Climate change in Hawaii and U.S. tropical islands

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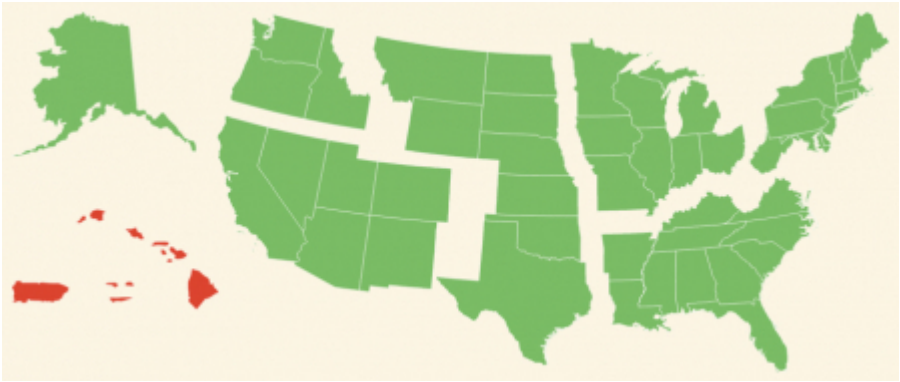
A sea turtle is seen swimming above a reef near the Hawaiian islands. Climate change has major impacts on ocean ecosystems and communities living on islands. Photo: Pixabay/public domain.

Overview

The United States controls dozens of islands located in tropical regions of the world. These include Puerto Rico and the U.S. Virgin Islands in the Caribbean Sea, and Hawaii and Guam in the Pacific Ocean. In the minds of many people, such places represent tropical paradises of bright sun and long beaches. These islands, though, are especially vulnerable to climate change because of their small size and low elevation. On many, communities are located along coastlines. These islands feature unique ecosystems, including coral reefs and mangrove forests. They are home to populations of animals and plants found nowhere else in the world. Island ecosystems are already stressed from human development and pollution. This makes them more sensitive to climate change.



Islands worldwide are experiencing changes in climate. These shifts include rising air temperatures and sea levels; warmer coastal waters; and changes in seasonal precipitation patterns. These shifts are expected to continue into the future, creating more unpredictable conditions for the people, animals and plants that live there.

Rising Temperatures And Sea Levels

Islands are experiencing rising air temperatures and sea levels. In Hawaii and the Central North Pacific, temperatures are projected to rise by 1.5 to 3.5 degrees Fahrenheit by the year 2050. In the Caribbean, Puerto Rico is projected to warm by 2 to 5 degrees F by the end of this century. A few degrees rise in temperature may seem insignificant, however, scientific research suggests warming will disrupt traditional weather patterns and ecosystems.

Higher global temperatures are contributing to rising sea levels, as the world's ice caps melt. In addition, warmer water temperatures cause water to expand. This adds to rising oceans that eat away at island coastlines. In Rincón, Puerto Rico, for instance, sea level rise is currently eroding the coastline at a rate of about 3 feet per year.

Water Resources And Communities

Climate change is expected to alter precipitation patterns, affecting the availability of water on some islands. On islands where precipitation decreases, ground and surface water supplies may not be recharged. The result is less freshwater for drinking and watering crops. In contrast, some islands are expected to receive heavier downpours that can cause flooding.

Climate change will also have far-reaching effects on local island culture, health and livelihoods. Coastal agriculture will likely be affected. Sea level rise can lead to saltwater flooding, causing soils to become too salty for crops. Residents living near the coasts may be forced to move if climate-related damage and threats become too extreme. Studies indicate warmer temperatures will also lead to more disease.

Infrastructure And Economy

Island communities and economic development are at greater risk due to climate change. Most island towns and businesses sit close to the coasts. This makes them especially vulnerable to sea level rise, coastal flooding and shoreline erosion.

These changes are expected to affect transportation and other infrastructure. This includes airports, roads, ports and water systems. In addition, many islands rely on imported food, fuel and building materials. This makes ports and airports critical to the well-being of island residents.

Climate change will also affect tourism, an important source of income for many islanders. Sea level rise will speed up beach erosion, and increase the chances of damage to buildings, businesses and ecosystems. Such changes could make these tropical islands less attractive to visitors.

Ecosystems Are Being Threatened

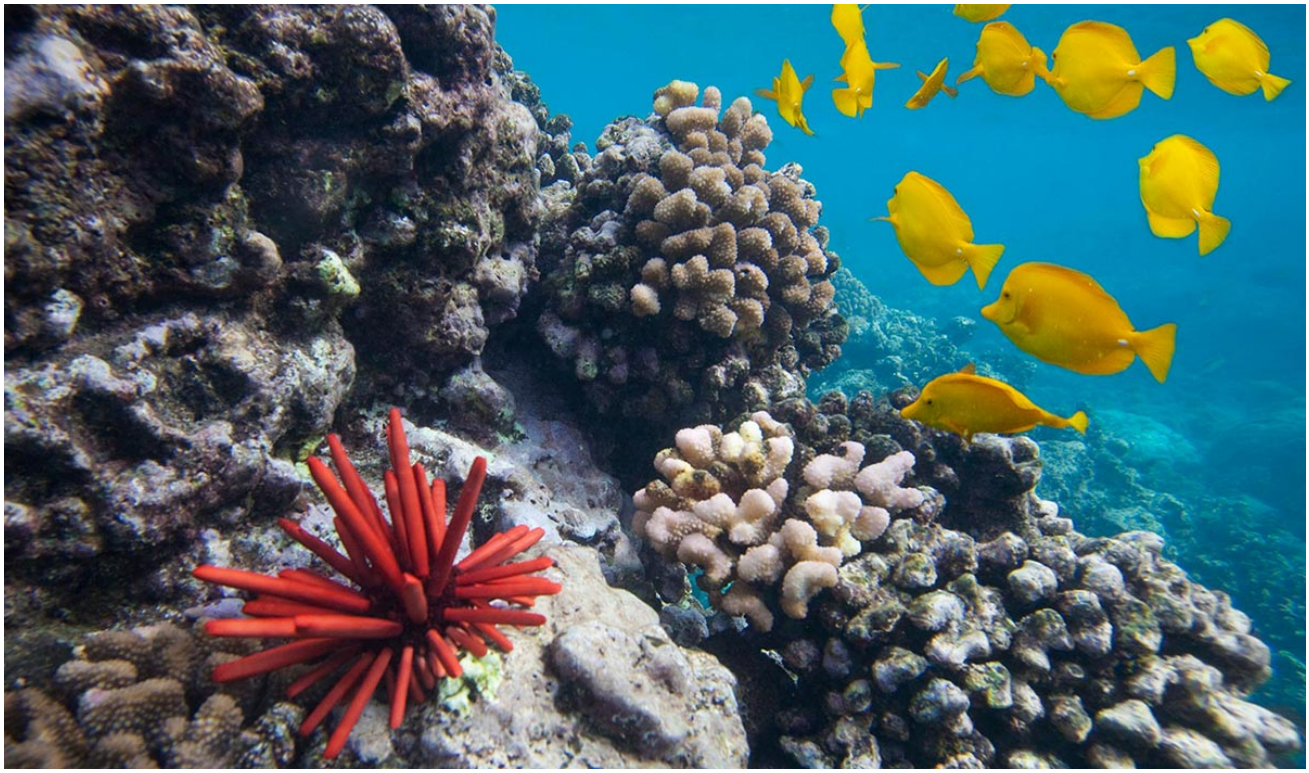
Islands are home to unique ecosystems and species that provide economic opportunities, safety and tradition to island communities. Rising sea levels and temperatures of coastal waters are already threatening these natural places.

Coral reefs, for example, serve as an important habitat for many fish and marine organisms. They also provide shoreline protection during hurricanes and other strong storms. Reefs also serve as valuable sources of seafood and bring in tourist dollars. In Hawaii, the goods and services provided by coral reefs generate about $385 million in business each year.

Reef ecosystems on many islands are already stressed by coastal development and pollution. Warmer coastal waters further stress reefs, resulting in coral disease outbreaks. As the oceans warm, coral reefs are expected to shrink.

Coral reefs in most climates can only handle temperatures as high as 84 degrees Fahrenheit. If the water gets warmer than that, the corals will release the algae living in their tissue. This process is called "bleaching" because it turns the corals white. More importantly, it increases the chance they will develop diseases and die. Corals and the algae that live in them need each other to remain healthy.

Ocean Is Becoming Less Habitable



Ocean water is also becoming more acidic. It is caused by oceans absorbing carbon dioxide from the atmosphere. Scientists blame climate change for this too. Acidic water makes it harder for corals to get calcium. They need calcium for their shells to grow.

As climate change alters coral reefs, the fish populations that inhabit them are expected to decline. Many island communities depend on local fisheries for food and income. Warming ocean temperatures can also damage fish habitats. This may lead to shifts in the reproduction or movement patterns of certain fish species, including tuna. These impacts may ultimately lead to a decline in the abundance and health of marine life.

Sea level rise will also result in loss of tidal marshes, swamps and other coastal habitats. These ecosystems provide important habitats for birds and aquatic life. Losses of these habitats will have a negative effect on many species. In the Caribbean, forests are retreating from the coastlines. Mangrove forests are shrinking in parts of the Pacific. Mangroves help to protect shorelines from erosion and limit flooding.

Plants and animals are increasingly stressed by high temperatures and, on some islands, by reduced rainfall. Climate change is creating conditions affecting populations of native plants and birds, as well as people.

Quiz

1 Which section of the article BEST explains how changing weather patterns will affect residents' ability to grow food?

(A) "Overview"

(B) "Rising Temperatures And Sea Levels"

(C) "Water Resources And Communities"

(D) "Infrastructure And Economy"

2 Which paragraph in the section "Ecosystems Are Being Threatened" BEST explains HOW rising ocean temperatures harm coral reefs?

3 Which of the following statements would be MOST important to include in a summary of the article?

(A) Many island communities will change their transportation due to rising temperatures and sea levels.

(B) Rising temperatures and sea levels are especially threatening to islands and their inhabitants.

(C) Increased pollution is contributing most to the negative effects of climate change on many islands.

(D) Climate change will make islands less attractive to tourists because buildings will be damaged.

4 Which option BEST describes two central ideas of the article?

(A) Climate change is affecting seasonal precipitation patterns in many areas around the world. Changes may also happen to the reproduction or movements of certain species of fish living near islands.

(B) Climate change is affecting dozens of islands in tropical regions controlled by the United States. Island coastlines and ecosystems have been stressed by human development and pollution for a long time.

(C) Climate change will have serious effects on the resources, culture, and livelihoods of people living on islands. Rising temperatures and sea levels threaten plants and animals in island ecosystems.

(D) Climate change will have serious effects on coral reefs, fish populations, and other marine life. Ocean water is becoming more acidic because it is absorbing carbon dioxide from the atmosphere.