NO PREP

Climate Change Impacts and Adaptation

Facing a Warming World

Includes: Student reading, case study, differentiated questions, teacher key

Name: Period: Date:

Climate Change Impacts and Adaptation: Facing a Warming World

Understanding Climate Change

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Understanding Climate Change

Climate change refers to the long-term alteration of Earth's climate systems, particularly the rise in global temperatures caused by greenhouse gases such as carbon dioxide, methane, and nitrous oxide. These gases trap heat in the atmosphere, creating what scientists call the greenhouse effect. While the greenhouse effect is a natural process that makes Earth livable, human activity has greatly intensified it over the past two centuries. The burning of fossil fuels for electricity, transportation, and industry releases massive amounts of carbon dioxide into the air. Deforestation, especially in tropical rainforests, further increases the problem by reducing the number of trees that absorb carbon. As a result, Earth's average surface temperature has risen more than 1°C since the late 19th century. While this may seem small, it has far-reaching consequences for ecosystems, weather patterns, and human societies. The impacts of climate change are not uniform. Some regions experience more frequent droughts, while others face stronger storms. Polar regions are warming faster than anywhere else, leading to the melting of ice sheets and glaciers. Sea levels are rising, threatening coastal cities and small island nations. For students of geography, climate change is not just an environmental issue—it is a global challenge that reshapes the relationship between people and the planet.

The Effects on People and Places

Climate change affects both natural systems and human societies. Extreme weather events such as hurricanes, wildfires, and heatwaves are becoming more intense and frequent. The 2021 heat dome in western North America caused record-breaking temperatures, leading to hundreds of deaths. In contrast, South Asia has faced devastating floods that displace millions. These events highlight how vulnerability

depends on location, resources, and preparedness. Rising seas threaten densely populated coastal areas. Cities like Miami, Bangkok, and Dhaka already experience flooding during high tides, a phenomenon sometimes called "sunny-day flooding." Small island nations like the Maldives and Tuvalu face an existential threat, as much of their land may disappear beneath the waves. Meanwhile, agricultural regions are disrupted as rainfall patterns shift. Farmers in sub-Saharan Africa, for example, face unpredictable growing seasons, which can worsen food insecurity. Climate change also amplifies social and political challenges. Resource scarcity caused by droughts can trigger conflicts, as seen in parts of the Middle East and Africa. Migration may increase as people flee areas made uninhabitable by rising seas or extreme heat. Public health is another concern, with warmer temperatures expanding the reach of diseases like malaria and dengue fever. In this way, climate change is not only an environmental crisis but also a human crisis.

Adapting to a Changing Climate

While reducing emissions is crucial, adaptation is equally important. Adaptation refers to strategies that help societies adjust to the effects of climate change. For coastal cities, this might mean constructing sea walls, restoring mangroves, or elevating buildings. Farmers are experimenting with drought-resistant crops and new irrigation methods. In some regions, governments are relocating communities away from high-risk areas. Adaptation also involves improving infrastructure. Better drainage systems reduce flooding in cities, while early warning systems save lives during storms. Public health measures can control the spread of climate-sensitive diseases. Education and community planning prepare citizens to respond effectively when disasters strike. However, adaptation has limits. Some ecosystems, like coral reefs, cannot survive rising temperatures and ocean acidification, no matter what humans do. Poorer countries face financial and technological barriers, making it difficult to adapt without international support. The Paris Agreement, signed in 2015, recognizes this challenge and calls for wealthier nations to help fund adaptation projects in vulnerable regions.

The Future of Climate Action

The choices made today will determine the severity of tomorrow's climate impacts. If global cooperation succeeds in reducing greenhouse gas emissions, warming may be limited, and adaptation strategies may prevent the worst outcomes. If not, the

world could face a future with widespread displacement, resource conflicts, and irreversible environmental damage. For students, the issue of climate change is not abstract—it is the world you will live in. Understanding its causes, impacts, and solutions is essential for informed citizenship. Geography helps reveal how local environments connect to global systems, showing why climate change is the defining issue of our time.

Key Information

Impact	Region Most Affected	Consequence
Rising seas	Coastal cities, small islands	Flooding, displacement
Heatwaves	North America, Europe, Asia	Deaths, wildfires, drought
Flooding	South Asia, Africa	Migration, crop loss
Melting ice	Arctic, Antarctica	Sea-level rise, habitat loss
Food insecurity	Sub-Saharan Africa	Hunger, economic instability

Case Study Excerpt: The Maldives – A Nation at Risk

The Maldives, a chain of islands in the Indian Ocean, is one of the countries most threatened by climate change. With an average elevation of only about five feet above sea level, even a small rise in sea levels could devastate the nation. Already, some islands experience regular flooding, saltwater intrusion into freshwater supplies, and erosion that damages homes and infrastructure. The Maldivian government has been outspoken on the global stage, warning that climate change poses an existential threat. In 2009, then-President Mohamed Nasheed even held an underwater cabinet meeting to draw attention to the crisis. The Maldives has explored creative adaptation strategies, such as building artificial islands, sea walls, and floating infrastructure. However, the costs are enormous, and the nation depends on international aid and cooperation. For many Maldivians, migration may eventually be the only option. Some officials have even suggested purchasing land in other countries to relocate citizens if their islands become uninhabitable. The plight of the Maldives demonstrates how climate change can directly threaten national survival. It is also a moral issue: small nations that contribute little to global emissions suffer some of the worst consequences, raising questions of fairness and global responsibility.

1. Why does the Maldives face such severe risks from climate change?

2. How does the Maldives highlight issues of fairness in the global response to climate change?

Multiple Choice

1. Which gases are primarily responsible for climate change?

    a) Carbon dioxide and methane

    b) Oxygen and nitrogen

    c) Hydrogen and helium

    d) Sulfur dioxide and ozone

2. Which country is most at risk from rising sea levels due to its low elevation?

    a) Russia

    b) Brazil

    c) Canada

    d) Maldives

3. Which of the following is an example of climate adaptation?

    a) Ignoring flood risks

    b) Constructing sea walls

    c) Burning more fossil fuels

    d) Expanding deforestation

Matching

Write the letter of the correct definition on the line next to each term.

Term	Definition
1. ___ Greenhouse effect	A) Phenomenon causing extreme temperatures in regions
2. ___ Paris Agreement	B) Building strategies to cope with climate change
3. ___ Heat dome	C) Natural process intensified by human activity
4. ___ Adaptation	D) Threatens small islands and coastal cities
5. ___ Sea-level rise	E) International treaty to reduce emissions

Fill-in-the-Blank

1. The _____ Agreement of 2015 called for nations to limit warming and support vulnerable countries.

2. The _____ effect is caused by gases trapping heat in Earth's atmosphere.

3. Coral reefs are especially vulnerable to warming seas and _____ acidification.

Short Answer

Answer each question in 2-4 complete sentences.

1. How does climate change increase risks for global food security?

_____

_____

_____

2. Why is adaptation more difficult for poorer nations?

_____

_____

_____

3. What role should wealthier countries play in addressing climate change?

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