Growing Choices

Food, housing, and their effects on ecosystems

ES.12 "Obtain, evaluate, and communicate information to describe the effects of human population growth on global ecosystems. a. Evaluate and communicate information describing the impact of measures used to increase the food supply for the..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline actions people take to produce food or build housing, and circle their environmental effects. Give each action and one linked effect the same number to show cause and effect.

A Farm at the City's Edge

1 At the edge of a growing city, a farm must produce more food on limited land. One option is a genetically modified crop, or GMO, with a gene that helps it resist a particular insect. If the trait works locally, farmers may lose less of the harvest and spray less insecticide. Yet insects can evolve resistance, especially if farmers rely on one tactic. Planting one crop across a huge area, called a monoculture, can simplify planting and harvest. It can also reduce habitat for other species and allow a disease suited to that crop to spread widely.

2 Another farm uses integrated pest management, or IPM. Workers check fields for pests, decide when damage warrants action, and combine methods such as crop rotation, habitat for pest predators, and targeted spraying. This can reduce unnecessary pesticide use, but monitoring takes time and skilled labor. Precision agriculture uses sensors and field maps to apply water or fertilizer where crops need it rather than treating every acre alike. That can reduce wasted water and nutrient runoff into streams. Equipment and data services cost money, however, and poorly calibrated tools can still waste resources.

3 Food production is only part of the pressure from population growth. As the nearby city expands, roads and buildings cover soil that once absorbed rain. Stormwater then runs over pavement, carrying oil and other pollutants into streams; heavy flows can erode banks. Replacing trees with pavement can also raise local temperatures and break wildlife habitat into smaller patches. Compact housing near existing streets may leave more surrounding land undeveloped than scattered houses would, but dense construction still needs drainage and shade. Comparing options means asking which benefits matter, what harms remain, and who bears the costs.

2 ANSWER WITH EVIDENCE

Use the passage

1. How might a GMO crop and a monoculture each help produce food, and what environmental concern does the passage raise about each?

2. Why might a farmer choose IPM instead of spraying for every pest sighting? Include a limitation of IPM.

3. Explain how precision agriculture can affect a stream, and name one reason its benefits might be limited.

4. Trace one way city expansion can harm a stream. How might compact housing reduce a different environmental effect of expansion?

3 YOUR TURN

Your own words

Imagine a town must add housing beside a farm while protecting a stream. In 4 to 5 sentences, recommend one farming approach and one housing choice, explain how your plan could protect the stream and wildlife habitat, and identify one cost or limitation.

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PART 1 · READ AND MARK

Underline actions people take to produce food or build housing, and circle their environmental effects. Give each action and one linked effect the same number to show cause and effect. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How might a GMO crop and a monoculture each help produce food, and what environmental concern does the passage raise about each?	**An insect-resistant GMO may prevent harvest losses, but insects can evolve resistance. A monoculture simplifies planting and harvest, but it can reduce habitat and let crop disease spread widely.**
2	Why might a farmer choose IPM instead of spraying for every pest sighting? Include a limitation of IPM.	**IPM uses monitoring and combined methods to reduce unnecessary pesticide use. It requires time and skilled labor.**
3	Explain how precision agriculture can affect a stream, and name one reason its benefits might be limited.	**Applying water or fertilizer where needed can reduce nutrient runoff into streams. Equipment and data cost money, and poorly calibrated tools may waste resources.**
4	Trace one way city expansion can harm a stream. How might compact housing reduce a different environmental effect of expansion?	**Pavement prevents rain from soaking into soil, so runoff can carry pollutants into streams or erode their banks. Compact housing may leave more surrounding land undeveloped.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would use IPM on the farm and build compact housing near existing streets. Checking for pests before spraying could limit pesticides that might wash into the stream. Keeping homes clustered could leave more land for wildlife and preserve soil that absorbs rain. IPM requires skilled workers, and the new housing would still need drainage to manage runoff.

Accept other supported cause-and-effect explanations and reasonable plans. Responses should distinguish a potential benefit from a remaining cost or limitation.