Building Bridges

Connecting Diaspora Armenian Students with their Environmental Heritage

A newsletter of the Armenia Tree Project Ages 6-10, Issue No. 7

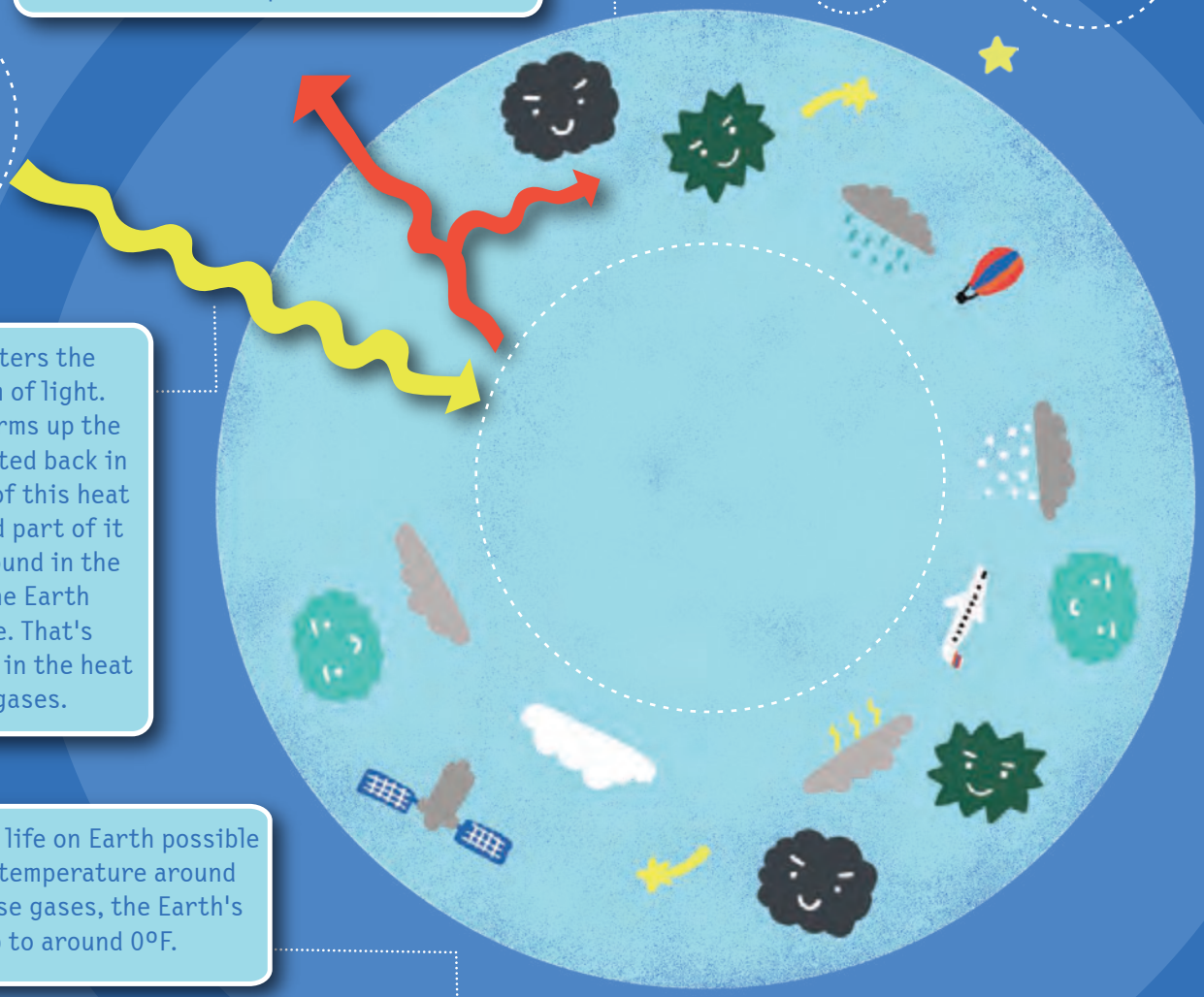
www.armeniatree.org

Help Aram meet Maral in Armenia!

WHAT IS CLIMATE CHANGE?

Complete the diagram by placing the stickers inside the dashed circles.

The atmosphere is the thin layer of gases that surrounds the Earth. It controls how cold or how hot our planet is.



Energy from the sun enters the atmosphere in the form of light. Some of this energy warms up the Earth and is then radiated back in the form of heat. Part of this heat escapes into space, and part of it is absorbed by gases found in the atmosphere, keeping the Earth warm, like a greenhouse. That's why the gases trapping in the heat are called greenhouse gases.

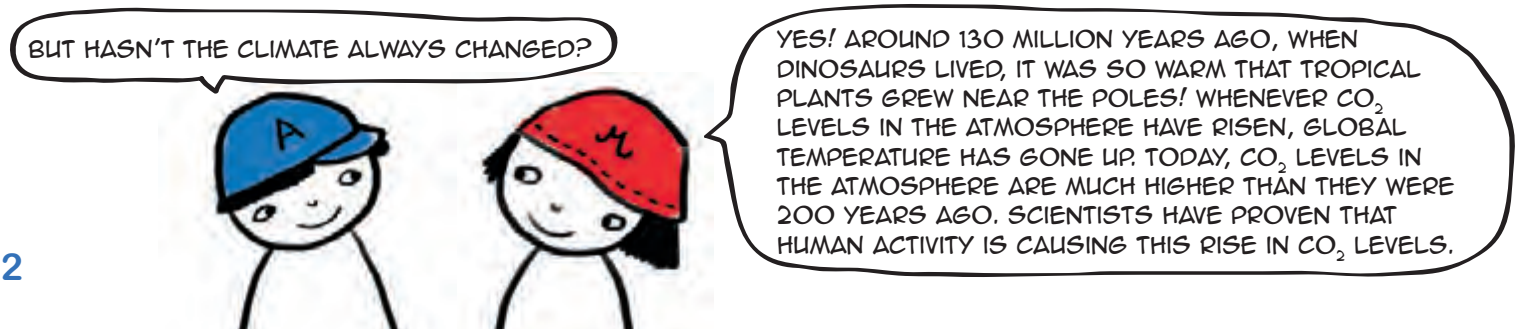
Greenhouse gases make life on Earth possible by keeping the average temperature around 59°F. Without greenhouse gases, the Earth's temperature would drop to around 0°F.

The most important greenhouse gases are

- carbon dioxide (CO_2)
- water vapor
- methane

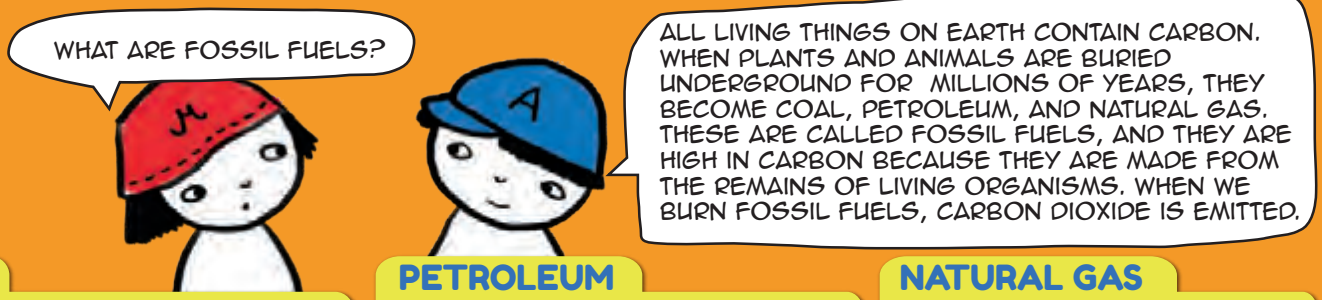
The problem is that we are releasing too much of these greenhouse gases into the atmosphere, and more heat is getting trapped, making our planet warmer. This is called global warming. It is also called climate change, because warmer temperatures are changing other aspects of the climate, like rainfall, snow, wind, and the seasons.

The Earth has warmed by an average of 1.5°F in the last century.

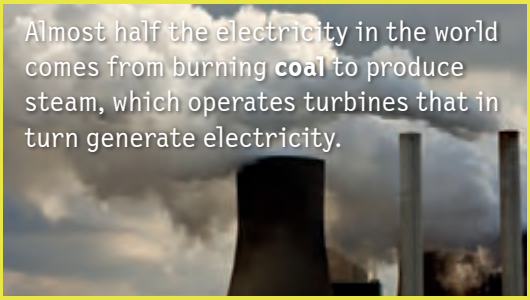


HOW ARE WE CAUSING CLIMATE CHANGE?

1 The burning of fossil fuels is the main source of CO_2 emissions.

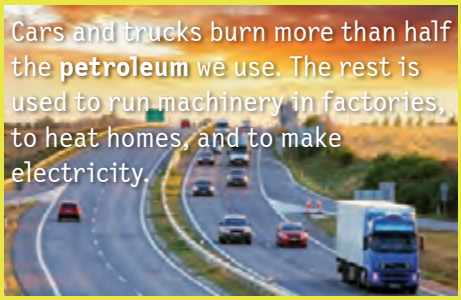


COAL



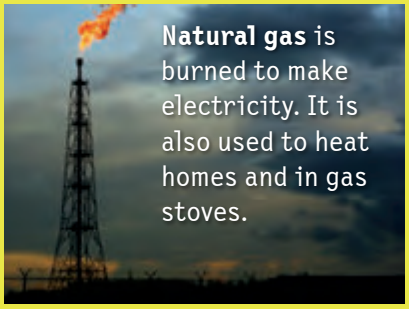
Almost half the electricity in the world comes from burning **coal** to produce steam, which operates turbines that in turn generate electricity.

PETROLEUM



Cars and trucks burn more than half the **petroleum** we use. The rest is used to run machinery in factories, to heat homes, and to make electricity.

NATURAL GAS



Natural gas is burned to make electricity. It is also used to heat homes and in gas stoves.

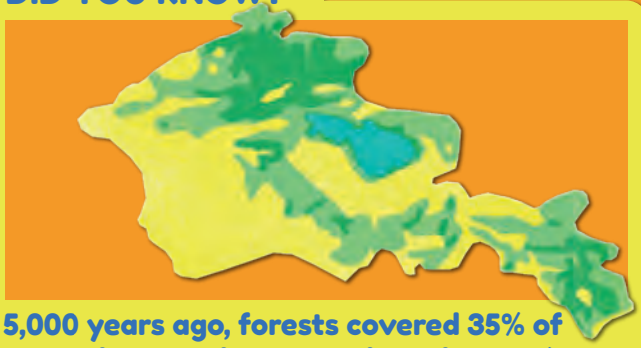
2 The production and transport of fossil fuels is the main source of methane emissions.

3 Deforestation = the destruction of forests.

Forests are cleared for roads and lumber and to open space for farms. When dead trees rot or burn, the carbon stored in them combines with the oxygen in the air to form carbon dioxide. Also, when forests are destroyed, there are less trees to absorb and store the carbon dioxide from the atmosphere.

We are destroying forests the size of about fifty soccer fields every hour!

DID YOU KNOW?



5,000 years ago, forests covered 35% of Armenia. Now they cover less than 10%.

4 Agriculture.

Plowing releases the carbon dioxide stored in the soil.

Rice paddies, manure, and gas from livestock (cows, pigs, and chickens) emit methane.

Adding fertilizers to crops releases nitrous oxide (another greenhouse gas).

5 Methane is released from waste in landfills.

CLIMATE CHANGE IS CHANGING OUR WORLD

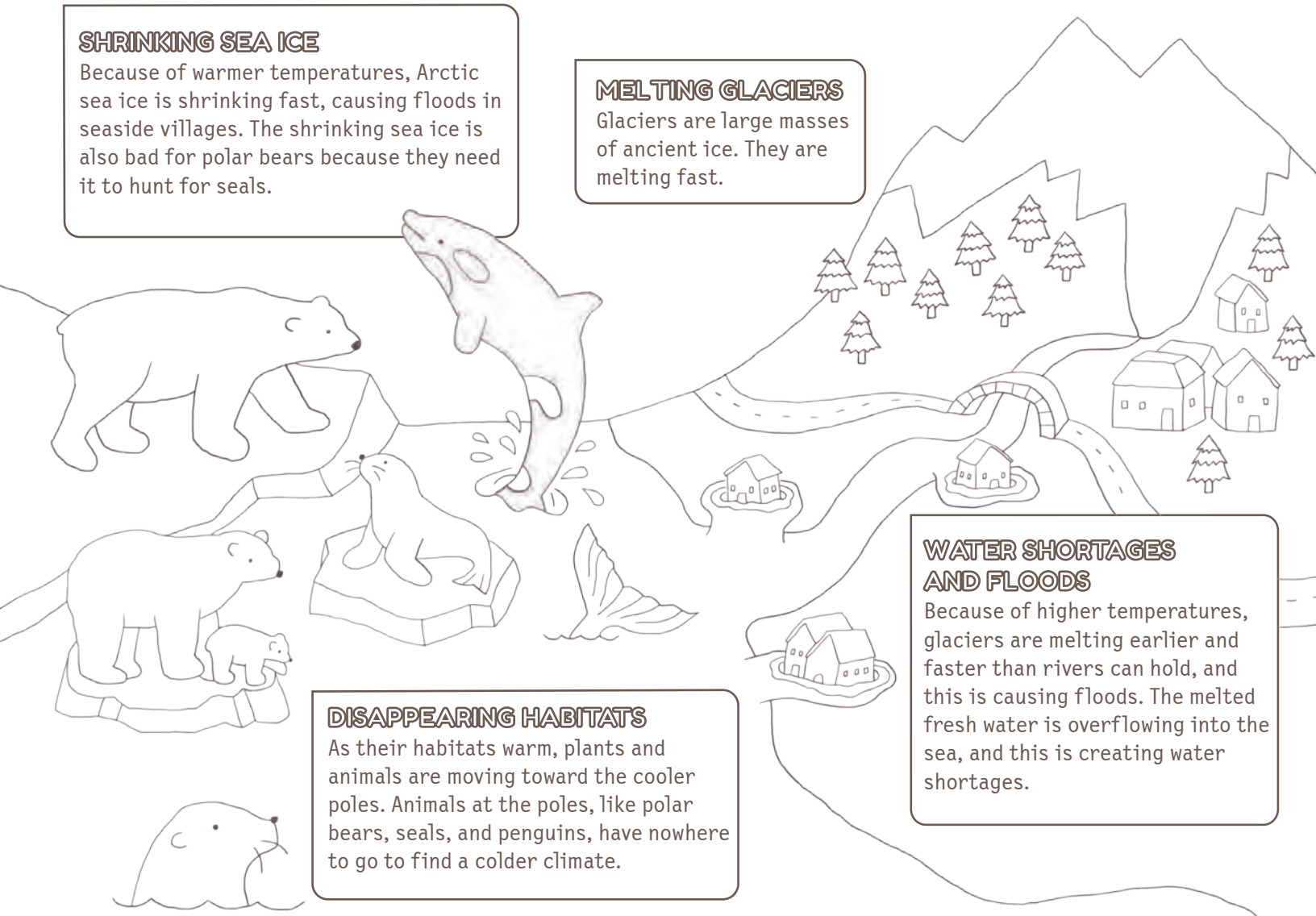
Get your markers and color this scene! Find out what is happening to our planet as it gets warmer.

SHRINKING SEA ICE

Because of warmer temperatures, Arctic sea ice is shrinking fast, causing floods in seaside villages. The shrinking sea ice is also bad for polar bears because they need it to hunt for seals.

MELTING GLACIERS

Glaciers are large masses of ancient ice. They are melting fast.



WATER SHORTAGES AND FLOODS

Because of higher temperatures, glaciers are melting earlier and faster than rivers can hold, and this is causing floods. The melted fresh water is overflowing into the sea, and this is creating water shortages.

DISAPPEARING HABITATS

As their habitats warm, plants and animals are moving toward the cooler poles. Animals at the poles, like polar bears, seals, and penguins, have nowhere to go to find a colder climate.

POSITIVE FEEDBACK

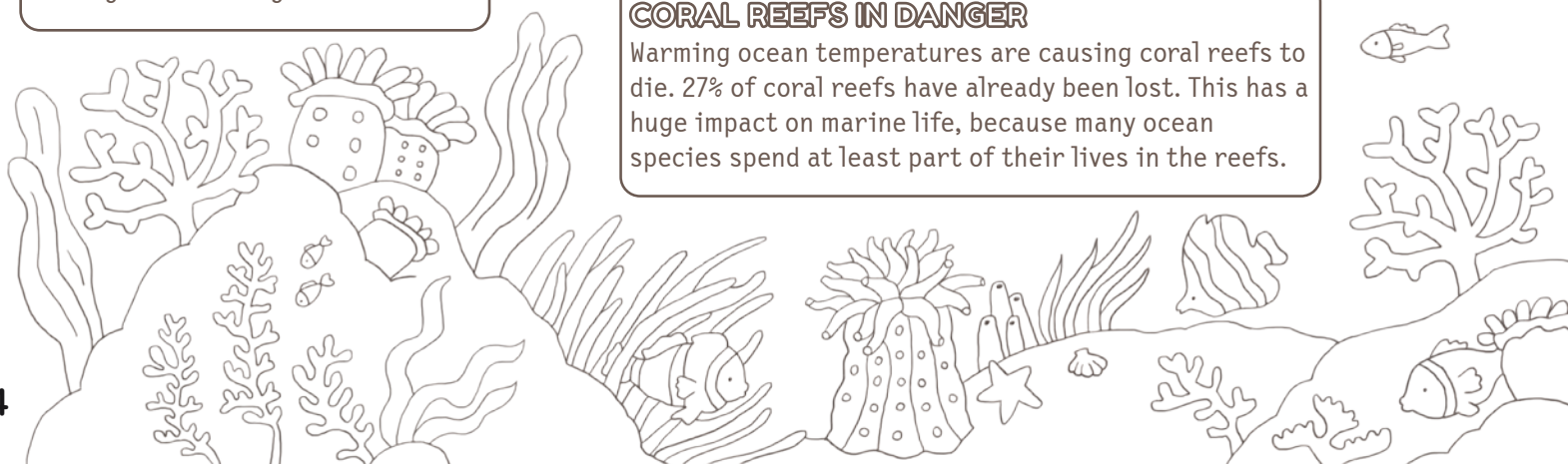
The polar ice caps and glaciers reflect the sun's heat because they are white. With the ice caps and glaciers shrinking, the Earth is not reflecting as much heat, causing more global warming.

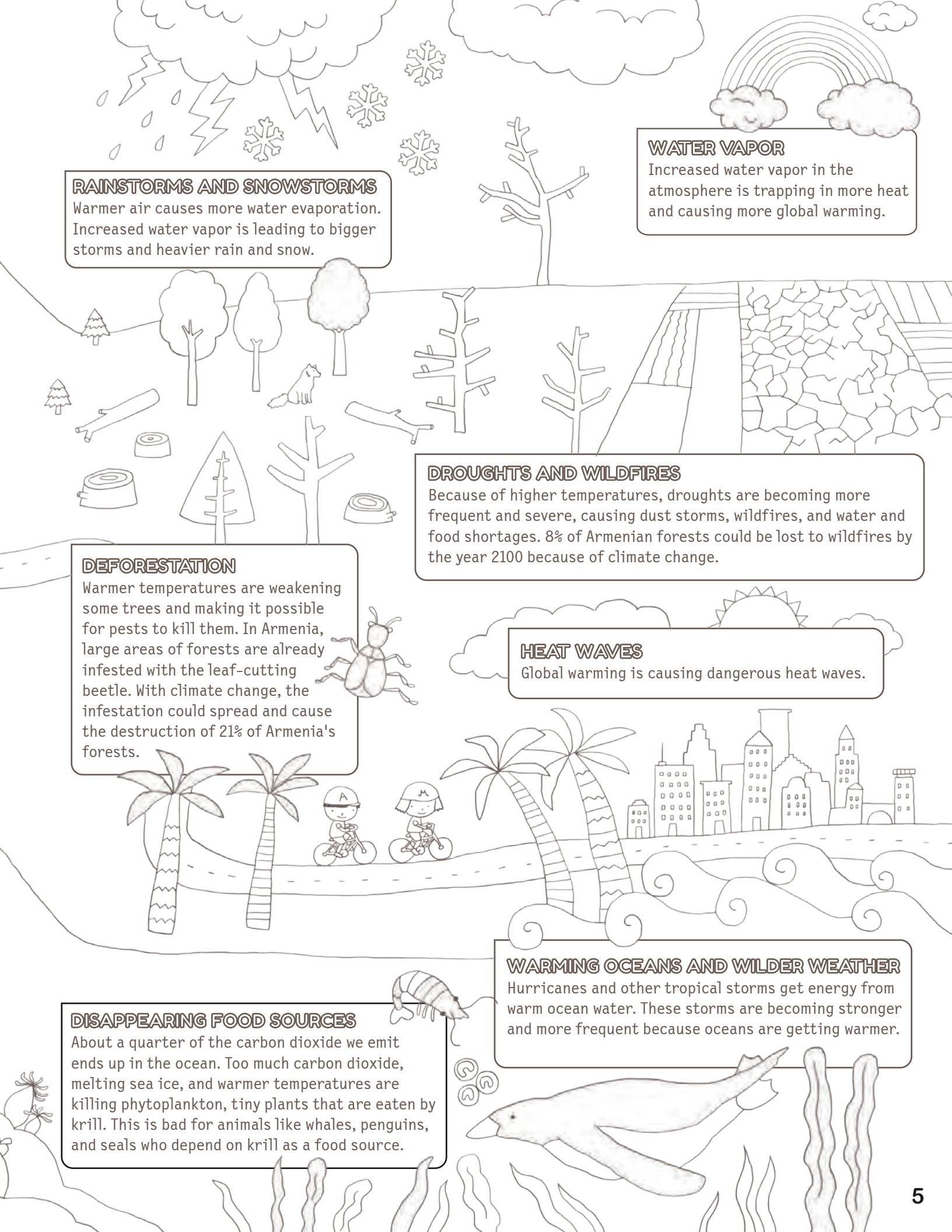
SEA LEVEL RISE

Melting glaciers cause a rise in sea level. With so much ice melting, sea levels have risen around 7.5 inches in the last century. Many people living near the ocean could lose their homes if sea levels continue to rise.

CORAL REEFS IN DANGER

Warming ocean temperatures are causing coral reefs to die. 27% of coral reefs have already been lost. This has a huge impact on marine life, because many ocean species spend at least part of their lives in the reefs.





RAINSTORMS AND SNOWSTORMS

Warmer air causes more water evaporation. Increased water vapor is leading to bigger storms and heavier rain and snow.

WATER VAPOR

Increased water vapor in the atmosphere is trapping in more heat and causing more global warming.

DROUGHTS AND WILDFIRES

Because of higher temperatures, droughts are becoming more frequent and severe, causing dust storms, wildfires, and water and food shortages. 8% of Armenian forests could be lost to wildfires by the year 2100 because of climate change.

DEFORESTATION

Warmer temperatures are weakening some trees and making it possible for pests to kill them. In Armenia, large areas of forests are already infested with the leaf-cutting beetle. With climate change, the infestation could spread and cause the destruction of 21% of Armenia's forests.

HEAT WAVES

Global warming is causing dangerous heat waves.

WARMING OCEANS AND WILDER WEATHER

Hurricanes and other tropical storms get energy from warm ocean water. These storms are becoming stronger and more frequent because oceans are getting warmer.

DISAPPEARING FOOD SOURCES

About a quarter of the carbon dioxide we emit ends up in the ocean. Too much carbon dioxide, melting sea ice, and warmer temperatures are killing phytoplankton, tiny plants that are eaten by krill. This is bad for animals like whales, penguins, and seals who depend on krill as a food source.

HOW CAN WE STOP CLIMATE CHANGE?

To stop climate change, we need to reduce greenhouse gas emissions.

SOLAR ENERGY

Solar power plants use large mirrors to focus sunlight on a tower containing a liquid. The liquid is heated and is used to make steam, which is then used to create electricity.

Solar panels absorb sunlight and convert it to electricity.


© Mariusz Blach/Dreamstime


© Tangencial/Dreamstime

Armenia has plans to start manufacturing solar panels and to construct a number of solar power stations.

WIND ENERGY

Wind turbines are used to make electricity. The blades of a wind turbine spin when the wind blows. The rotating blades turn a shaft that is connected to a generator that creates electricity.

Armenia has one wind farm in the province of Lori.


photo: Vahe Martirosyan

GEOTHERMAL ENERGY

Geothermal power comes from heat deep within the Earth. The Earth's core is a ball of iron and can be as hot as 12,600F!!

At a geothermal power plant, wells are drilled 2 miles into the Earth to pump steam to the surface. The steam is used to generate electricity.


© Selitbul/Dreamstime

In Armenia, a geothermal power plant will be constructed in the volcanic area of Qarqar.


photo: Marine Petrosian

HYDROPOWER

The energy captured from the movement of a river is used to generate electricity in a hydroelectric power plant.


photo: Levon Galstyan

Hydropower provides about one-third of Armenia's electricity.

MARINE ENERGY

The energy from waves and tides can be captured using special buoys and turbines.

SAVING OUR FORESTS

Trees absorb a lot of CO_2 and give us clean oxygen to breathe everyday. When forests are destroyed, they release CO_2 and can no longer absorb it. Protecting forests and planting new ones is necessary to stop climate change.

Since 1994, ATP has planted over 5 million trees in Artsakh and Armenia. In 2017, 260,000 more trees will be planted.

NUCLEAR POWER

In a nuclear power plant, uranium atoms release energy as they are split. This energy heats water, creating steam that moves through a turbine, which turns a generator to create electricity.

The Metsamor Nuclear Power Plant in Armenia began operation in 1976, but was shut down in 1988 after the earthquake for safety reasons. It reopened in 1995, and its operation has been extended to 2027. It provides around 40% of Armenia's electrical power.

ORGANIC FARMING

Organic farms use less fossil fuels and do not use artificial fertilizers. They do not contribute to global warming.

BIOMASS ENERGY

Biomass energy comes from organic material like dead plants, trees, grass, leaves, crops, animal fat, manure, and more. Biomass can be burned to create heat or electricity. It can also be used to produce biofuels and even as a fertilizer for trees!

In the small Armenian village of Basen, a special oven is used to transform straw into fuel pellets for heating.

ELECTRIC VEHICLES

Electric cars are powered by an electric motor instead of a gasoline engine. They emit no pollution when operated.

ENERGY EFFICIENCY

How much energy we need depends on efficiency. Being efficient means using less energy for the same amount of work. For example, well-insulated buildings are energy-efficient because they retain more heat.

In this infrared photo, the red, orange, and yellow areas show where heat is being lost. The blue building on the left is more energy-efficient because it has fewer heat leaks than its neighbor.

WORD SEARCH: Can you find all 11 words that are underlined on these pages?

M	O	R	G	A	N	I	C	E	N
A	H	L	E	U	D	L	N	F	U
R	M	F	O	R	E	S	T	F	C
I	T	R	T	L	O	R	H	I	L
N	M	G	H	A	T	A	S	C	E
E	O	P	E	L	F	L	U	I	A
H	Y	D	R	O	P	O	W	E	R
B	I	O	M	A	S	S	I	N	F
W	R	G	A	M	P	A	N	C	R
D	S	L	L	O	G	F	D	Y	M
E	L	E	C	T	R	I	C	U	W

USING LESS ENERGY: WHAT CAN YOU DO?
The easiest way to stop global warming is to use less energy. Check out pages 10 and 11 to find out what YOU can do!

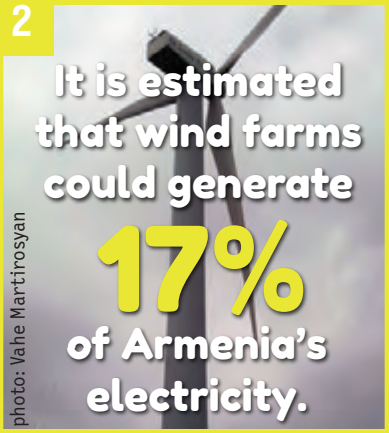
20 Facts ABOUT

1

Armenia is more vulnerable to climate change consequences than most countries in Europe and Central Asia.

© Evgenia Fashayan/Dreamstime

2



It is estimated that wind farms could generate **17%** of Armenia's electricity.

photo: Vahe Martirosyan

3

The North Pole is **3.6°F** warmer than it was 50 years ago.

© Christopher Hilger/Dreamstime

4

Every gallon of gasoline a car burns releases **20 pounds** of CO_2 into the air.

© Winai Tepsuttinun/Dreamstime

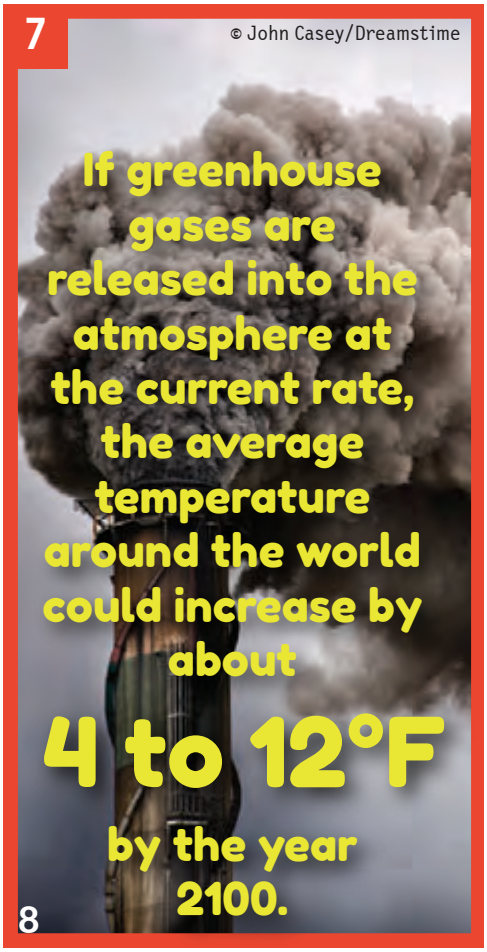
5

The geothermal energy that could be developed is **1,000** times more than the annual consumption of energy in the world.

6

In Sweden there is a train powered with methane released from decomposing waste.

7



© John Casey/Dreamstime

If greenhouse gases are released into the atmosphere at the current rate, the average temperature around the world could increase by about **4 to 12°F** by the year 2100.

8

21-34% of forests in Armenia are at risk of disappearing due to climate change.

9

The greenhouse effect is so strong on Venus that its average temperature is **855°F!**

© Yurikswo/Dreamstime

10

Dinosaurs contributed to global warming by passing tons of gas!

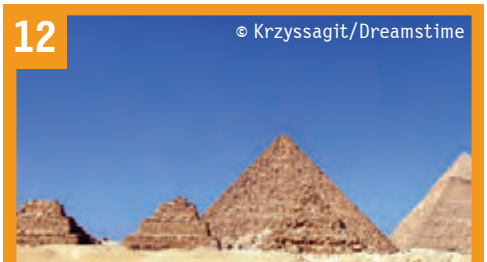
© Valentin Negoescu/Dreamstime

11

In Chinese schools, each student must plant at least one tree before graduating.

CLIMATE CHANGE

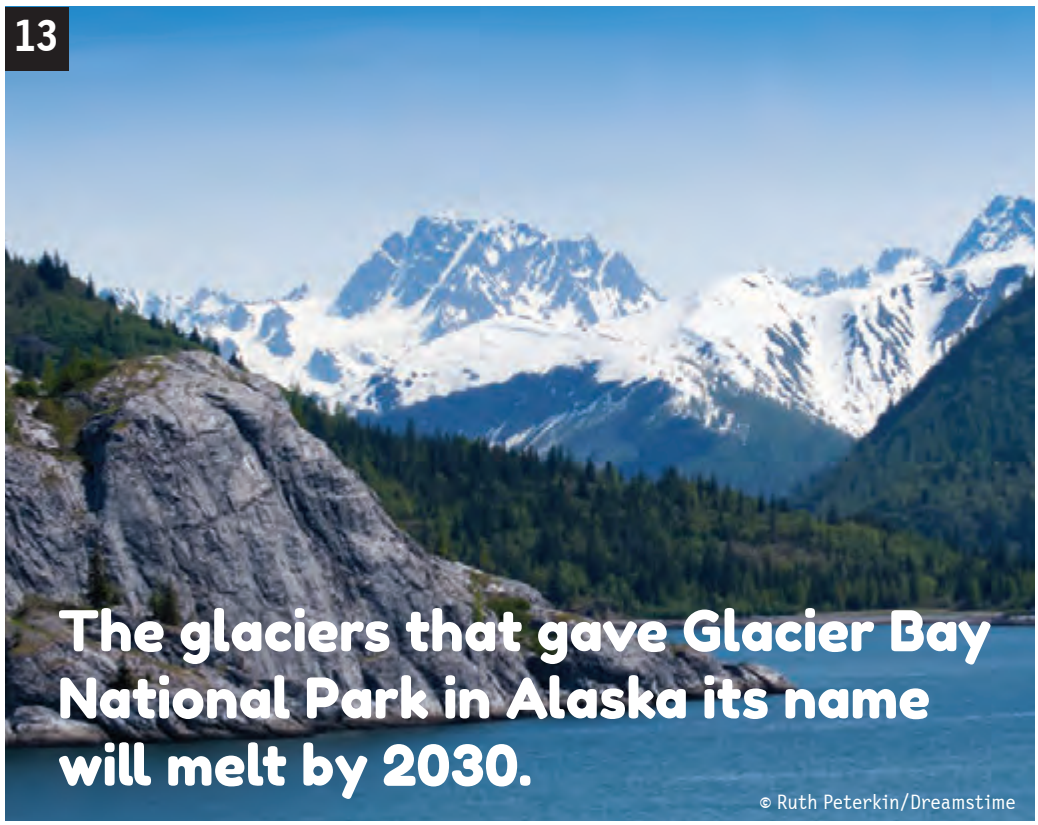
12



© Krzyssagit/Dreamstime

Egypt's Old Kingdom collapsed because of an extended drought 4,200 years ago!

13



The glaciers that gave Glacier Bay National Park in Alaska its name will melt by 2030.

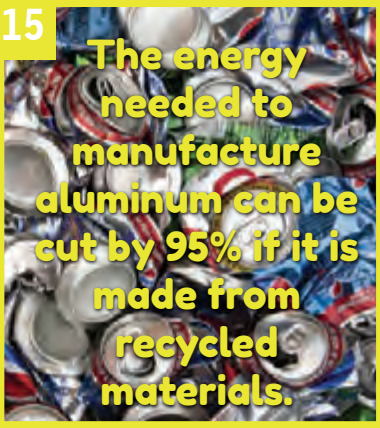
© Ruth Peterkin/Dreamstime

14

© W.scott Mcgill/Dreamstime

Wind energy provides 6% of the electricity in the US, but it has the potential to provide 30%.

15



The energy needed to manufacture aluminum can be cut by 95% if it is made from recycled materials.

© Steve Allen/Dreamstime

16

© Hovikm/Dreamstime

If the global warming rate does not change, the water flowing to Lake Sevan will decrease by 19% by 2100.

17

© Wang Peng/Dreamstime

If the Himalayan glaciers disappear, 2.6 billion people will face a shortage of drinking water.

18

Americans drive their vehicles a total of

3 trillion

miles per year.

That's like driving to the sun and back 13,440 times!

19

About 22% of CO_2 emissions is caused by deforestation.

© Hoxuanhuong/Dreamstime

20

If everyone planted

2 trees a year for 10 years,

it would make up for all of the deforestation of the past 10 years.

A SMALL CARBON FOOTPRINT WINS THE RACE!

Your carbon footprint is the amount of CO_2 released because of your activities. The smaller your carbon footprint, the less you add to climate change. Play this game with friends and learn how your daily activities affect climate change.

YOU WILL NEED:
- a dice
- playing pieces like a pebble or coin
- a pencil and piece of paper to add your points

HOW TO PLAY:
Place your players at START and let the youngest player roll the dice first. Move as many spaces as the dice is rolled. If you land on a green space, you gain 0 or 1 carbon footprints. If you land on an orange space, you gain 2 carbon footprints.

The game ends when one of the players reaches FINISH. The player with the least points has the lowest carbon footprint and is the winner!

START

you lower the thermostat in winter +1

you turn off the light when you leave a room +0

you take long showers +2

you use LED light bulbs at home +1

you walk or bike often +0

You wash and dry half loads of clothes +2

you fix items that are broken instead of buying new ones +1

you recycle +1

you eat meat often +2

you buy products made with recycled materials +1

you throw away leftovers +2

you help plant trees +0

on hot days, you use fans instead of air conditioners +1

you use public transportation often +0

you use plastic bags instead of reusable ones +2

you eat organic food often +1

you often buy over-packaged products +2

you compost food scraps +1

you donate your clothes when you outgrow them +0

FINISH

aram and maral

ARAM AND MARAL ARE PLANTING TREES IN YEREVAN WITH ATP.

I AM SO GLAD WE ARE PLANTING TREES! WE ALL NEED TO HELP STOP CLIMATE CHANGE!

YES! PLANTING A TREE IS GREAT BECAUSE EVERYONE CAN DO IT. IT HELPS THE PLANET BECAUSE TREES REDUCE GLOBAL WARMING BY REMOVING THE CARBON DIOXIDE FROM THE AIR.

THEY ARE ALSO HOME TO MANY ANIMALS!

LOOK! THIS HOUSE IS SURROUNDED BY TREES! THIS IS ANOTHER WAY TREES HELP STOP CLIMATE CHANGE. THE TREES KEEP THE HOUSE COOL IN THE SUMMER, SO THERE WILL BE NO NEED TO USE FANS AND AIR CONDITIONERS, REDUCING ENERGY USE.

I LOVE THE SHADE!

HAVE YOU HEARD ABOUT URBAN "HEAT-ISLANDS"?

NO, WHAT ARE THEY?

WHEN THERE ARE NO TREES IN A NEIGHBORHOOD, IT BECOMES MUCH WARMER THAN AREAS THAT ARE SHADEAD WITH TREES. THIS IS CALLED THE "HEAT-ISLAND EFFECT."

SO WHEN WE PLANT TREES IN THE CITY, WE ARE MAKING IT COOLER AND HELPING REDUCE ENERGY USE AND THAT REDUCES GLOBAL WARMING!

IT'S TOO HOT IN HERE!

I THINK THIS PARKING LOT COULD USE SOME TREES, TOO!

YES! IN FACT, PARKING CARS IN THE SHADE KEEPS THEM COOLER, AND THIS MAKES THE WHOLE AREA COOLER, SO LESS ENERGY IS USED TO KEEP COOL.

WOW! I KNEW TREES WERE IMPORTANT TO STOP CLIMATE CHANGE, BUT I HAD NO IDEA THEY WERE SO COOL, HAHA!

THEY ALSO GIVE US FRUITS!

YES, THEY ARE. AND I AM SO HAPPY WE ARE ABLE TO HELP ATP MAKE ARMENIA GREENER BY PLANTING TREES.

ME TOO. YOU KNOW, I ALSO HELP PLANT TREES IN MY OWN NEIGHBORHOOD BACK HOME. IT DOESN'T MATTER WHERE YOU LIVE, YOU CAN PLANT TREES ANYWHERE TO HELP THE PLANET.

TRUE! BUT IF YOU WANT TO HELP ARMENIA BECOME GREENER AND CAN'T TRAVEL THERE, YOU CAN ALWAYS USE THE DONATION BOX IN THIS NEWSLETTER TO HELP ATP PLANT TREES!

LET'S ALL WORK TOGETHER TO STOP CLIMATE CHANGE! AS DR. SEUSS' LORAX SAYS: "UNLESS SOMEONE LIKE YOU CARES A WHOLE AWFUL LOT, NOTHING IS GOING TO GET BETTER. IT'S NOT!"

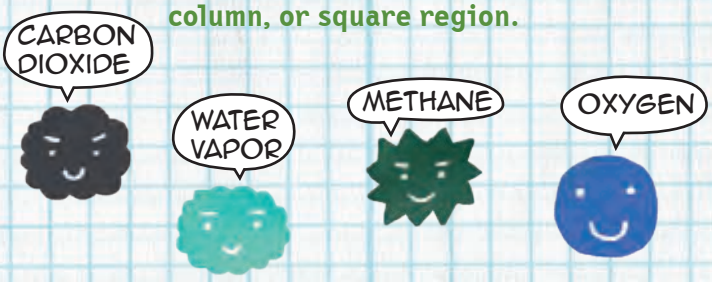
I LOVE TREES!

GLOSSARY

Atmosphere: the layer of gases surrounding the Earth.
Carbon footprint: the amount of carbon dioxide created by a person's activities or the manufacture and transportation of a product.
Climate: the usual weather conditions of a region.
Climate change: the changes in climate factors, including rain, snow, temperature, and winds, caused by global warming.
Deforestation: the process of cutting down trees in a forest.
Drought: a long period of time with little or no rain.
Energy efficiency: using less energy to do something by limiting the ways energy is wasted.
Fossil fuels: carbon-containing fuels, like coal, petroleum, and natural gas, formed from the remains of ancient plants and animals.
Glacier: a large mass of ice formed in cold regions from compacted snow.
Global warming: an increase in the world's average surface temperature.
Greenhouse effect: the warming of the Earth's surface that takes place when heat from the sun is held in by the atmosphere.
Greenhouse gases: the gases that contribute to the greenhouse effect by trapping in the heat from the sun. Carbon dioxide is a greenhouse gas.
Habitat: the natural environment of an animal or plant.
Organic farming: a method of producing food and other plant and animal products without using chemicals.
Sea ice: the solid layer of frozen ocean water.
Wind farm: a group of energy-producing wind turbines.

ATMOSPHERIC SUDOKU

Using the greenhouse gas and oxygen stickers included in the newsletter, complete this puzzle in such a way that there is only one of each gas in any given row, column, or square region.



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ARMENIA TREEPROJECT

Developed by Alik Arzoumanian and Sarah Hayes. Designed and illustrated by Alik Arzoumanian.
Funded by the Thomas A. Kooyumjian Family Foundation as part of ATP's Building Bridges Program.
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printed on recycled paper