

## Water Cycle Wheel Activity Kit



*To the Instructor:* You will notice that this manual is written as if it were to be read by young learners. We have done this intentionally to provide specific language and examples that can be used in lessons taught by those unfamiliar with this topic. Feel free to use our language or simply pull out the facts and use your own.

Visit [www.nature-watch.com/watercycle](http://www.nature-watch.com/watercycle) to watch step by step video assembly instructions.

### AN INTRODUCTION TO THE EARTH'S WATER

Think about all the places you can *find water*... in oceans, rivers, and lakes, in your kitchen sink, and in water fountains you drink from. Now think about all the ways you *use water* every day... you drink it, you bathe in it, you use it to water your plants, to wash your clothes and in so many other ways too!

Water is truly all around us, and has so many different uses. We know a lot of ways that we use water, but did you know that the Earth uses water too? Water is an important part of the Earth's weather and ecosystem (*Everything that exists in a particular environment*).

So how can water do so many different things and serve so many purposes? The water that surrounds us on Earth is always in motion. Water doesn't only move on the surface of the Earth (where we live)—it also moves above the Earth (in the sky) and below the Earth's surface in groundwater.

The **Water Cycle** is the name of the process that describes the movement of water across and between all parts of the Earth (scientists also call it the **hydrologic cycle**).

If water is always in motion around us, wouldn't it feel like we're swimming all the time? Not really—water can take on

many different forms. We can't always see it because it isn't always in the same form as the water we drink. Water can be a solid, a liquid, or a gas.

The way that we commonly think of water is as a **liquid**. Water is a liquid when its particles are all very close to each other, but not touching or attached to each other. The particles can move around freely, so water in its liquid form takes on the shape of the item it's contained in... think about how water takes on the shape of a cup when its poured inside one, but it spreads out into a big puddle if you pour it on the ground.

Water has a **solid** state, also known as ice. Water becomes solid when it gets very cold. Ice can be many different things—an ice cube in your freezer, a glacier in the ocean, or a snowflake. In its solid state, water's particles are all attached to each other, and since they are so close together they feel hard or solid.

Lastly, water as a **gas** is known as "water vapor." When water is a gas, its particles are all very far apart and move around freely (think of steam). As water vapor cools, the many little water droplets join together into larger droplets that form clouds and fog.

Standards alignment information is available at: [www.nature-watch.com/standards](http://www.nature-watch.com/standards)

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# THE WATER CYCLE

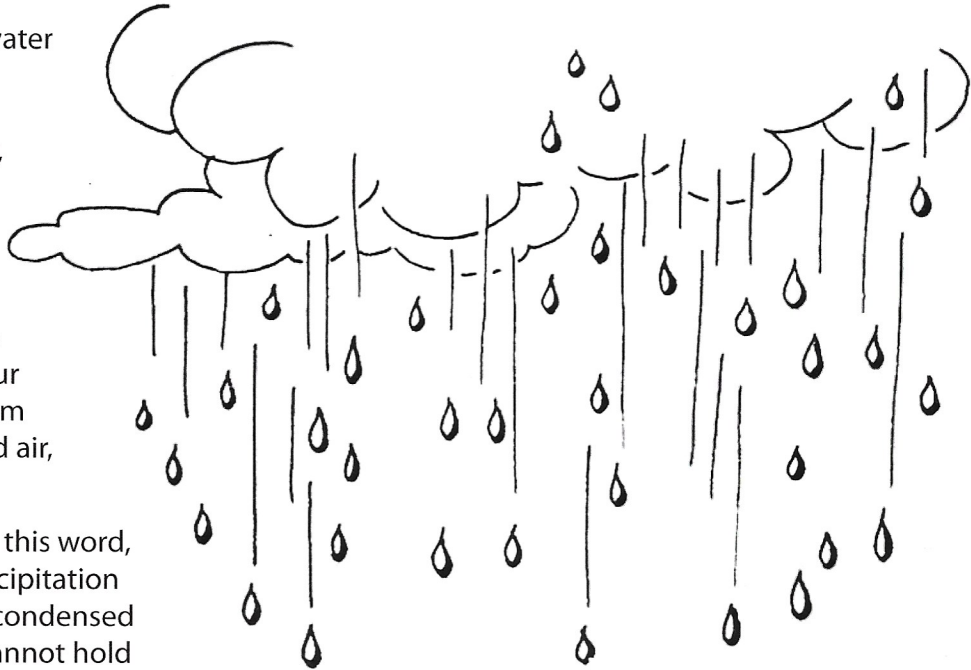
The water cycle is the term for the continuous movement of water through the atmosphere, the surface of the Earth, and under the Earth (as soil water or groundwater). The name for all of these areas where water can be found is the hydrosphere.

There are several processes that make up the water cycle...

**Evaporation:** Evaporation is the process of water turning from a liquid to a gas. When the sun heats up bodies of water like the oceans, lakes or rivers, the liquid water turns to vapor or steam and rises into the air above. In order for evaporation to occur, water particles must heat up and begin to move freely. (Evaporation can be illustrated by our bodies when we sweat. When we get hot, our bodies produce sweat as liquid on our skin—we can dry it with a towel, or the liquid will become warm and turn into vapor. As our sweat evaporates, we feel cooler).

**Transpiration:** Water doesn't only turn into gas when it rises off of bodies of water like the oceans... it also turns into vapor when it rises off plants, trees, and land—this process is known as transpiration. Transpiration is the process by which plants lose water out of their leaves. The majority of water vapor in the air is from evaporation, but transpiration does its part to help move along the water cycle.

**Condensation:** Condensation occurs when water vapor in the atmosphere begins to cool down and turn back into liquid again. As the water particles change from being warmer to cooler, they begin to take the form of water droplets. Condensation is a very important part of the water cycle because it produces clouds, which are made of many little water droplets bunched together. Another example of condensation is when you're able to see your breath on a cold winter day—the moisture from your warm mouth condenses as it hits the cold air, which allows you to see it as a "mini cloud."



**Precipitation:** Even if you're not familiar with this word, chances are you're very familiar with what precipitation is—rain, snow, sleet or hail. When the air has condensed so much water vapor back into liquid that it cannot hold it all anymore, precipitation falls back to the Earth's surface.

Precipitation is the main way that water is delivered back to the surface of the Earth.

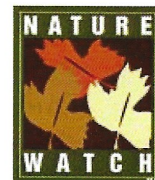
**Collection:** When water falls back to the Earth as precipitation, it may fall back into bodies of water like oceans, or it may fall on to the ground where it runs off into streams, rivers, ponds, and lakes. Animals or plants may "drink" some of this water. Some will percolate down through the ground into underground pools of groundwater that we can pump and use. Water will then evaporate again from oceans, lakes etc. and the process begins all over again.

The important thing to remember about the water cycle is that these processes do not all occur one at a time—they're *all* happening *all* the time. Since there is no starting or ending point to the water cycle, it is continuous and unending. So, when you turn your Water Cycle Wheel in the direction the arrows point, you'll see water drops or rain and snow moving through all the openings, illustrating the constant cycling of water around Earth.

## Answers to Questions on Back of Manual

- |                  |                   |
|------------------|-------------------|
| 1. Liquid        | 7. Gas            |
| 2. Condensation  | 8. Pollution      |
| 3. Oceans        | 9. Motion         |
| 4. Water Cycle   | 10. Collection    |
| 5. Precipitation | 11. Solid         |
| 6. Evaporation   | 12. Transpiration |

# POLLUTION AND THE WATER CYCLE



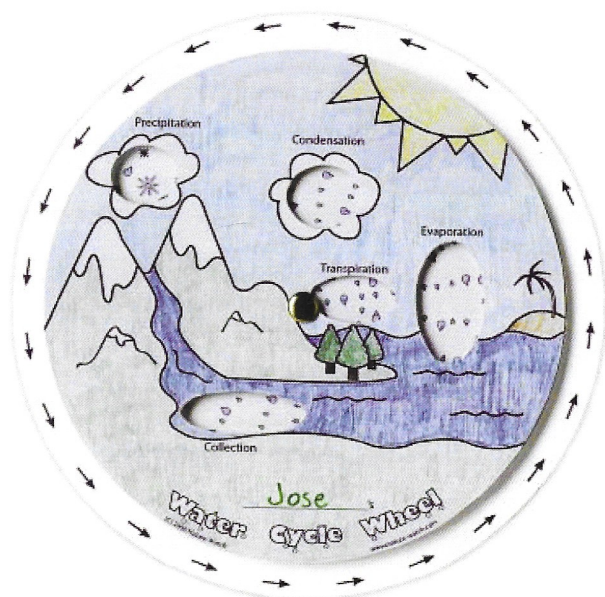
Pollution is the introduction of chemicals or other unwanted elements to an environment. With more than 7 billion people on Earth, our planet is affected by pollution in many ways. **Water pollution** is one of the major types of pollution. Water is considered “polluted” when we can’t use it for its intended purpose.

There are lots of ways that water can become polluted:

- **Chemicals** from factories or manufacturing plants can contaminate water. Also, chemicals can enter our water supply from things as simple as pouring paint or motor oil into a street drain.
- Our own **trash** can cause water pollution—many of the items that we throw away contain chemicals or other pollutants that will enter our groundwater supply once that trash is sitting in a landfill. This is why we’re not supposed to throw items like batteries into the trash (they go into special recycling programs).
- **Sewage** can leak into rivers and streams.
- There are also several natural events that can affect the quality of the water: volcanoes, earthquakes and storms can disrupt the water supply or cause it to become more polluted. These events are beyond our control, so it is important that we decrease human caused pollution as much as possible to decrease the total amount of pollution around us.

So why is water pollution bad? Pollution can enter our water supply in many different places—oceans, lakes, rivers, creeks, groundwater and more. Water from any of these places will reenter the water cycle through evaporation or transpiration. (Just like the water cycle is an efficient way of spreading *water* around, it can also quickly spread *pollution* once it enters the water supply.) Polluted water can then get into our food supply when we eat animals that drink it or eat crops watered by it. Fish that we eat can also absorb pollutants from water.

## INSTRUCTIONS FOR ASSEMBLING YOUR WATER CYCLE WHEEL



Visit [www.nature-watch.com/watercycle](http://www.nature-watch.com/watercycle) to watch step by step video assembly instructions.

### Materials:

- Front and back of water cycle wheels
- Brass fasteners
- Crayons, markers or colored pencils (you provide)

### Instructions:

1. Begin by discussing the water cycle (previous page) with your participants.
2. As you talk about the various phases of the cycle, allow them to color in both the front and back of their diagrams. (Be sure to have the participants write their names in the space provided!)
3. Attach the front wheel to the back wheel using a brass fastener.
4. Rotate your Water Cycle Wheel in the direction of the arrows to illustrate the movement of water through all parts of the water cycle!

## ADDITIONAL WATER CYCLE ACTIVITIES

1. **Conservation.** The water cycle is actually the perfect example of recycling! Just like we can recycle or reuse old paper, bottles or cans, our water is constantly moving through the water cycle (from vapor to clouds to rain to water storage and back to vapor again). However, even though water is always cycling, we need to do our part to conserve it. How can we help conserve or recycle water? What can you do at home or at school to help use less water?
2. **Evaporation in action!** You can watch evaporation in action by measuring a puddle. All you need is a piece of chalk and a puddle on the ground (this works best on a sunny

day). First thing in the morning, outline the puddle with the chalk. A couple hours later, go back to the puddle and outline it again. Continue this a few more times throughout the day. As the liquid on the ground evaporates into water vapor, the puddle should shrink. Where did the water go?

3. **Weather Words.** The water cycle is tied-in very closely to our Earth’s weather. Learn about different weather terms and how they apply to the water cycle. What’s the difference between rain and snow? Is evaporation affected by the temperature of the air? Do different looking clouds cause different types of weather?

NAME: \_\_\_\_\_



## WATER WRAP-UP!

Test your water cycle knowledge by filling in the blanks below. Use the Word Bank to the right to see all the possible answers.

1. When water is a \_\_\_\_\_, its particles are close to each other (but not touching) and can move around freely.
2. \_\_\_\_\_ occurs when water vapor in the atmosphere begins to cool down and turn back into liquid again.
3. \_\_\_\_\_ are the largest bodies of water on Earth.
4. \_\_\_\_\_ is the name of the process that describes the movement of water across and between all parts of the planet.
5. Rain, snow, sleet and hail are known as \_\_\_\_\_.
6. \_\_\_\_\_ is the process of water turning from a liquid to a gas.
7. When water is in a \_\_\_\_\_ state, we also call it "water vapor."
8. \_\_\_\_\_ is the introduction of chemicals or unwanted elements into our environment or water supply.
9. The water that surrounds us on Earth is always in \_\_\_\_\_.
10. \_\_\_\_\_ is the process of water gathering together in bodies of water or the ground.
11. When water is in its \_\_\_\_\_ state, it's also known as ice.
12. \_\_\_\_\_ is the process of water turning from liquid to gas as it rises off of plants, trees, and land.

### WORD BANK

Collection  
Condensation  
Evaporation  
Gas  
Liquid  
Motion  
Oceans  
Pollution  
Precipitation  
Solid  
Transpiration  
Water cycle

## DID YOU KNOW?

- There is a lot of water on the Earth... over 290,000,000 cubic miles of water! More than 75% of the Earth's surface is covered in water. Of all the Earth's water, the vast majority of it—97%—is salt water like we find in the oceans. And of the 3% that is fresh water (like what we drink or find in most lakes), almost all of it is stored underground.
- Most water on Earth today is the same water that's been here since Earth was formed. You could be drinking or swimming in the same water that was used by the dinosaurs!
- A tree can drink enough water in one day to fill up four bathtubs.
- Earth has a perfect place in our solar system as the third planet from the sun. This distance creates a temperature that allows most of our water to be in its liquid form. If Earth were closer to the sun, our water would get so hot that it would all turn into water vapor, and if we were further from the sun, water would get very cold and all turn in to ice.
- Water helps to regulate the temperature of the Earth. For instance, as water evaporates off the oceans, it cools the atmosphere.
- In the United States, the average amount of water used per person is about 80+ gallons per day (USGS.gov)!