INFORMATIONAL READING COMPREHENSION:

Sustaining the World With Seaweed

Read the passage and answer the questions that follow.

1 Despite the name, seaweed is not actually a weed! The plant-like marine organisms collectively referred to as "seaweed" are actually beneficial algae. Because many species of these macro-algae are edible and quite nutritious, they are often referred to as sea vegetables. But seaweed is more than a food sometimes used to flavor soups and wrap sushi. Many scientists believe that seaweed could be the key to solving some of the world's most pressing problems. If cultivated and used wisely, seaweed could not only feed the world's growing population but also help us reduce pollution and maintain a healthy balance of the gases in Earth's atmosphere. Seaweed could serve as a source of environmentally friendly consumer products and meaningful jobs.

2 **Seaweed as Superfood.** The world's human population is currently growing by tens of millions of people each year. As the population continues to expand, we will need to be able to produce sustainable, healthy foods to feed everyone. Furthermore, we will need to do so with less land and fewer resources to go around. Seaweed can be a big part of the solution. Seaweed grows fast, and it is rich in healthy protein, vitamins, minerals, and fiber. And growing seaweed doesn't require the use of harmful pesticides, fertilizers, fresh water, or—perhaps most significantly—land! Researchers have estimated that ocean seaweed gardens covering around 180,000 total kilometers—the approximate size of the state of Washington—could likely feed the world.

3 Seaweed is not just a food source for people, though. Seaweed is an excellent source of nutrition for all types of animals, many of which provide food for humans, too. In fact, seaweed provides both food and habitat for many species of fish. Healthy "forests" of seaweed help sustain fisheries that people rely on for both food and jobs. Furthermore, seaweed is a nutritious supplement that can be added to livestock feed. Studies have shown that mixing seaweed into feed for cattle and sheep can reduce their production of methane gas by 99 percent, which in turn significantly decreases the amount of this heat-trapping gas in the atmosphere.

4 **Help From Kelp.** Methane is just one heat-trapping gas that seaweed can help reduce. Carbon dioxide (CO_2), a greenhouse gas that stays in the atmosphere much longer than methane, can be absorbed and kept out of the atmosphere by a giant seaweed called kelp. Kelp forests grow near rocky shorelines. Like forests of trees on land, marine kelp forests need CO_2 to grow and produce their own food through a process called photosynthesis. But kelp grows much faster than trees—as much as two feet per day! So kelp absorbs, or captures, a lot of carbon dioxide while it grows. Even more importantly, it keeps the CO_2 out of the atmosphere for a long time—much longer than trees. When trees die, they quickly release carbon dioxide back into the atmosphere. But much of the carbon from decaying kelp is carried away and buried deep in the ocean. This process happens in two ways.

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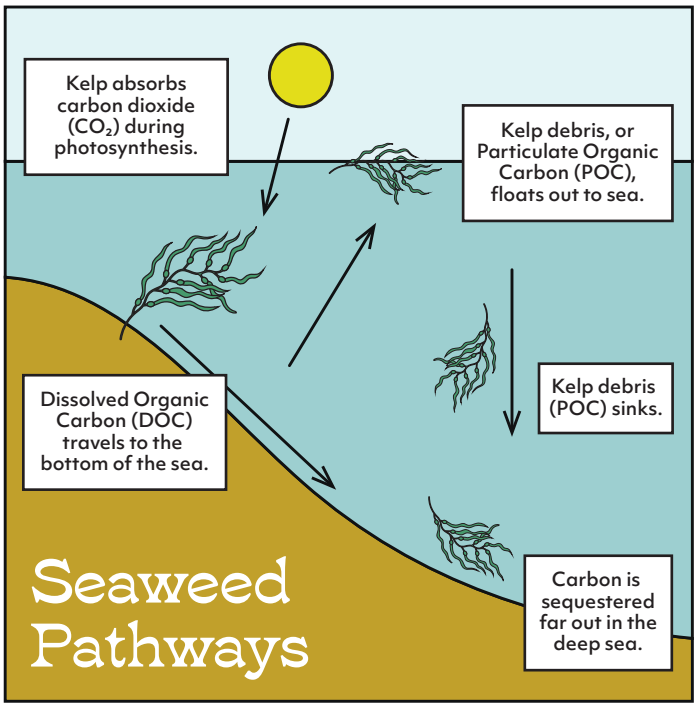
5 First, tiny particles of carbon are dissolved in the water surrounding the kelp. This "Dissolved Organic Carbon" (DOC) is carried away by waves and currents. It descends and settles on the bottom of the ocean. At the same time, larger pieces of kelp debris, called "Particulate Organic Carbon" (POC), float out to sea on the surface of the ocean, buoyed by air-filled pockets called bladders. The air pockets on the kelp fronds eventually burst, and the POC sinks to the bottom, far away from shore and deep in the ocean. Here, it is sequestered, or kept away from the atmosphere, for hundreds or even thousands of years. Many scientists now believe that seaweed is the best way to capture and remove surplus carbon dioxide from the atmosphere.



6 **A Sampling of Seaweed Solutions.** People are taking notice of these and other potential benefits of growing seaweed. While **seaweed aquaculture** is a long-standing tradition throughout Asia, seaweed farms are now popping up in coastal areas around the world. You can now find gardens of seaweed growing in places like Ireland, Canada, Chile, and the United States. These farms create much-needed jobs in coastal areas hit hard by declining fisheries. And people are finding more and more uses for this super-crop, creating even more jobs across many different industries. Seaweed has commercial uses not only in the food industry, but also in the cosmetic and pharmaceutical industries. In other industries, seaweed could be used to produce environmentally friendly biofuels and biodegradable alternatives to plastics. Seaweed has also shown promise as an effective way to treat and purify wastewater. It can naturally remove toxic pollutants from sewage systems and industrial runoff. In these ways, seaweed can help people and industries thrive without causing lasting damage to the environment.

7 The positive potential of seaweed aquaculture seems almost limitless. Even so, it's important to make sure that seaweed farming expands in a thoughtful, sustainable way that does not cause more problems than it solves. For instance, growing too much seaweed too close to shore could alter natural marine ecosystems in a way that harms existing species. Growing non-native species of seaweed, or just one kind, could have similar consequences. Additionally, people who rely on coastal regions for recreation or fishing could be negatively impacted if seaweed farms are not located strategically and managed properly. But with appropriate management and thoughtful growth, seaweed could be just the crop that sustains the world.

Commercial Applications of Seaweed

Food	human superfood; food for fish and livestock; fertilizer for food crops; "umami" flavor enhancer; thickening agents
Cosmetics	skin-care products; toothpastes; hair-care products; bath salts; spa treatments
Pharmaceuticals	anti-inflammatory medicines; treatments for diseases such as cancer, diabetes, arthritis, and hypertension; cold, cough, and stomach-upset medicines; burn treatments
Other Industries	wastewater cleanup, biofuels, plastic alternatives

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Answer the following questions about "Sustaining the World With Seaweed."

1. **Part A: Which statement best represents the author's point of view as expressed in the passage?**

   A. Without seaweed, marine animals would no longer be able to survive in the wild.

   B. Seaweed could play an important role in solving many of the world's problems.

   C. People need to stop harvesting seaweed because it is destroying the oceans.

   D. Seaweed is the only food that people really need in order to survive and be healthy.

   Part B: List three central ideas the author presents to support the above point of view.

   A. _____

   B. _____

   C. _____

2. **Based on information in the "Seaweed as Superfood" section of the text, describe the advantages of seaweed as a source of human food.**

   _____

   _____

   _____

   _____

3. **Based on information in the "Help From Kelp" section, why do marine kelp forests likely outperform land forests in removing CO_2 from the atmosphere? Choose all that apply.**

   A. Because they grow faster, kelp forests absorb CO_2 from the atmosphere at a faster rate than an equal acreage of trees.

   B. There are more kelp forests in all the oceans than there are tree forests on all the continents of the world.

   C. Kelp lives much longer than trees, so it holds onto its absorbed CO_2 for a longer period than trees do.

   D. The CO_2 from decaying kelp forests gets trapped, while the CO_2 from trees is quickly returned to the atmosphere.

   E. Marine animals that live in the kelp forests consume the CO_2 that is absorbed by the underwater kelp forests.

4. **Review the text and diagram in the "Help From Kelp" section of the passage. In your own words, summarize the process by which kelp removes and keeps CO_2 out of the atmosphere.**

   _____

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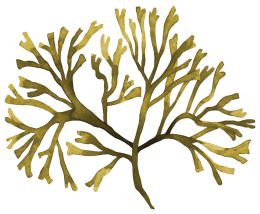

5. What is the meaning of seaweed aquaculture as it is used in paragraph 6?

A. the interactions among organisms in seaweed forests
B. the intentional cultivation of seaweed in ocean gardens
C. the harvesting of wild seaweed from marine environments
D. the traditional use of seaweed in many Asian foods

6. Name two problems discussed in "A Sampling of Seaweed Solutions." Then, describe at least one seaweed solution the author presents for each problem.

Problem	Seaweed Solution

7. Explain why the author likely included the table on page 2.

_____

_____

_____

8. Based on information in the table on page 2, what does the "pharmaceutical industry" mentioned in paragraph 6 most likely do?

A. trains doctors and nurses at hospitals
B. grows seaweed in gardens called "pharms"
C. provides clean, safe water to sick people
D. produces medicines to treat illnesses

9. According to the author, seaweed farming could have a positive impact on people living in coastal communities, but it could also have a negative impact if it is not done right. Describe a possible positive and a possible negative effect.

A. Possible positive effect: _____

B. Possible negative effect: _____

10. What is the likely reason that the author includes possible downsides of seaweed farming in the last paragraph?

A. The author wants to discourage people from planting seaweed gardens.
B. The author is restating the main points discussed in the passage.
C. The author wants people to take on seaweed farming in a careful manner.
D. The author is trying to persuade people to plant only certain types of seaweed.