Natural does not mean harmless

Natural disturbances alter organisms, resources or habitat structure. A flood, hurricane, drought or volcanic eruption can have effects as large as those of many human-made disruptions.

1. RECOGNIZE PATTERNS THROUGH TIME

PERIODIC — **A recurring cycle**

Seasonal changes in water flow follow an annual pattern, although each year differs.

EPISODIC — **Separate events**

An eruption or major drought occurs as an episode, with quiet intervals between events.

RANDOM — **Unpredictable timing or location**

The exact place and time of an individual lightning strike may be unpredictable.

2. DESCRIBE THE EVENT AND ITS EFFECTS

Timing categories can overlap: a disturbance may be episodic while its exact timing is unpredictable. Describe frequency, duration, affected area and severity separately. A short storm can leave damaged habitat for years; a slow climate shift can transform a whole region.

3. SOME ECOSYSTEMS DEPEND ON DISTURBANCE

In fire-adapted ecosystems, fire can release nutrients from vegetation, open space and help some plants regenerate. It can also kill organisms and remove cover. Effects depend on the species present and the fire regime; more frequent or severe fire is not automatically beneficial.

Disturbance magnitude and time patterns: College Board, ERT-2.G.1-2.
Fire and ecosystem processes: National Park Service, Wildland Fire Ecology.

Scope: College Board AP Environmental Science CED, Topic 2.5, p. 56.

Long-term change redraws habitats

Earth's climate has varied over geological time. Changes in orbit, solar energy and atmospheric composition can alter temperature and precipitation, reshaping where ecosystems occur.

1. LAND ICE AND GLOBAL SEA LEVEL



2. COASTLINES AND CONNECTIONS CAN CHANGE

Lower sea level can expose coastal land and connect areas that were separated by water. Rising sea level can flood low-lying land and shift shorelines inland. These changes alter habitat area, saltwater exposure and routes available to organisms.

3. KEEP CAUSES AND TIMESCALES DISTINCT

Land ice melting adds water to the ocean; melting floating sea ice has little direct effect on sea level. Ocean warming also raises sea level through thermal expansion. Natural climate variation in the past does not explain away today's warming, which is primarily driven by human greenhouse gas emissions.

Glacial storage and sea level: USGS, Sea Level and Climate.
Natural Earth-system drivers: NASA Science.
Drivers of current global warming: NASA Science, Causes.

Scope: College Board AP Environmental Science CED, Topic 2.5, p. 56.

Habitat change has uneven consequences

The same disturbance may harm some organisms and create opportunities for others. Trace the change in habitat or resources before predicting a population response.

1. FLOODS CHANGE MORE THAN WATER DEPTH

Erosion and moving sediment

Soil can be removed; deposits may bury plants or bottom-dwelling organisms.

Changes in vegetation and structure

Uprooted trees remove cover in one place but may create shelter for fish elsewhere.

Changed resources and access

Food, nesting sites and safe resting areas can move, disappear or become available.

2. WILDLIFE CAN MOVE OVER DIFFERENT TIMESCALES

Short-term movement may take animals away from floodwater or toward remaining water during drought. Longer-lasting habitat change can shift migration routes or where populations live. Seasonal migration is a recurring round trip; a lasting range shift is not necessarily one.

3. MOVEMENT IS NOT A GUARANTEED SOLUTION

Organisms must be able to reach suitable conditions and find enough resources there. Barriers, limited mobility or habitat loss can prevent escape. If conditions remain unsuitable, survival or reproduction can fall. Moving to a new place is not the same as evolving a new inherited trait.

Recovery depends on what remains: surviving organisms, soil, seed sources and suitable conditions. Repeated disturbances can interrupt recovery. A return of plant cover does not necessarily mean the original species composition has returned.

Flood effects on wetland organisms and habitat: USGS, 1993 Midwest flood.
Habitat changes and migration: College Board, ERT-2.G.5-6.
Changing wildlife habitats and migration cycles: U.S. Fish & Wildlife Service.

Scope: College Board AP Environmental Science CED, Topic 2.5, p. 56.