Form	BA - 2, Science, Biology with ESS, SY 24-25
Identifier	F-6DDWOB_C15351

Item	I-SCI-F-S000055-SB2-Q1
Identifier	I-SCI-F-S000055
Standards	SCI.9-12.HS-LS4-5

Coral reefs are often called the "rainforests of the sea" due to their high biodiversity and importance in ocean ecosystems.

One of the significant environmental challenges coral reefs face today is ocean acidification, which occurs when the pH of the ocean decreases due to increased levels of carbon dioxide in the atmosphere dissolving into the water. This change in environmental conditions can have severe consequences for the survival of coral species.

What evidence would **BEST** support the claim that changes in environmental conditions lead to the emergence of new species over time?

- A Observation of new, acid-resistant coral species in areas affected by ocean acidification
- B A sudden decrease in the number of all coral species in an areaA sudden decrease in the number of all coral species in an area
- C No change in coral species despite environmental changes
- D Decreased biodiversity in all ocean ecosystems

Item	I-SCI-F-S000057-SB2-Q2
Identifier	I-SCI-F-S000057
Standards	SCI.9-12.HS-LS4-5

Coral reefs are often called the "rainforests of the sea" due to their high biodiversity and importance in ocean ecosystems.

One of the significant environmental challenges coral reefs face today is ocean acidification, which occurs when the pH of the ocean decreases due to increased levels of carbon dioxide in the atmosphere dissolving into the water. This change in environmental conditions can have severe consequences for the survival of coral species.

In the context of the passage, which factor is **most likely** to cause a shift in species distribution within coral reef ecosystems?

A The application of fertilizers

B Ocean acidification

C Deforestation

D Increased fishing activities

Item	I-SCI-F-S000058-SB2-Q3
Identifier	I-SCI-F-S000058
Standards	SCI.9-12.HS-LS2-7

A recent study conducted in Hawaii's diverse ecosystems has revealed the increasing occurrence of hybridization between endemic plant species and invasive plant species introduced by human activities. One specific example involves the native *Metrosideros polymorpha*, commonly known as ʻōhiʻa, which is a keystone species in Hawaii's forests. Due to the spread of the invasive strawberry guava (*Psidium cattleianum*), hybridization events between these two plant species have been observed in areas where the invasive species has encroached upon the natural habitats of the ʻōhiʻa tree. Researchers have noted that the hybrids often exhibit a mix of characteristics from both parent species, potentially impacting the genetic integrity of the native plant populations.

Metrosideros polymorpha

Psidium cattleianum

This phenomenon raises concerns about the long-term survival of endemic plant species in Hawaii and calls for the development of solutions to mitigate the effects of hybridization on biodiversity.

Which of the following solutions could help mitigate the effects of hybridization on Hawaii's native plant species?

A Introducing more non-native species to increase competition

B Creating protected areas to prevent the spread of invasive species

C Allowing hybridization to continue without intervention

D Promoting urbanization to reduce natural habitats

Item	I-SCI-F-S000059-SB2-Q4
Identifier	I-SCI-F-S000059
Standards	SCI.9-12.HS-LS2-7

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Metrosideros polymorpha

Psidium cattleianum

This phenomenon raises concerns about the long-term survival of endemic plant species in Hawaii and calls for the development of solutions to mitigate the effects of hybridization on biodiversity.

How might researchers refine their approach to protecting the genetic integrity of the native ʻōhiʻa tree?

A By completely eradicating the invasive strawberry guava

B By monitoring and controlling the spread of invasive species in critical habitats

C By encouraging the hybridization process

D By increasing urban development to restrict plant growth

Item	I-SCI-F-S000060-SB2-Q5
Identifier	I-SCI-F-S000060
Standards	SCI.9-12.HS-ESS2-7

In the world's oceans, coral reefs play a crucial role not only in providing habitats for marine life but also in shaping coastal ecosystems through a complex process of coevolution. Corals, which are marine invertebrates belonging to the class *Anthozoa,* have developed a unique mutualistic relationship with photosynthetic algae known as *zooxanthellae*. These algae live within the tissues of the coral and provide them with essential nutrients through photosynthesis, while the coral provides the algae with a protected environment and compounds necessary for photosynthesis. This symbiotic relationship not only benefits the corals but also leads to the formation of massive reef structures that alter the physical and chemical dynamics of coastal areas.

Coral reefs function as natural barriers that protect coastlines from erosion by reducing the energy of incoming waves. The complex structures created by corals help dissipate wave energy, preventing damage to shorelines and reducing the risk of coastal flooding. In turn, the presence of coral reefs influences the patterns of sedimentation and erosion along coasts, shaping the physical geography of these areas over time. Furthermore, the intricate network of reefs provides diverse habitats for a wide range of marine species, contributing to the rich biodiversity of coastal ecosystems.

As corals grow and expand their colonies, they secrete calcium carbonate, a substance that contributes to the formation of the rocky structure characteristic of coral reefs. Over time, this process of calcium carbonate deposition leads to the construction of extensive reef systems that serve as hotspots of biological productivity and biodiversity. The evolution of corals and their symbiotic relationships with other organisms have not only transformed coastal landscapes but have also influenced the evolution of new life forms adapted to these unique environments.

How has the coevolution of corals and their symbiotic algae transformed coastal landscapes?

- A By decreasing biological productivity in coastal ecosystems
- B By reducing the formation of soil in coastal regions
- C By creating extensive reef systems that shape the physical geography
- D By preventing the growth of other marine organisms

Item	I-SCI-F-S000061-SB2-Q6
Identifier	I-SCI-F-S000061
Standards	SCI.9-12.HS-ESS2-7

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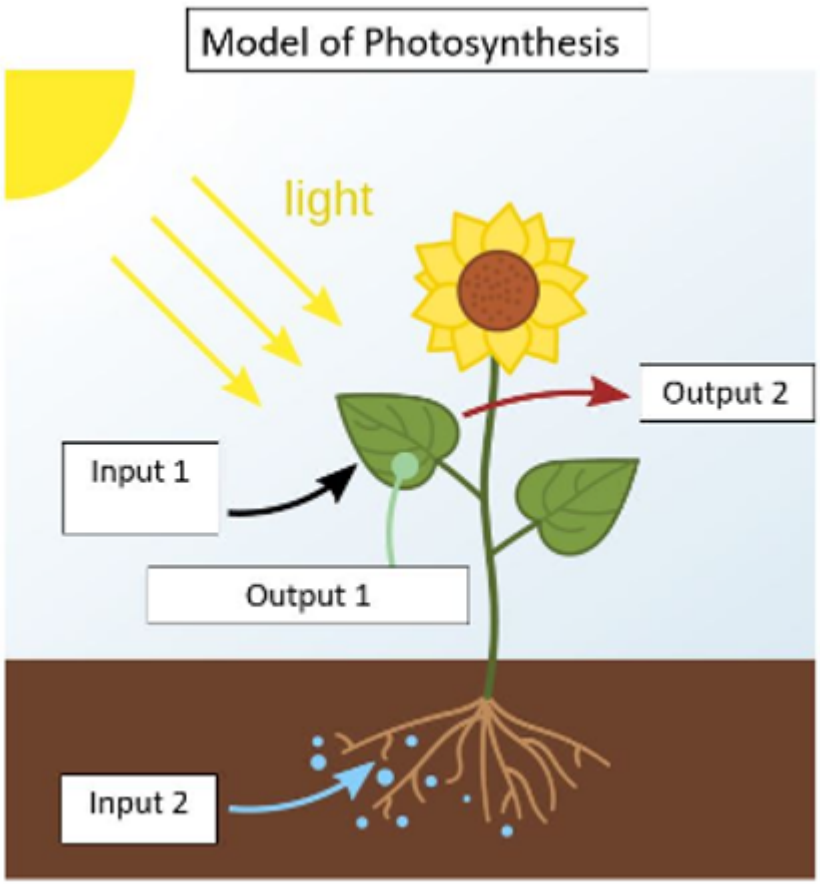
What is one way in which the presence of coral reefs influences coastal ecosystems?

- A They decrease the amount of calcium carbonate in the ocean.
- B They increase the rate of coastal flooding.
- C They reduce the diversity of marine life in coastal areas.
- D They alter patterns of sedimentation and erosion along coasts.

Item	I-SCI-F-S000062-SB2-Q7
Identifier	I-SCI-F-S000062
Standards	SCI.9-12.HS-LS1-5

Shenshen has been studying the process of photosynthesis in plants. As a class assignment, she is asked to develop a diagrammatic model of photosynthesis at the macroscale level. She made the following:



Which of the following identification of inputs and outputs **BEST** shows what is occurring in the system?

A	Inputs: Water and carbon dioxide	Outputs: Glucose and oxygen
B	Inputs: Oxygen and sunlight and	Outputs: Carbon dioxide and water
C	Inputs: Water and Oxygen	Outputs: Chloroplasts and glycogen
D	Inputs: Sunlight, air, and fertilizer	Outputs: Proteins and lipids

Item	I-SCI-F-S000064-SB2-Q8
Identifier	I-SCI-F-S000064
Standards	SCI.9-12.HS-LS1-5

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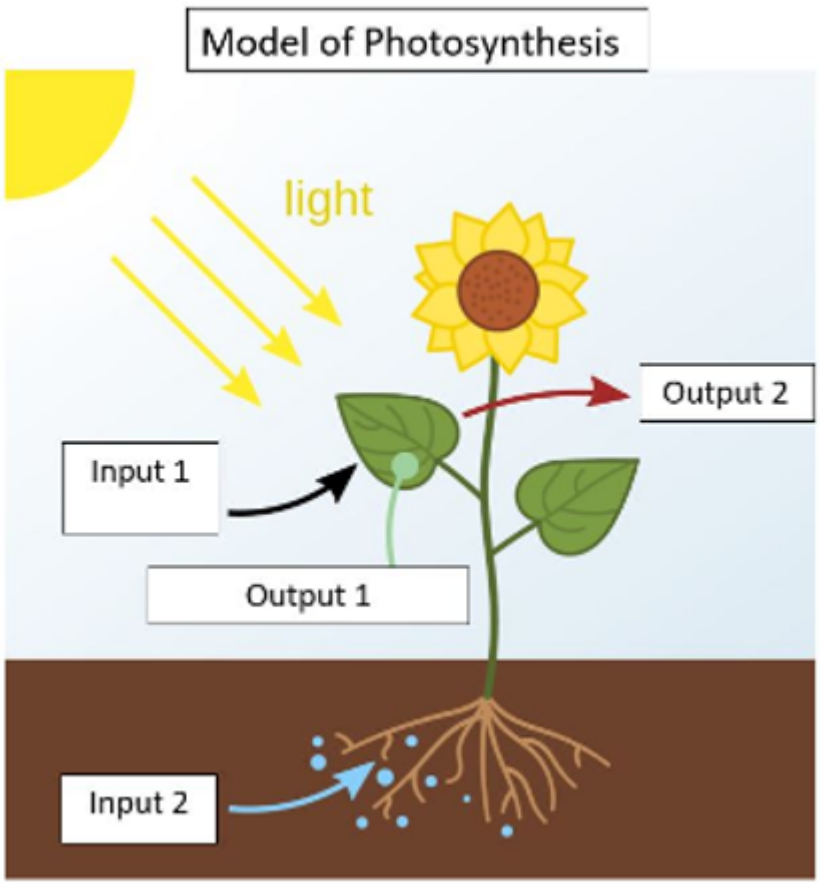


Which of the following is the primary input of matter for the process of photosynthesis in plants?

A Oxygen and glucose

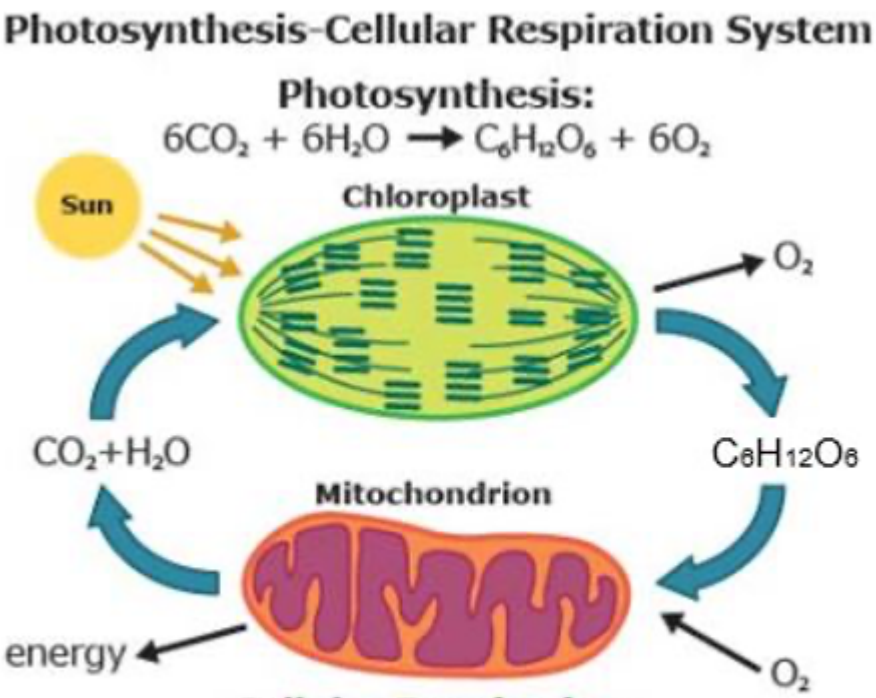
B Carbon dioxide and water

C Nitrogen and hydrogen

D Methane and ammonia

Item	I-SCI-F-S000065-SB2-Q9
Identifier	I-SCI-F-S000065
Standards	SCI.9-12.HS-LS2-3

Below is a diagrammatic model of the Photosynthesis – Cellular Respiration System



Using the diagrammatic model provided, which statement **BEST** describe the role of energy in the Photosynthesis – Cellular Respiration System?

A Energy that is not released through cellular respiration is destroyed.

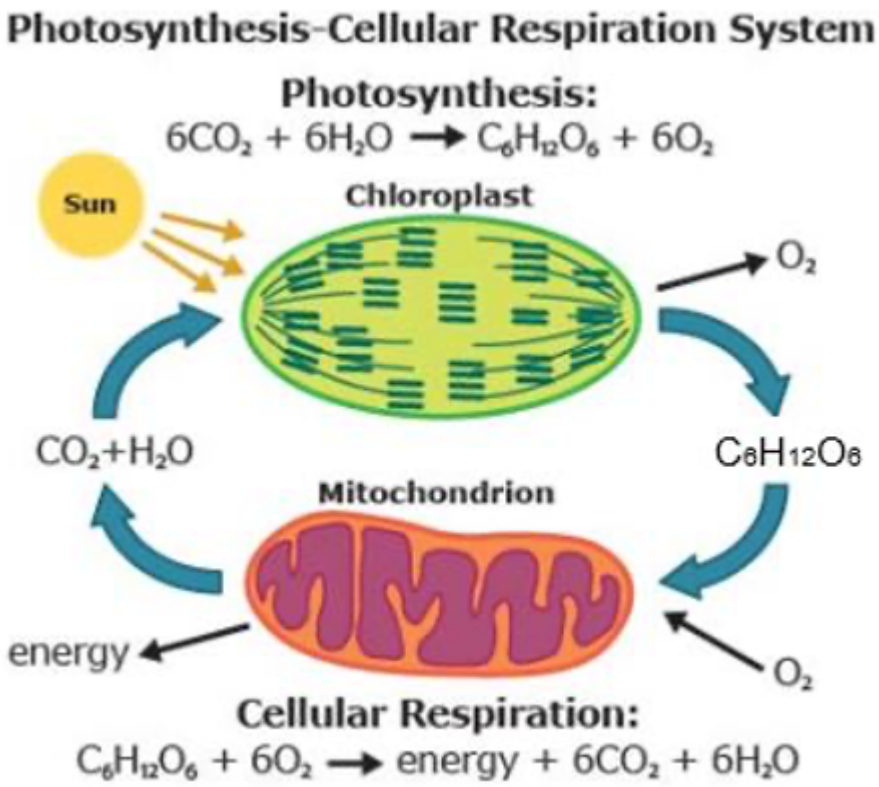
B Energy is created by the chloroplasts and contained within the system.

C Energy is produced during photosynthesis and absorbed during cellular respiration.

D Energy input drives the cycling of matter for the system and is released through cellular respiration.

Item	I-SCI-F-S000066-SB2-Q10
Identifier	I-SCI-F-S000066
Standards	SCI.9-12.HS-LS2-3

Below is a diagrammatic model of the Photosynthesis – Cellular Respiration System



How does the cycling of matter differ between aerobic and anaerobic respiration?

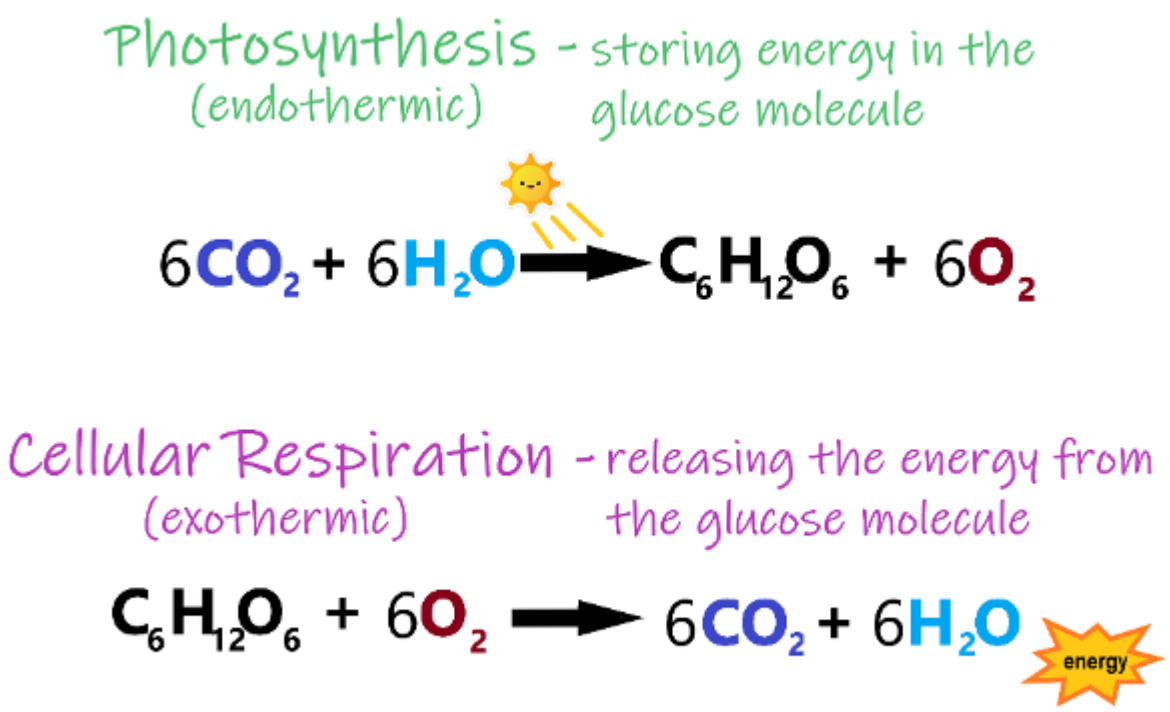
A. Aerobic respiration cycles matter through complete oxidation, producing carbon dioxide and water, while anaerobic respiration results in partial breakdown products like lactic acid or ethanol.

B. Aerobic respiration does not cycle matter, whereas anaerobic respiration cycles matter through complete oxidation.

C. Both aerobic and anaerobic respiration cycle matter in the same way, producing carbon dioxide and water.

D. Anaerobic respiration cycles matter through complete oxidation, producing carbon dioxide and water, while aerobic respiration results in partial breakdown products.

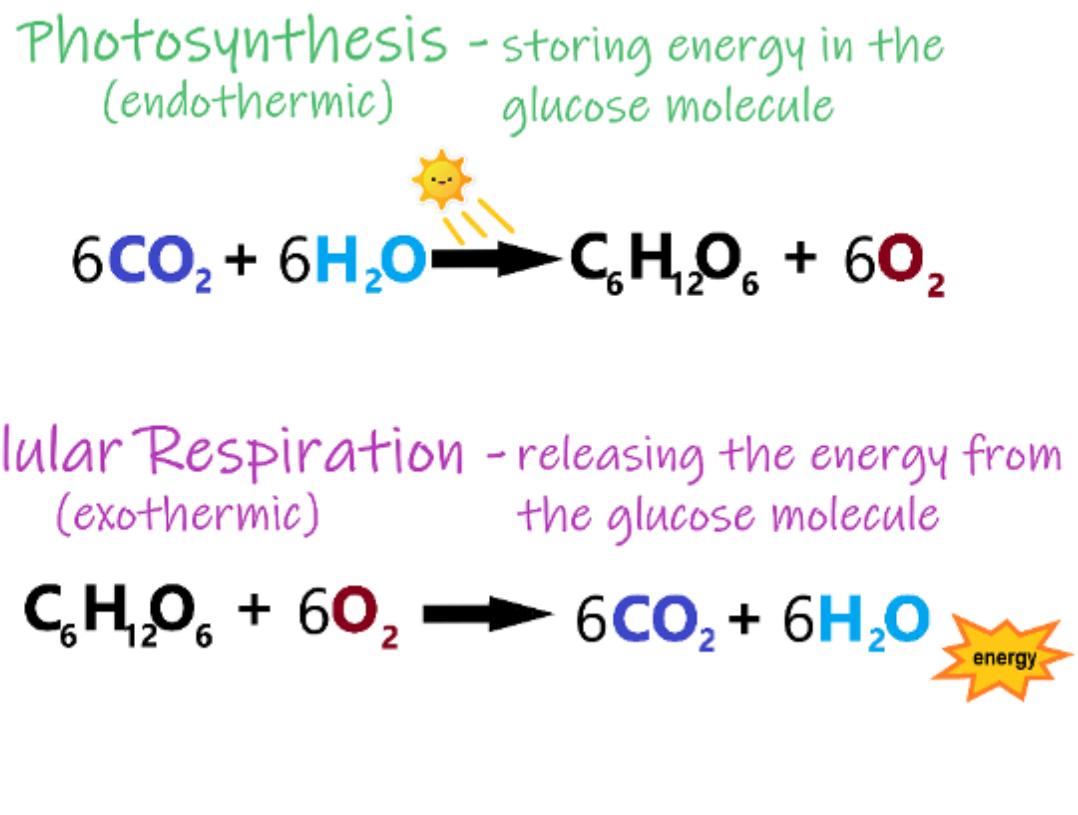
Item	I-SCI-F-S000067-SB2-Q11
Identifier	I-SCI-F-S000067
Standards	SCI.9-12.HS-LS2-5



Derrick wants to change the diagrammatic model above by adding an arrow between the two reactions shown to model how the two systems work together to cycle carbon through the Earth's different systems or spheres. What addition to the diagrammatic model could be made to **BEST** represent the flow of carbon between photosynthesis and cellular respiration?

- A. Draw an arrow going from the reactant side of photosynthesis to the product side of cellular respiration.
- B. Draw an arrow going from the reactant side of photosynthesis to the reactant side of cellular respiration.
- C. Draw an arrow going from the product side of photosynthesis to the reactant side of cellular respiration.
- D. No arrows would be needed as these reactions do not occur in the same cells.

Item	I-SCI-F-S000068-SB2-Q12
Identifier	I-SCI-F-S000068
Standards	SCI.9-12.HS-LS2-5



How do plants contribute to the carbon cycle in the geosphere?

A By releasing carbon dioxide directly into the soil

B By storing carbon in their biomass and eventually becoming part of the soil when they decompose

C By converting soil carbon into oxygen

D By preventing carbon from entering the soil

Item	I-SCI-F-S000069-SB2-Q13
Identifier	I-SCI-F-S000069
Standards	SCI.9-12.HS-ESS2-2

In a recent study published in the Journal of Environmental Science, researchers investigated the impact of deforestation on local climate and precipitation patterns in the Amazon Rainforest.

Deforestation on Amazon Rainforest

The researchers collected data on temperature, humidity, and precipitation levels in both deforested areas and intact forest regions over a period of five years. The results of the study revealed a significant difference in climate variables between the two types of areas. Deforested regions experienced higher daytime temperatures and lower humidity levels compared to areas with intact forest cover. Additionally, there was a noticeable decrease in overall precipitation in deforested areas, leading to drier conditions throughout the year. The study also found that these changes in climate variables directly correlated with the extent of deforestation in the region, highlighting the complex feedback mechanisms between land cover change and local climate patterns.

What was the primary focus of the study published in the Journal of Environmental Science regarding the Amazon Rainforest?

- A The impact of reforestation on local climate
- B The impact of deforestation on local climate and precipitation patterns
- C The effect of urbanization on the Amazon Rainforest
- D The role of agriculture in the Amazon Rainforest

Item	I-SCI-F-S000070-SB2-Q14
Identifier	I-SCI-F-S000070
Standards	SCI.9-12.HS-ESS2-2

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How did deforestation impact precipitation levels in the Amazon Rainforest according to the study?

A Precipitation levels increased in deforested areas.

B Precipitation levels were higher in deforested areas during certain seasons only.

C Precipitation levels remained unchanged.

D Precipitation levels decreased in deforested areas.

Item	I-SCI-F-S000071-SB2-Q15
Identifier	I-SCI-F-S000071
Standards	SCI.9-12.HS-ESS2-2

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Which of the following **BEST** describes the feedback mechanism between deforestation and local climate patterns identified in the study?

- A Higher temperatures and lower humidity lead to increased precipitation in deforested areas.
- B Deforestation leads to higher temperatures and lower humidity, which reduce precipitation, creating drier conditions.
- C Intact forests increase humidity and temperature, leading to more precipitation and wetter conditions.
- D Deforestation has no significant impact on climate variables or precipitation patterns.

Item	I-SCI-F-S000072-SB2-Q16
Identifier	I-SCI-F-S000072
Standards	SCI.9-12.HS-ESS2-6

The absolute quantity of carbon held in a habitat pool at any specified time is the carbon stock or store. The rate at which the carbon is stored is referred to as the carbon sequestration rate.

Carbon Sequestration Rates in Forest Ecosystems

Location	Carbon Sequestration Rate (tons/year)
Amazon Rainforest	5,000
Boreal Forest	3,500
Tropical Forest	4,200
Temperate Forest	2,800

If the carbon sequestration rate of the Boreal Forest increases by 20%, what would be its new annual carbon sequestration rate?

A 3,360 tons/year

B 4,700 tons/year

C 4,200 tons/year

D 7,000 tons/year

Item	I-SCI-F-S000073-SB2-Q17
Identifier	I-SCI-F-S000073
Standards	SCI.9-12.HS-ESS2-6

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Carbon Sequestration Rates in Forest Ecosystems

Location	Carbon Sequestration Rate (tons/year)
Amazon Rainforest	5,000
Boreal Forest	3,500
Tropical Forest	4,200
Temperate Forest	2,800

Which Earth system is primarily responsible for storing the largest amount of carbon?

- A Atmosphere
- B Biosphere
- C Hydrosphere
- D Geosphere

Item	I-SCI-F-S000074-SB2-Q18
Identifier	I-SCI-F-S000074
Standards	SCI.9-12.HS-ESS3-5

Impact of Increasing Average Global Temperature on Glacial Ice Volume in Antarctica

Year	Average Global Temperature Change (°C)	Glacial Ice Volume Change (km^3)
2000	0.5	-250
2005	0.8	-300
2010	1.2	-400
2015	1.5	-500
2020	1.9	-600

What trend is observed in the data regarding the relationship between average global temperature change and glacial ice volume change in Antarctica?

- A There is no correlation between average global temperature change and glacial ice volume change.
- B As average global temperature increases, glacial ice volume remains constant.
- C As average global temperature increases, glacial ice volume increases.
- D As average global temperature increases, glacial ice volume decreases.

Item	I-SCI-F-S000075-SB2-Q19
Identifier	I-SCI-F-S000075
Standards	SCI.9-12.HS-ESS3-5

Impact of Increasing Average Global Temperature on Glacial Ice Volume in Antarctica

Year	Average Global Temperature Change (°C)	Glacial Ice Volume Change (km^3)
2000	0.5	-250
2005	0.8	-300
2010	1.2	-400
2015	1.5	-500
2020	1.9	-600

Based on the trend observed in the data, what is the projected glacial ice volume change in Antarctica if the average global temperature increases by 2.5°C?

A -750 km^3

B -900 km^3

C -1000 km^3

D -1100 km^3