SI Environmental Science - Full Discipline Demo

Oceans and Coasts

Final Report - Answer Guide

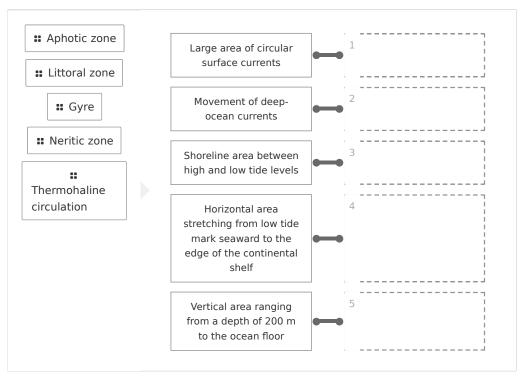
Institution Science Interactive University

Session SI Environmental Science - Full Discipline Demo
Course SI Environmental Science - Full Discipline Demo

Instructor Sales SI Demo

Test Your Knowledge

Match each term to the best description.



Correct answers:

- 1 Gyre 2 Thermohaline circulation 3 Littoral zone 4 Neritic zone
- 5 Aphotic zone

Classify each statement as true or false.

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Rocky coastlines located inside lagoons are more at risk to erosion than sandy, barrier island coastlines.

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The Coastal Vulnerability Index is a rating system used to assess the risks of coastlines from rising sea levels.

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Coastlines with higher overall CVI values are more susceptible to erosion and flooding than coastlines with lower values.

** Only coastlines in the tropics are threatened by coastal erosion.

Tr	ue	False
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Correct answers:

1

Coastlines with higher overall CVI values are more susceptible to erosion and flooding than coastlines with lower values.

The Coastal Vulnerability Index is a rating system used to assess the risks of coastlines from rising sea levels.

2 Only coastlines in the tropics are threatened by coastal erosion.

Rocky coastlines located inside lagoons are more at risk to erosion than sandy, barrier island coastlines.

Exploration



	Deep-ocean currents are driven by differences in	
	 wind speeds 	
	water density	✓
	orotational forces	
	air temperatures	
	The Coastal Vulnerability Index evaluates undeveloped coastlines based variables.	d on
	o four	
	five	
	six	✓
	seven	
	Many species in the ocean reside permanently in the zone or visit in obtain food or sunlight energy.	it to
	aphotic	
	littoral	
	intertidal	
	epipelagic	~
Exerc	cise 1	
	ype of surface ocean currents are Assateague Island and Goosefare Bay e what direction do they flow? Reference the location of each site in your ex	
Atlant	eague Island and Goosefare Bay are exposed to warm surface currents from the ic gyre. Both sites are located on the Atlantic coast of North America. The currer vise, northerly direction, transferring heat from the tropics to each location.	North nts flow in a



the coa	study site from this exercise experienced the highest rate of coastal erosion? How is stal erosion rate related to Coastal Vulnerability rankings? Reference Data Table 1 in planation.
	Assateague Island has experienced more coastal erosion in the past than Goosefare Bay as recorded in Data Table 1. Higher erosion rates result in the assignment of higher coastal vulnerability ranking values. Assateague Island has a CVI ranking value of 5 for coastal erosion rate whereas Goosefare Bay has a value of 3 as recorded in Data Table 1.
Goosefa	on the calculated overall Coastal Vulnerability Index, is Assateague Island or are Bay predicated to be at a higher risk of future coastal flooding? Reference Data in your explanation.
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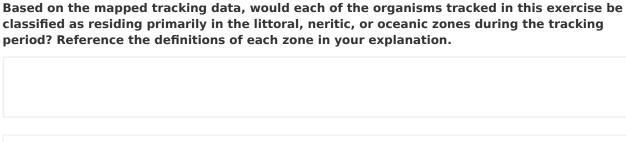
Data Table 1: Coastal Vulnerability Variables and Rankings $({\sf SAMPLE}\ {\sf ANSWER}\ {\sf BELOW})$

(SAMEL ANSWER BELOW)				
Variable	Assateague Island value	Assateague Island ranking	Goosefare Bay value	Goosefare Bay ranking
(a) Coastline type	Barrier island	5	Indented coast	2
(b) Coastal slope (%)	0.13	2	0.39	1
(c) Mean wave height (m)	1.2	4	1.1	4
(d) Mean tide range (m)	0.64	5	2.78	3
(e) Relative sea level change (mm/yr)	5.15	5	1.87	2
(f) Erosion/accretion rate (m/yr)	-4.1	5	0.19	3

Data Table 2: Assateague Island and Goosefare Bay CVI (SAMPLE ANSWER BELOW)

(SAMPLE ANSWER BELOW)	
Location	CVI
Assateague Island	28.9
Goosefare Bag	4.9

Exercise 2



Each of the organisms tracked in this exercise would be classified as residing primarily in the oceanic zone during the tracking period because the majority of each organism's tracks occurred in the open North Pacific Ocean between the west coast of North America and the Hawaiian Islands. The littoral zone includes the distance between low and high tides, the neritic zone occurs above the continental shelf, and the oceanic zone stretches across the open ocean beyond the continental shelves.

Based on depth data, would each of the organisms tracked in this exercise be classified as vertically migrating primarily through the epipelagic or aphotic zones? Reference the definitions of each zone and Data Table 3 in your explanation.

The great white shark migrated primarily within the epipelagic zone, which extends from the ocean surface to a depth of -200 m. The average tracking depths for the white shark were -179 m. The bluefin tuna and elephant seal migrated primarily in the aphotic zone, which extends from a depth of -200 m to the ocean floor. The average depth for the tuna was -311 m and the average depth for the seal was -342 m as recorded in Data Table 3. The Laysan albatross was tracked mostly above the water surface with a positive average depth of 7.85 m, as recorded in Data Table 3, and was not tracked within either the epipelagic or aphotic zones.

Data Table 3: Marine Animal Migrations

(SAMPLE ANSWER BELOW)

(SAMI) EE AMSWER BEESTI)		
Animal	Maximum daily depth range (m)	Average depth (m)
Elephant seal	-125 to -715	-341.79
Bluefin tuna	-60 to -480	-310.85
Laysan albatross	0 to 30	7.85
Great white shark	0 to -730	-179.40

Competency Review



Surface currents are driven by and the earth's rotation.	
• heat	
winds	✓
water density	
sound waves	
Gyres rotate clockwise in the Northern Hemisphere.	
○ True	~
■ False	
Coastal erosion is caused by	
 strong waves 	
high tides	
storm surges	
All of the above	✓
Coastal slope (%) is a variable in the Coastal Vulnerability Index.	
○ True	~
False	
The zone contains shoreline that is sometimes under water and sometimes exposed.	
aphotic	
neritic	
○ littoral	~
oceanic	



The highest diversity of marine life occurs in the neritic zone that overlays the continental shelf.	
○ True	
○ False	
Assateague Island has a lower overall CVI value than Goosefare Bay.	
True	
○ False ✓	
Tracking data suggests that migrate through the oceanic zone of the North Pacific Ocean.	
great white sharks	
bluefin tuna	
elephant seals	
All of the above	

Extension Questions

A developer is searching for a location to build a coastal resort that will offer guests year-round snorkeling, swimming, and beach activities with a low risk of flooding and erosion. Apply your knowledge of oceans and coasts to provide the developer with location suggestions to meet their goals. Include the parameters of water currents, coast exposure, and water depth in your explanation. (SAMPLE ANSWER BELOW)

The developer should select a location that receives warm surface currents that transport heat from the tropics to allow for year-round water access for guests. The coastline should be protected from open ocean waves by being located in a bay or lagoon to both reduce the chances of flooding and result in calmer water conditions for guests to swim and snorkel. A beach consisting of sand or small gravel with promote a variety of beach activities compared to a rocky coastline. A location should also be chosen that is outside the path of tropical storms, which frequently result in erosion and flooding. The location should have a gentle-sloping continental shelf that will create an expansive neritic zone rich in ocean life, including numerous fish and coral species, for guests to observe while snorkeling.