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INDUSTRIAL / CHEMICAL DISASTER



WHAT IS CHEMICAL DISASTER?

Chemicals play a major role in our everyday life. They are part of what we eat, where we work, and how we live. Despite their prevalence in our lives, many chemicals are hazardous, or toxic. Toxic chemicals can be found in our soil, water, air, and bodies. This contamination has seriously affected the health of humans and wildlife everywhere.

Hazardous materials come in the form of explosives, flammable and combustible substances, poisons, and radioactive materials. These substances are most often released as a result of transportation accidents or because of chemical accidents in manufacturing plants.

WHAT HAPPENS

A **home chemical emergency** arises when chemicals are used improperly at home. Some chemicals that are safe, and even helpful in small amounts, can be harmful in larger quantities or under certain conditions. Most chemical accidents that occur in our own homes can be prevented.

A **major chemical emergency** is an accident that releases a hazardous amount of a chemical into the environment. Such a major chemical accident may lead to a **chemical disaster**.

Hazardous materials: Chemical substances, which if released or misused, can pose a threat to the environment.

Chemical disaster caused by industries is termed as **industrial disaster**. There are many kinds of industrial disasters. The fast ones that result in many deaths make the news all over the world when they happen. The slow ones that kill or cripple people over long periods of time take a lot more work to discover, and to research.

Accidents can happen underground, on railroad tracks or highways, and at manufacturing plants. These accidents sometimes result in a fire or explosion, but many times you cannot see or smell anything unusual. You may be exposed in three ways:

- Breathing the chemical.
- Swallowing contaminated food, water, or medication.
- Touching the chemical, or coming into contact with clothing or things that have touched the chemical.

Learn about chemicals and chemical emergencies:

- Chemicals are everywhere. They are an important part of life.
- The most common chemical accidents occur in our own homes, and they can be prevented.
- The best way to avoid chemical accidents is to read and follow the directions for use, storage, and disposal of the product. Mixing products can be hazardous.
- The best way to protect yourself and your family is to be prepared. Knowing what to watch for and how to respond will keep you alert to chemical hazards.

SOME PREVENTIVE MEASURES

BEFORE

- ✓ Make an emergency kit.
- ✓ Make an emergency plan.
- ✓ Learn about your community's risk from major chemical emergencies.
- ✓ Find out evacuation plans for home, public places and schools.

- ✓ Learn about industry and community warning signals.
- ✓ Discuss chemical emergencies with your family.

DURING

- ✓ If you hear a siren or other warning signal, turn on a radio or television for further emergency information.
- ✓ Strictly follow instructions. Your life could depend on it.
- ✓ Seek information on:
 - Type of health hazard
 - The area affected
 - How to protect yourself
 - Evacuation routes (if necessary)
 - Shelter locations
 - Type and location of medical facilities
 - The phone numbers to call if you need extra help
- ✓ Call 100 only for a possible life-threatening emergency. Telephone lines are frequently overwhelmed in disaster situations. They need to be clear for emergency calls to get through.
- ✓ If you are at the scene of a chemical accident:
 - Call the local police / fire department to report the nature and location of the accident as soon as possible.
 - Move away from the accident scene and help others away.
 - Stay away from the spilled substance and avoid touching it.

- Try to avoid inhaling gases, fumes, or smoke. If possible, cover your mouth with a cloth while leaving the area.
- Stay away from accident victims until the hazardous material has been identified.
- Try to stay upstream, uphill, and upwind of the accident.

✓ How to Shelter-in-Place

- One of the basic instructions you may be given in a chemical emergency is to *shelter-in-place*.
- While gathering your family, you can provide a minimal amount of breathing protection by covering your mouth and nose with a damp cloth.
- Immediately after the shelter-in-place announcement is issued, fill up bathtubs or large containers for an additional water supply, and turn off the intake valve to the house.
- If gas or vapors could have entered the building, take shallow breaths through a cloth or a towel.
- Avoid eating or drinking any food or water that may be contaminated.
- Seal house so *contaminants* cannot enter.
- Go to an above-ground room (not the basement) with the fewest windows and doors.
- Take your Disaster Supplies Kit with you.
- Stay in the room and listen to your radio or television until you are told all is safe, or you are told to evacuate.
- If you are told there is danger of explosion, close the window shades, blinds, or curtains. To avoid injury, stay away from the windows.

Contaminants: Something that contaminates / makes impure / pollutes; **Shelter-in-place:** To take immediate shelter where you are – at home, work, school, or in between

- If you are told to evacuate immediately, take your Disaster Supplies Kit. Pack only the bare essentials, such as medications, and leave your home quickly. Follow the route authorities recommend. Do not take shortcuts on the way to the shelter, they may be blocked or expose you to dangerous chemicals.
- It is important to stay calm, listen carefully, and follow all instructions.
- If an evacuation order is issued, listen to your radio to make sure the evacuation order applies to you, and to understand if you are to evacuate immediately or if you have time to pack some essentials.
- Avoid using the telephone.
- If you are told to evacuate, do so immediately.
- Take your Disaster Supplies Kit.
- Only if you have time, seal your house so contaminants cannot enter.
- Move quickly and calmly.
- Do not assume that a shelter will have everything you need.
- If you need a ride, ask a neighbor.
- Check on neighbors to make sure they have been notified, and offer help to those with special needs.
- Close your car windows and air vents, and turn off the heater or air conditioner.
- For your safety, follow the exact route you are told to take.

AFTER

- ✓ Return home only when authorities say it is safe.
- ✓ Follow local instructions concerning the safety of food and water.
- ✓ Clean up and dispose of residue carefully. Follow instructions from emergency officials concerning cleanup methods. Local officials will best know proper procedures for your particular situation.

TEST YOUR KNOWLEDGE

I. Unscramble the following

1. HECIAMSLC
2. EMREEGCNY IKT
3. ASG EALK
4. AZARHODSU

II. Fill in the blanks from the following words

Contaminants, Evacuation route, Calmly, Disaster supply kit

1. If possible, seal your house so that _____ cannot enter
2. If you are told to evacuate immediately, take your _____
3. During evacuation, move quickly and _____
4. For your safety, follow the exact _____ you are told to take

III. Match the column

Sl no.	Column A	Column B
1	If a chemical substance is spilled	Take shallow breaths through a cloth or a towel
2	If gas or vapors could have entered the building	Avoid touching it
3	Shelter-in-place	It may be contaminated
4	Avoid eating or drinking any food or water from outside	One of the basic instructions in chemical emergency

ACTIVITY

Collect some information on one of India's worst chemical disasters in Bhopal. Include the following:

1. Cause
2. Types of devastation caused
 - a. To the place
 - b. To the people
3. Lessons we can learn from it

DID YOU KNOW?

- ✓ The Bhopal disaster, also referred to as the Bhopal gas tragedy, was a gas leak incident and one of the worst industrial disasters in India.

UNCONTROLLED URBANIZATION



WHAT IS UNCONTROLLED URBANIZATION?

It is the increase in number of people living in towns and cities.

WHAT HAPPENS

Urbanization occurs because people move from rural areas to urban areas. This usually occurs when a country is still developing. Historically, it has been closely connected with industrialization. Following industrialization, surpluses increased in both agriculture and industry. Larger and larger proportions of a population could live in cities. Economically, cities became the ideal places to locate factories and their workers.

Causes of Urbanization

- Industrialization
- Job opportunities
- Availability of easy transportation
- Availability of more/better services (health, education, etc)
- Absence of enough land for agricultural production in rural areas
- *Migration*

Migration: To move from one country or region and settle in another

Positive Effects of Urbanization

- Reduced transport costs, exchange of ideas and sharing of natural resources
- Cities act as beacons for the rural population because they represent a higher standard of living
- Cities offer opportunities to people not available in the country side
- Social and religious taboos / sanctions disappearing
- Education is a tool to eradicate social evils
- Industrialization, Urbanization, Education, Legislation, Secularization – sequence of development
- Diffusion of urban culture to rural areas

Urbanization is a sequence of development. However, if urbanization is not planned or controlled then it could have negative impacts as well.

Negative Effects of Urbanization

- Public health issues
 - *Sanitation* – settlements were ill equipped to handle large populations and their sanitation needs
 - *Pollution* – caused by effluents, smoke and smog
 - Fire hazards – due to use of flammable materials and proximity / congestion
 - Epidemics – due to spread of communicable diseases caused by contaminated water and air and overcrowding
- Unemployment and under employment



Pollution: Process of making air dirty and impure; **Unemployment:** Condition of willing workers lacking jobs or 'gainful employment'

Impact of unemployment on society:

- Individual – failure to meet financial obligations such as purchasing food to feed oneself and one's family, paying bills, failure to make mortgage payments or to pay rent may lead to homelessness
- Societal – rising unemployment increases the crime rate



- Housing
 - *Overcrowding*
 - Loss of privacy
 - Lack of housing contributes directly to crime, stress and family breakdown
 - Shortage of livable housing leading to growth of slums
 - Human beings have a right to live a life of dignity
- Transportation
 - Because of much higher densities of people and activities in cities, *transportation* is a key issue
 - Inadequate or lack of public transport creates commuting problems leading to loss of efficiency
- Social effects – poverty, lack of opportunities, psychological problems, alcoholism, drugs, crime, violence and other deviant behaviors
- Environment
 - Pollution
 - *Deforestation*
 - Disturbs the balance of eco system

Overcrowding: Too many people / buildings, etc in one area; **Transportation** – Movement of people and goods from one place to another; **Deforestation** – cutting or burning of trees in an area

THINGS YOU SHOULD DO

- Plant trees and incorporate the care of city green spaces.
- Spend time out in communities through play and socialization and learn evaluating, planning and caring for environment.
- Participate in school-and-community based programmes and learn how to act effectively on issues of particular concern.
- Learn evacuation plans of your city, which may be required in case of disasters.
- Contact emergency numbers so that there is no panic / stampede in case of disaster.
- Identify safe open spaces within your locality.

TEST YOUR KNOWLEDGE

I. Unscramble the following words related to the negative effects of uncontrolled urbanization

1. ADTFSTERIOENO
2. OLPTUILNO
3. VEORIORCDGWN
4. NEUPMOLYEMTN

II. Fill in the blanks from the following words

Positive and Negative, Evacuation plans, School-and-community, Planned and Controlled

1. Learn _____
2. Participate in _____ based programmes
3. Urbanization should be _____
4. Effects of urbanization are both _____

III. Match the column

Sl no.	Column A	Column B
1	Identify	Plant more trees
2	In case of disasters	Safe open spaces in your locality
3	Urbanization occurs	Contact emergency numbers
4	For green spaces	Because people from rural areas to urban areas

ACTIVITY

Interview your grandparents or any other senior citizen about everyday life in the past and then compare it with your present day. You may ask about the following:

1. Traffic and vehicles
2. Houses and buildings
3. People in the community/area/village
4. Factories and industries
5. Forest/trees/greenery
6. Jobs and employment

What are the differences? How has your area/town changed? Is it better or worse? Make a classroom presentation about things that have improved and things that have deteriorated.

DID YOU KNOW?

- ✓ Around 3 billion people, half of the world's population live in cities.
- ✓ Highest urban growth rates are in developing countries.
- ✓ About 160,000 people move from rural areas to cities every day.

CLIMATE CHANGE

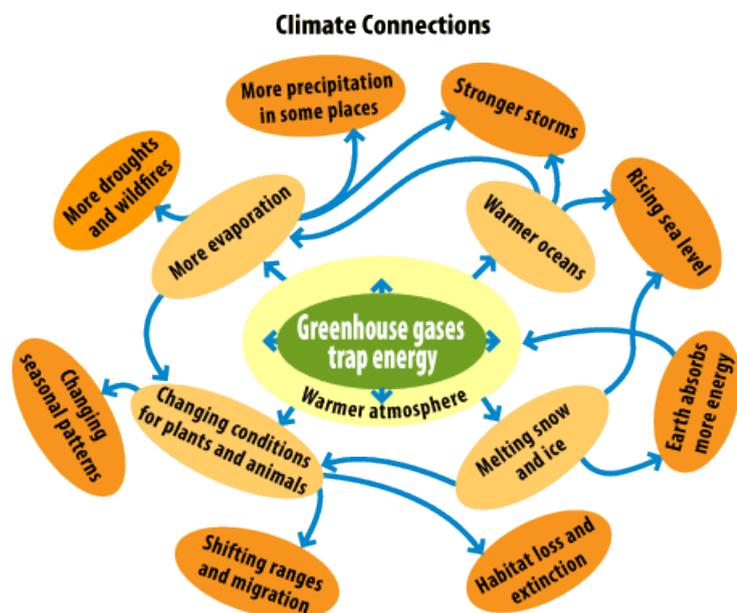


WHAT IS CLIMATE CHANGE?

Our world is always changing. Look out your window long enough and you might see the weather change. Look even longer, and you'll see the seasons change. The Earth's climate is changing, too, but in ways that you cannot easily see. When scientists talk about *global climate* change, they are talking about the global climate and a pattern of change that has been happening over many years.

WHAT HAPPENS

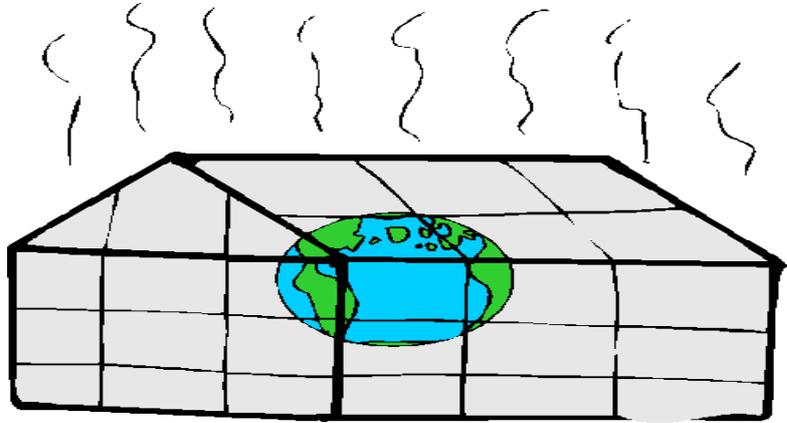
One of the most important trends that scientists look at is the average temperature of the Earth, which has been increasing for many years. This is called **global warming**.



Global climate: The average climate around the world

The Greenhouse Effect

The Earth is getting warmer because people are adding heat-trapping gases to the atmosphere, mainly by burning fossil fuels (coal, oil, natural gas). These heat-trapping gases are called greenhouse gases. Greenhouse gases keep the Earth warm through a process called the **greenhouse effect**.



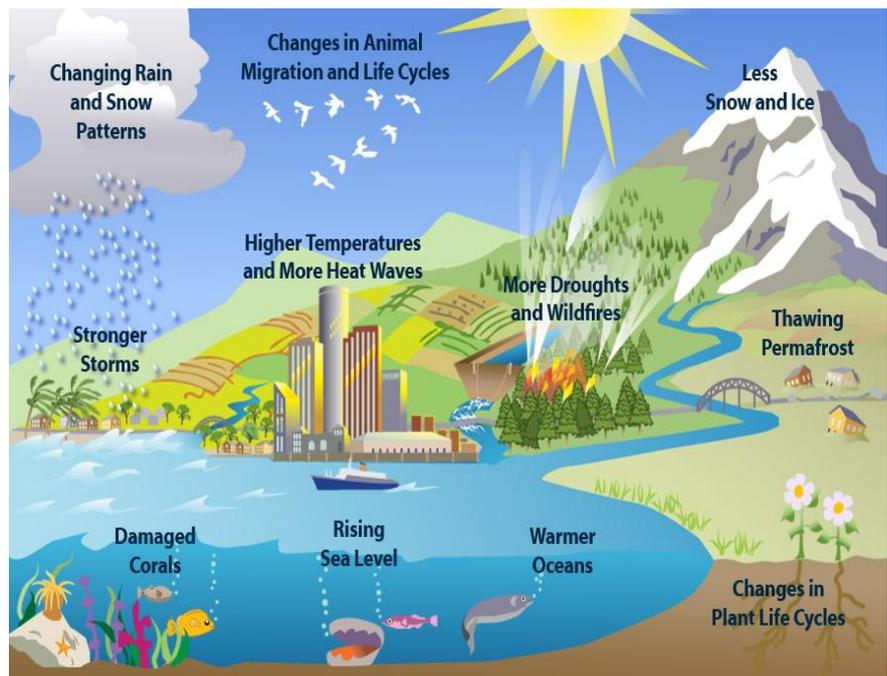
Rising global temperatures lead to other changes around the world, such as stronger hurricanes, melting glaciers, and the loss of wildlife habitats. That is because the Earth's air, water, and land are all related to one another and to the climate. This means a change in one place can lead to other changes somewhere else.

These changes affect people, plants, and animals in many ways. The Earth's climate has changed before, but this time it is different. People are causing these changes, which are bigger and happening faster than any climate changes that modern society has ever seen before.

See the Impacts

The signs of global climate change are all around us:

- Higher temperatures and more heat waves
- Changing rain and snow pattern
- More droughts and wildfires
- Warmer oceans
- Rising sea level



- Wilder weather / weather extremes
- Stronger storms
- Increased ocean acidity
- Damaged corals
- Shrinking sea ice
- Melting glaciers
- Less snow and ice
- Thawing permafrost
- Changes in plant life cycles
- Changes in animal migration and life cycles

How will climate change affect you, your community and the environment around you?

Global climate change will affect people and the environment in many ways. Some of these impacts, like stronger hurricanes and severe heat waves, could be life threatening. Others, like *spreading weeds*, will be less serious. And some effects, like longer growing seasons for crops, might even be good! However, as the Earth keeps getting warmer, the negative effects are expected to outweigh the positive ones.

The more we learn about how climate change will affect people and the environment, the more we can see why people need to take action to reduce the greenhouse gas emissions that are causing climate change. We can also take steps to prepare for the changes we know are coming.

- **Health**
 - **Temperature-related illnesses:** People should take precautions on hot days to keep cool. Cities can also set up heat wave warning systems and air-conditioned shelters where people can cool off.
 - **Air pollution:** People can check the daily air quality forecast for their area by looking in the newspaper, on TV, or on weather websites. When ozone levels are high, people should be careful about exercising or working outdoors.

- **Spreading diseases:** People should take common-sense steps to avoid tick and mosquito bites, and communities can take actions to control mosquitoes, such as removing sources of standing water. It is also important for doctors to know the symptoms of diseases that could be spreading to new areas so they can diagnose and treat their patients.
- **Agriculture**
 - **Crop losses:** Farmers may be able to prepare for climate change by planting crops during different times of the year, or by planting crops that can survive better in hot and dry conditions.
- **Energy**
 - **Hydropower:** If climate change begins to affect hydropower production, people can adapt by using less energy, using energy in more efficient ways, or finding other clean energy sources.
 - **Air conditioning:** People can plant trees near offices and homes to provide shade and keep them cool naturally. They can also use fans instead of air conditioners when it's not too hot. When air conditioning is needed, people can save energy by setting the thermostat a few degrees warmer. When buying a new air conditioner, people can choose energy-efficient models.
- **Water Supplies**
 - **Public water supplies:** As climate change continues, people might have to prepare for water shortages by using less water.
 - **Lakes, rivers and streams:** Communities might have to find new sources of water to support their needs. People might also have to adapt by using less water.
- **Plants, Animals, and Ecosystems**
 - **Disappearing habitats:** Just like people, plants and animals will have to adapt to climate change. Many types of birds are migrating from one place to another due to change in temperature. People can help plants and animals adapt by protecting and preserving their habitats.
 - **Coral reefs:** To help give coral reefs a better chance of surviving the effects of climate change, swimmers, boaters, and divers should treat these fragile ecosystems with care. People can also support groups working to protect coral reefs.

- **Forests**

- **Wildfires:** As the climate continues to change, people will have to prepare for the risk of increasing wildfires by becoming more aware of the danger, taking extra precautions to prevent fires, not building in fire-prone areas, and being ready to manage fires when they do occur.

- **Coastal Areas**

- **Coastal cities:** Coastal cities can prepare for climate change by protecting or restoring natural shoreline buffers like sand dunes and wetlands, improving storm drainage systems, and building protective barriers where necessary.
- **Coastal wetlands:** People can protect wetlands as much as possible by not disturbing the land, the flow of water, or plants in these areas.

- **Recreation**

- **Ski season:** Owners of ski resorts and other businesses (such as hotels and restaurants) that depend on winter sports can take steps to prepare for a shorter or less profitable winter season. For example, some ski resorts have added activities like golf and mountain biking to make money during other parts of the year.
- **Beaches:** People already add sand to certain beaches to replace sand that has washed away. In the future, people might have to replenish beach sand more often, but this will cost more money. In other places, people might choose to build sea walls or other structures to protect the shore from erosion. Ideally, these projects will be planned carefully to prevent them from damaging important habitats for plants and animals.

Do you want to learn first-hand about the effects of global climate change on the natural world? Here are some of the types of information you can collect:

- Track when leaves grow and flowers bloom in the spring:
- Observe migrating birds:
- Record the hatching and migration of butterflies:
- Collect information on coral reefs and reef fish:
- Monitor invasive species:
- Learn more about how you can help plants and animals adapt to climate change.

What You Can Do

Can one person help stop global climate change? Yes! Especially when the simple steps you, your friends, and your family take are multiplied by millions of people all over the world.

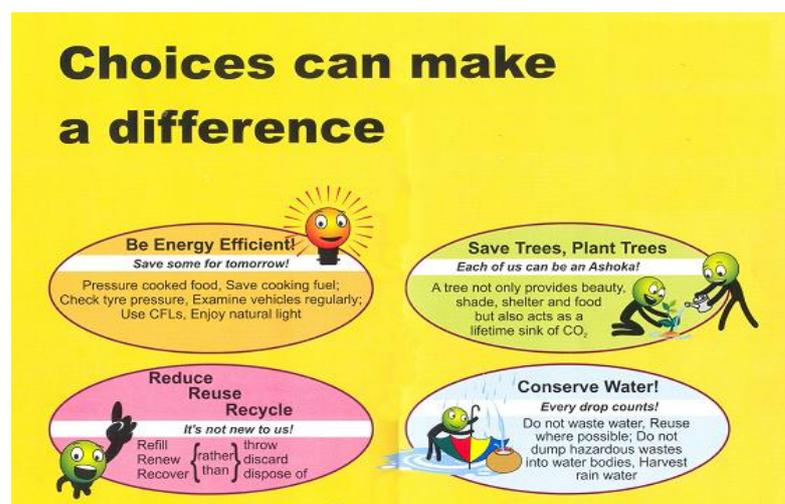
Switch to Clean Energy

- Choose green power. Talk with your family and school about switching to renewable energy.
- Generate your own power. Can your school or home generate its own renewable energy? Talk with your family and school about the possibility of installing solar panels, a solar water heater, or even a wind turbine.



Use Less Energy

- **Power down** Switch off and disconnect electronics and appliances when not in use.
- **Do the math** An energy audit can help you calculate how much energy your family uses at home and identify ways to reduce your energy use
- **Look for the label** Energy-efficient appliances



- **Be energy-wise at school**

Travel Green

- Walk, cycle or take a bus to school.
- Give the car a break.
- Walk if the distance is short.



Watch Your Water Use

- Be water-wise. Reuse water.
- Fix that faucet.
- Look for leaks.
- Keep it cool.
- Go low flow.



Reduce Waste

- Reduce.
- Reuse.
- Recycle.
- Buy recycled
- Spread the message – Reduce – Reuse - Recycle



More Ways to Make a Difference



- Plant trees.
- Consider buying locally grown food.
- Reduce your carbon footprint.
- Spread the word

It is important for people to plan for both the immediate and future impacts of climate change. Planning now will help keep societies healthy and strong by making it easier for people to successfully adapt to the changes that lie ahead.

TEST YOUR KNOWLEDGE

I. Unscramble the following words related to climate change

1. LOLGAB ARNWIMG
2. EREGNEOSHU TFECFE
3. LCNAE RYEGNE
4. EWAEHRT EXMETER

II. Fill in the blanks from the following words

Reuse, Greenhouse gas, Energy efficient, Weather extreme

1. Reduce - _____ - Recycle
2. Use _____ appliances
3. Reduce emissions of _____
4. _____ is an impact of climate change

III. Match the column

Sl no.	Column A	Column B
1	Greenhouse effect	Weather extreme
2	Burning fossil fuels	Alternate source of energy
3	Impact of climate change	Process through which greenhouse gases keep the Earth warm
4	Wind energy	Produces greenhouse gases

DID YOU KNOW?

- ✓ If there were no greenhouse gases in the atmosphere, the Earth would be a very cold place.
- ✓ Thousands of measurements of the Earth's air, water, and land are taken every day from weather stations, airplanes, ships, satellites, and many other sources all around the globe. Taken all together, these measurements and other observations tell us that

the Earth's climate is warming, people are the main cause, and impacts on society and the environment are already happening.

- ✓ Some appliances and electronics plugged into an outlet still use power, even when they are turned off. Put off and disconnect appliances and electronics when not in use.