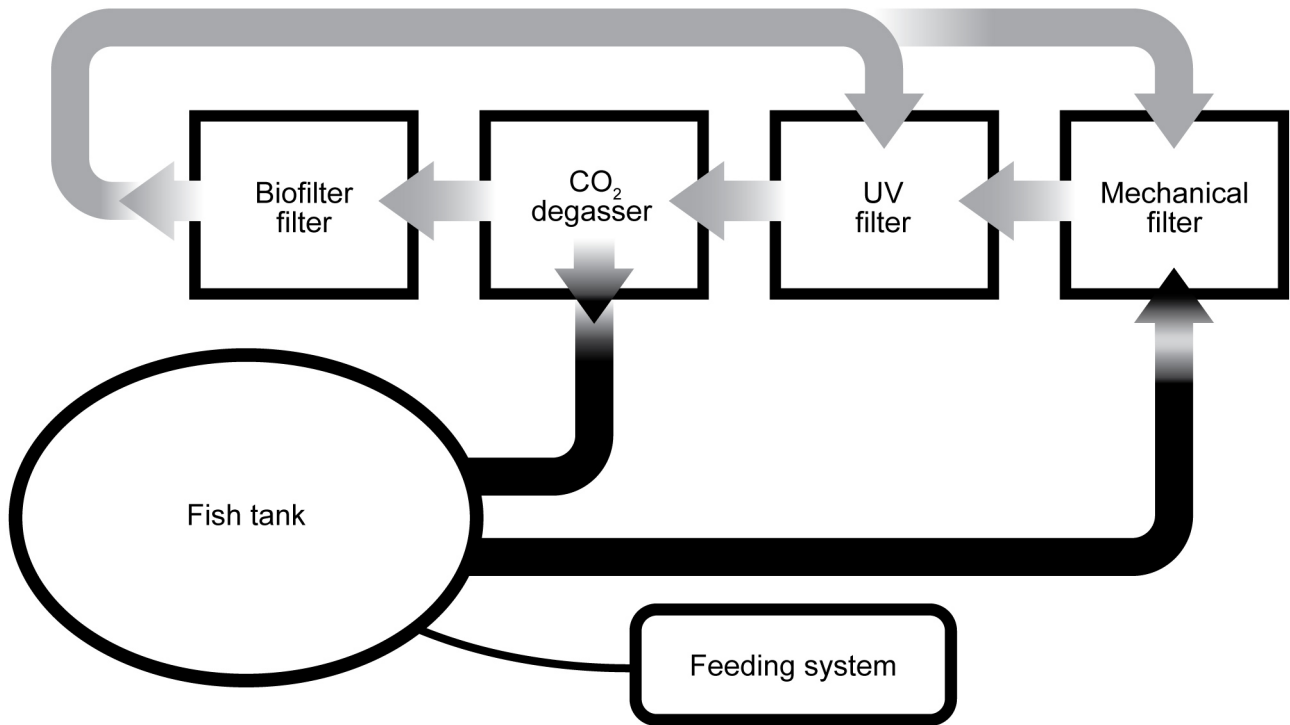
QUESTION 10

Select the list of criteria used to design Australia's marine protected areas.

- (A) connectivity, fish population numbers
- (B) connectivity, coverage and networking
- (C) aesthetic value, fish population numbers
- (D) aesthetic value, coverage and networking

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QUESTION 11



When contrasted with an open aquaculture system, the system shown above results in

- (A) lower mortality rates.
- (B) higher economic costs.
- (C) lower introduction of pathogens.
- (D) higher capacity to control water quality.

QUESTION 12

Artisanal and small-scale fisheries are characterised by

- (A) low levels of annual catch for human consumption.
- (B) high levels of capital and energy.
- (C) low levels of sea life discard.
- (D) high levels of subsidy.

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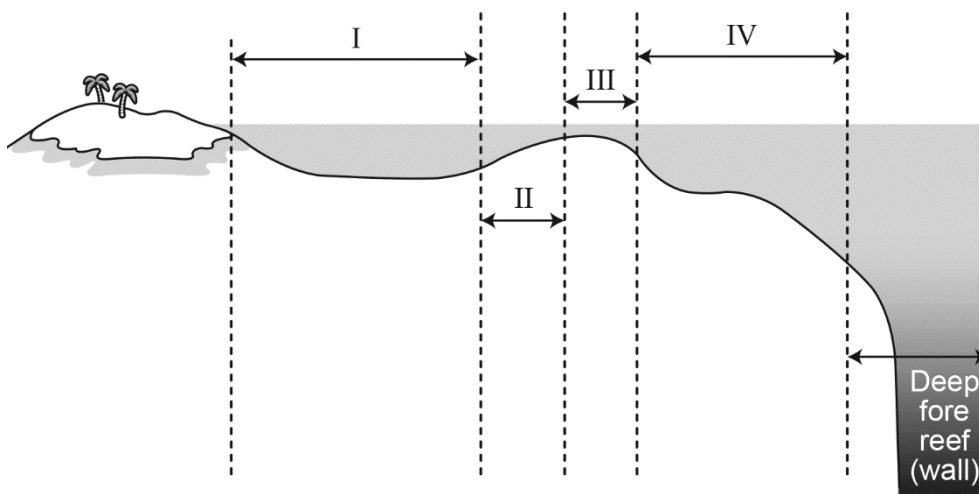
QUESTION 13

Which option describes the correct order of the sexual life cycle of typical reef-forming hard coral?

- (A) polyp, planulae, gametes, zygotes
- (B) gametes, polyp, planulae, zygotes
- (C) gametes, zygotes, planulae, polyp
- (D) zygotes, polyp, planulae, gametes

QUESTION 14

The figure below shows a cross-section of a reef.



Identify the back reef.

- (A) I
- (B) II
- (C) III
- (D) IV

QUESTION 15

Which of the following, if increased, would have the most widespread impact on the distribution of coral?

- (A) number of flood events
- (B) sea surface temperatures
- (C) land-based sources of pollution
- (D) crown-of-thorns starfish presence

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QUESTION 16

Select the potential consequence of ocean acidification for coral reef systems.

- (A) bleaching of coral
- (B) decreased algal production
- (C) reduced dispersal of coral larvae
- (D) destruction of coral reef structures

QUESTION 17

A recent study found that 63% of butterfly fish were observed to be perched on, or sheltered within, live corals. From this information, corals are habitat

- (A) formers.
- (B) modifiers.
- (C) responders.
- (D) determiners.

QUESTION 18

Select the option that would have the greatest impact on increasing marine fish stocks.

- (A) banning bottom trawling
- (B) reducing coastal pollution
- (C) improving governance and enforcement
- (D) increasing the number of marine protected areas

QUESTION 19

Which abiotic factors have determined the distribution of corals over the past 6000 years?

- (A) light availability, salinity
- (B) light availability, suitable substrate
- (C) average sea surface temperatures, salinity
- (D) average sea surface temperatures, suitable substrate

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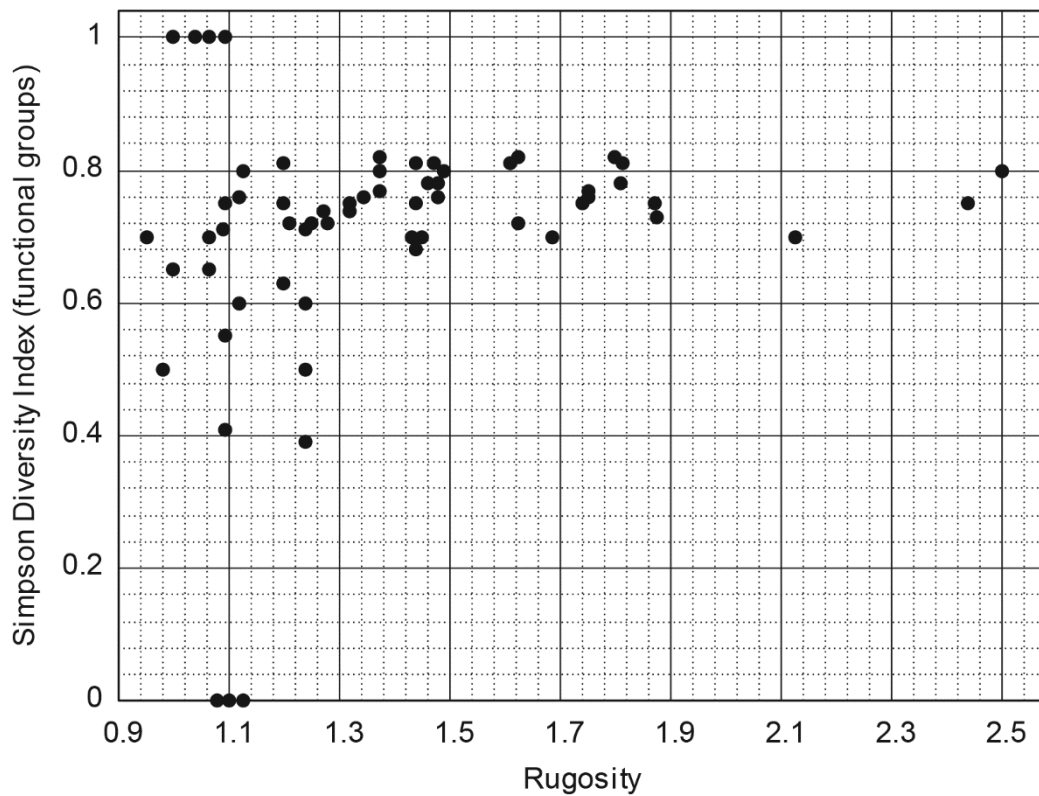
QUESTION 20

Which arguments would be used to provide the strongest evidence for mangrove conservation from an ecocentric perspective?

- (A) economic and social
- (B) ecological and social
- (C) aesthetic and economic
- (D) aesthetic and ecological

QUESTION 21

The graph below shows the results of a reef survey.



The graph suggests that habitat rugosity between 1.22 and 2 supports

- (A) lower levels of functional group diversity.
- (B) greater levels of functional group diversity.
- (C) optimal levels of functional group diversity.
- (D) stabilised levels of functional group diversity.

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QUESTION 22

Oysters were exposed to increasing levels of a heavy metal over 35 days. The table below shows the nanograms of heavy metal per gram of dry weight oyster tissue.

Days after exposure	Treatment level			
	Very low	Low	Medium	High
3	2	5	6	4 000
7	2	7	10	4 000
14	2	10	28	4 500
21	2	15	35	5 000
28	2	20	40	10 000
35	2	21	42	12 500

At which exposure level could this species best be used to show bioaccumulated heavy metal levels?

- (A) high
- (B) medium
- (C) low
- (D) very low

QUESTION 23

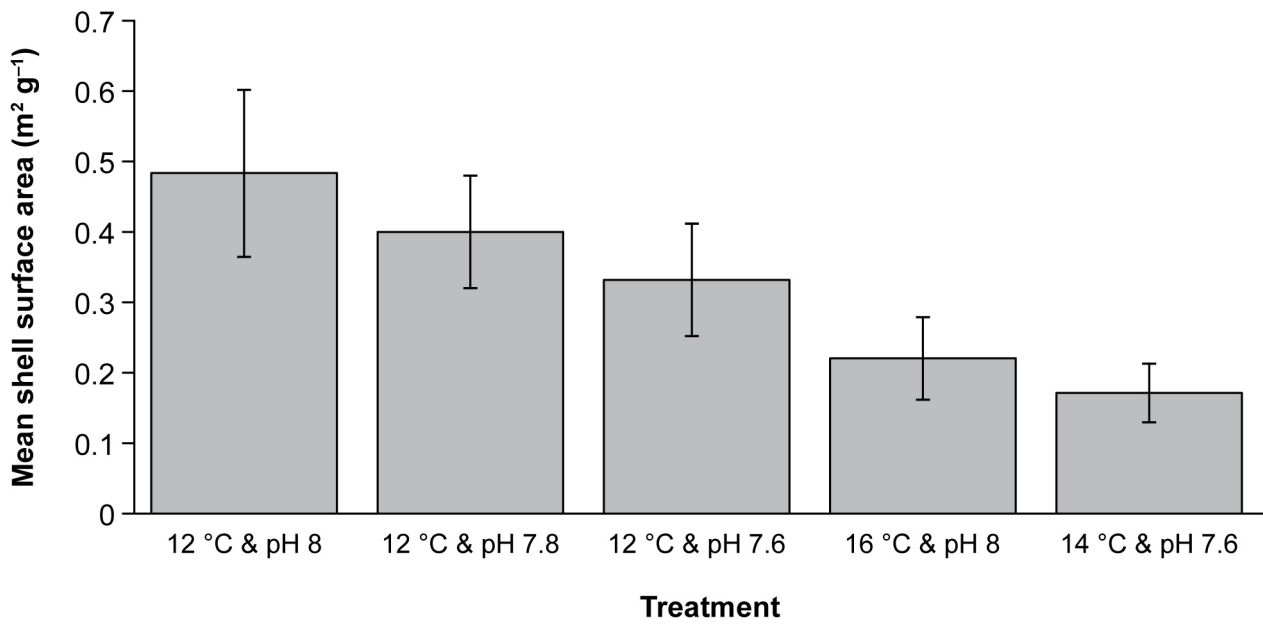
Which of the following is **not** a central component to the precautionary principle of ecosystem management?

- (A) decreasing public participation in decision-making
- (B) exploring a wide range of alternatives to harmful actions
- (C) shifting the burden of proof to those who caused the activity
- (D) taking preventive action when scientific knowledge is uncertain

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QUESTION 24

Under experimental conditions the blue mussel, *Mytilus edulis*, was exposed to five treatment conditions.



From the figure above, which factor causes the greatest negative impact on the mean shell surface area?

- (A) 14 °C
- (B) 16 °C
- (C) pH 7.6
- (D) pH 7.8

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QUESTION 25

The figure shows a sample of coral found on a reef.



Select the group of coral represented by the figure.

- (A) soft
- (B) hard
- (C) brain
- (D) sea fan

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References

Question 1

Map adapted from ‘Australian Fishing Zone showing the location of Commonwealth fisheries’ © Australian Fisheries Management Authority’. Used with permission.

Question 2

Figure derived from Fulton, E, Smith, A, Smith, D & Johnson, P 2014, ‘An integrated approach is needed for ecosystem based fisheries management: Insights from ecosystem-level management strategy evaluation’, *PLOS One*, vol. 9, no. 1, <https://dx.doi.org/10.1371/journal.pone.0084242>.

Question 5

Figure derived from Kinkreet 2013, <https://w.wiki/5TQ>.

Question 8

Image derived from image that was originally from NOAA, https://commons.wikimedia.org/wiki/File:Pteropod_shell_dissolved_in_seawater_adjusted_to_an_ocean_chemistry_projected_for_the_year_2100.jpg.

Question 9

Figure derived from Great Barrier Reef Marine Park Authority 2009, Zoning Map Extents (2010) (v1.0) [Dataset] 78A0B79C-FACE-422B-A62F-C57A343BC721. Retrieved from <http://www.gbrmpa.gov.au/geoportal>. Licensed under CC BY 4.0, <https://creativecommons.org/licenses/by-sa/4.0>.

Question 11

Figure derived from Land Based Aquaculture Assessment Framework 2018, *AKVA split loop RAS system*, www.lbaaf.co.nz/land-based-aquaculture/intensive-recirculating-aquaculture-systems-ras-.

Question 14

Figure derived from National Oceanic and Atmospheric Administration 2017, ‘How do coral reefs form?’, *NOS Education*, https://oceanservice.noaa.gov/education/tutorial_corals/media/supp_coral04b.html.

Question 21

Graph derived from Ding, B, Curole, J, Husemann, M & Danley P 2014, ‘Habitat complexity predicts the community diversity of rock-dwelling cichlid fish in Lake Malawi, East Africa’, *Hydrobiologia*, www.researchgate.net/figure/Scatterplots-of-Simpson-diversity-and-rugosity-at-a-the-species-and-b-the-functional_fig1_263175421.

Question 22

Data adapted from Abdou, M et al. 2018, ‘Tracing platinum accumulation kinetics in oyster *Crassostrea gigas*, a sentinel species in coastal marine environments’, *Science of the Total Environment*, vol. 615, pp. 652–663, www.ncbi.nlm.nih.gov/pubmed/28992492.

Question 24

Graph derived from Mackenzie, C et al. 2014, ‘Ocean warming, more than acidification, reduces shell strength in a commercial shellfish species during food limitation’ *PLOS One*, vol. 9, no. 1, <https://doi.org/10.1371/journal.pone.0086764>.

Question 25

Figure inspired by Adapted from Figueroa Guzmán, J 2015, ‘Contribución al conocimiento de la fauna de octocorales (Octacorallia: Gorgonidae) en el Arrecife Rocosos del Islote los Ahorcados, Ayampe, Manabí-Ecuador’ (PhD thesis), Universidad Laica Eloy Alfaro de Manabí, Manta, www.researchgate.net/publication/282649869.

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