Water Wise

By: Nikita LaCour

Focus on Inquiry

The learners will become water wise as they make personal connections through project-based learning, case studies, and Newbery Medalist Linda Sue Park's novel, *A Long Walk to Water*. Numerous opportunities will lend itself for learners to predict and identify environmental and global challenges in regard to water scarcity and culturally relevant issues in an assortment of water wise lessons. The learners will describe this waterwise state of affairs through science, technology, reading, engineering, art, and mathematics (STREAM). They will write, research, analyze, present, construct models, and utilize the scientific method and engineering design process as they navigate through the water wise engaging lessons.

Lesson Summary

In this lesson, students engage in discussions about water and its significance, including examining statements related to leadership and resources. They start by sharing prior knowledge about Africa and the importance of water, discussing its uses and sources, and questioning the accessibility of clean water. Through reading *A Long Walk to Water*, students build vocabulary and background knowledge while exploring the global water crisis. They research water-related topics using various resources and watch videos that highlight struggles for clean water, prompting discussions about the causes of water shortages and the impact of climate. Students create presentations featuring interesting facts about water, conduct character trait analyses of figures in the book, and design pamphlets promoting water conservation. They also study specific case studies, such as Flint and Jackson, to understand local water issues. The lesson incorporates multimedia elements, such as book trailers and author interviews, to deepen understanding. Assessments include observations, quizzes, reflections, and presentations to gauge comprehension and skill development. Finally, students synthesize their learning through a 3-2-1 Bridge activity related to the sustainable goal of clean drinking water, connecting their insights from the lesson to the themes in *A Long Walk to Water*.

Lesson Content Overview

- Subject: Water
- Duration: 1-2 months
- Setting: classroom, lab, library, outdoor classroom, school, field trip
- Grouping: Individual, whole group, small group
- Grade Level: 6th-8th grade

Louisiana Standards (*Use the Louisiana Student Standards from the Academic Standards Library. Identify the code and full verbiage for the standard(s) used).*

Standard	Description
3.1.4.A	Know that natural and human-made objects are made up of parts - Identify and describe what parts make up a system
3.5.4.A	Know basic landforms and earth history - Identify various earth structures (eg. mountains, faults, drainage basins) through the use of models
4.1.4.B.	Identify how matter cycles through an ecosystem. Trace how death, growth, and decay cycle matter through an ecosystem.
4.1.4.E	Recognize the impact of watersheds and wetlands on animals and plants - Explain the role of watersheds in everyday life and identify the role of watersheds and wetlands for plants and animals.
6-MS-ESS3-4	Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.
7-MS-ESS2-4	*Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.*
8-MS-ESS3-1	*Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes*
LA.RL.7.1	Cite several pieces of relevant textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
LA.RL.7.2	Determine a theme or central idea of a text and analyze its development over the course of the text; provide an objective summary of the text.
LA.RL.7.3	Analyze how particular elements of a story or drama interact (e.g., how setting shapes the characters or plot).

LA.RL.7.4	Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings; analyze the impact of rhymes and other repetitions of sounds (e.g., alliteration) on a specific verse or stanza of a poem or section of a story or drama.
LA.RL.7.6	Analyze how an author develops and contrasts the points of view of different characters or narrators in a text.

Student Learning Objectives

After the Water Wise lessons, students should be able to:

- Apply skills and understanding in making artworks informed by their investigations of the world as a subject matter and use of expressive forms.
- Develop knowledge, understanding and skills to communicate through speaking, listening, reading, writing, viewing and representing.
- Develop skills to acquire, process and communicate geographical information.
- Develop and apply skills in scientific inquiry through the process of working scientifically.
- Express themselves and their relationships with others and their world.
- Demonstrate an understanding of the water cycle.
- Explain what turbidity is, how to measure it and how it affects the water characteristics.
- Explain the relationship between oxygen levels, bacteria and the breakdown of organic matter using an indicator solution.
- Explore the need for not polluting and conserving our freshwater supply.
- Explore ways to prove the properties of water.
- Evaluate the relationship between biodegradable waste and dissolved oxygen in water.
- Gain a visual perspective on global water distribution and average U.S. water consumption.
- Identify the watersheds of Louisiana and locate them on a map.
- Know in which watershed they reside.
- Learn that water is the universal solvent.
- Learn how important it is to protect our freshwater supply from pollution that is added to our streams as they wind through the rural areas of Louisiana.
- Locate and identify where each watershed empties into the ocean.
- See how microbiological factors over time will break down waste to the point where it can be safely discharged into our streams.
- Study the chemistry of water.
- Understand the limited supply of freshwater that exists on the earth.
- Understand how vegetation and other land covers slow soil erosion and protects against sedimentation.
- Understand that water flowing through the ground is cleaned as it travels.
- Understand the concept of watershed and be able to explain how water is drained from the land.

Prior Knowledge Needed by Students

- Pre Reading Videos Building Background Knowledge on The Lost Boys
    - Lost Boys of the Sudan

Background Information for Teachers

A Long Walk to Water Lesson Plans ~ The Organized Homeschooler

Park View Middle School: Mrs. Capirchio-A Long Walk to Water

Like all matter, water is constantly cycled through ecosystems. This compound comprises nearly 70 percent of our bodies and is used in many of our chemical reactions. The oceans contain about 97 percent of the world's water. The remainder is fresh water that is in the form of gas (vapor), liquid, or ice. Seventy five percent of this water is frozen in glaciers and in ice in the polar regions. Only about 1 percent of the earth's water is available as fresh, liquid water.

- Much of this fresh, liquid water is found in the ground in rock and soil layers. The zone in the earth that contains water saturated soil and/or rocks is known as an aquifer. The upper surface of an aquifer is known as the water table. The remainder of our freshwater is found in the surface water of lakes, rivers, and ponds, and in the bodies of organisms.

- Water has cohesive forces that will adhere to surfaces. There are also spaces between the molecules that can't be seen.

The movement of water into the atmosphere--molecules of water, like molecules of all liquids, are in constant motion. Because of this, what happens to these molecules? They collide with each other, causing them to move to a less crowded area. What is the movement of particles from a crowded to a less crowded area called? Diffusion. When water diffuses from the soil or from a body of water, it changes from a liquid to a gas form. What is this diffusion of water called? Evaporation. Water is also released from the bodies of organisms and evaporates into the atmosphere. In what ways do animals release water? Excretion, exhaling, and perspiration. Where is water released from plants? Mostly from microscopic pores in their leaves. What is transpiration? The evaporation of water from pores of plants

- Water that is not evaporated or absorbed into the soil, will drain from the land by way of watersheds. Watersheds are the natural sloping land that water follows as it drains off of the land.

Clarity and Turbidity

Clarity indicates how deep light can penetrate into the water and can be measured with a secchi disk at any site where the water is deep enough. Turbidity or cloudiness in water is caused by suspended solid matter, which limits sunlight's ability to pass through water. There are many possible sources of turbidity. Most people think primarily of sediment, stirred up from disturbed or eroded soil, as clouding the water. But microscopic plankton, such as algae, can also contribute to high turbidity when their numbers are overabundant, usually due to excess nutrients and sunlight.

Turbidity blocks out the light needed by submerged aquatic vegetation (SAV's). Lack of SAV's decreases the amount of oxygen in water and leaves the water with less ability to support aquatic life. Turbidity also reduces visibility for fish that are sight breeders or egg layers, clogs gills of organisms not adapted to a certain level of turbidity, smothers benthic creatures and eliminates habitat spaces. Suspended sediment can carry excess nutrients and pesticides throughout the water system.

- Suspended particles near the water surface absorb additional heat from sunlight, raising surface water temperature. Apparent water color, microscopic examination and stream walk observations can help determine the sources of turbidity.
- Moderate levels of turbidity can indicate a healthy, well-functioning ecosystem in which plankton flourish at a reasonable level to form the foundation of the food web. High turbidity and low clarity is an indicator of either runoff from disturbed or eroded soil or blooms of microscopic organisms due to high nutrient inputs. Very clear water is not perfect either—open ocean and crystal clear tropical waters support only sparse plant and animal life.

Materials Needed

- Anchor charts
- Anticipation guide
- Art colored pencils
- Chromebook,google slides
- Graphic organizers
- Guiding questions
- Infographic
- Journal
- Maps
- Markers
- Paper
- Photographs
- Plates
- Powerpoints
- Rubrics
- Sample sentences
- Secchi sticks
- Videos
- Beakers
- Dry yeast
- Graduated cylinders
- Test tubes and test tube racks
- Stirring sticks
- Pipettes
- Methylene blue solution
- Masking tape
- Milk
- Water
- Copies of pages 7 and 8 of Incredible Water with the Water Lion for each student
- Wax paper
- About $10.00 of pennies
- Small Dixie cups
- Medicine droppers
- Toothpicks
- Prepared stream trays - one filled with soil (has a loose vegetation cover), one filled with sand, one filled with gravel, one filled with loose soil
- Water containers with a sprinkle spout
- Containers to catch the runoff
- Modeling clay
- Long shallow pan
- Sponges
- Watering can
- Soil
- Jar of muddy water
- Small potted plant
- Clear plastic bag
- Twist tie
- Food coloring

Detailed Lesson

1. Engage

Directions

Ask Students:

1) Do you agree or disagree with these statements? Explain.
- A leader is born, not made.
- Water is our most precious resource.
- Humans will act poorly if there are no laws.
- You must take care of yourself before you can help others

2) What do you know about the continent of Africa? Have you ever traveled to this place? Do you know any famous people from Africa? Have you watched any movies that take place on this continent?

3) Write the word WATER on the board and discuss with students what water is used for and why it is so important. Questions can be posed such as: a) Why do we need water? b) What types of activities is water used for? c) Where and when do you use water the most? d) Where do you think the water that you use comes from? e) What is the difference between fresh and saltwater? f) What are the properties of water that make it so important?

4) Pose the Questions and allow students to answer and defend their response.
How did water get to you today? Was it clean? How was it cleaned? • Does everyone have clean, safe water? • How can we educate people about tap water?

2. Explore

Directions

The Learner Will:

1. Build background and vocabulary by reading A Long Walk to Water.

2. Complete research to learn about water using the following sites Amazing Facts about Water! & Groundwater | Information on Earth's water

3. Watch the following videos carefully: India - A daily struggle for clean water and The Water Crisis Is Here

After watching the videos discuss the following: Have you ever wondered why there is such an incredible shortage of drinking water around the world? Is drinking water dependent

on the climate and weather of an area? Are humans responsible for the shortage of water?

The teacher may introduce the idea of the water cycle and/or falling water tables here or ask students to engage in some independent inquiry.

3. **Explain**

Directions

The Learner Will:

1. Create and present three interesting facts about water and transform the facts into a word cloud.

2. Complete two character trait activities to determine the traits of each character in the story show. Activity 1-The Postcard Mrs. Wagner's Summary - ALWTW
   Activity 2- Paired Reading The Last Class: The Story of a Little Alsatian by Alphonse Daudet

3. **Create a Pamphlet**: Group activity- Create a pamphlet that can be used anywhere in the world to show people how to use water judiciously. The pamphlet should include new and interesting ways to persuade people of the importance of water conservation.

4. **Make a case study** of a place which has a shortage of water, highlighting the problems and reasons for the shortage of water and the steps taken to overcome the shortage. See Flint, Michigan and Jackson, Mississippi resources

Sites for Creating Word Clouds

4. **Expand**

Directions

The Learner Will:
View and Discuss **a Book Trailer: A Long Walk to Water** and at the end of the book, play this short video [1:29] which displays a collage of images with some overlaid text.

Watch an interview of Linda Sue Park author of A Long Walk to Water then write about what inspired or surprised them in the video

Analyze and draw conclusions from art, cartoons, photos, and quotes.

5. Evaluate

Directions

The teacher will gain insight into students' existing understanding and skills prior to beginning a new concept through discussions, informal quizzes, surveys, or quick writing assignments.

Options will include be or not limited to:

- *Observations during in-class activities; of students non-verbal feedback during lecture*
- *Homework exercises as review for exams and class discussions)*
- *Reflections journals that are reviewed periodically during the semester*
- *Question and answer sessions, both formal–planned and informal–spontaneous*
- *Conferences between the instructor and student at various points in the semester*
- *In-class activities where students informally present their results*
- *Student feedback collected by periodically answering specific question about the instruction and their Self-evaluation of performance and progress*

The teacher will check for understanding using Bell Ringers/Warm-ups, Kahoot, Quizziz, Nearpod, Wonderopolis, Ed Puzzle, Socratic Seminars, 321 Bridges, observations, quizzes, projects, labs, and presentations.

Moreover, the teacher will scaffold large or long-term assignments into smaller assignments providing opportunities for students to receive constructive feedback and to revise work and models if necessary. In addition, rubrics will be utilized to assess discrete skills and evaluate students' work and growth.

6. Extension

Directions

TLW: Construct a 3-2-1 Bridge (3 Thoughts, 2 Questions, and 1 Analogy) after exploring the sustainable goal of clean drinking water and how it correlates to A Long Walk to Water.
Multimedia Text Set

TLW: Use the SWBST Summary Strategy & include the answers of the questions in their summary.

How to Write a Summary

https://quizizz.com/admin/search/%20a%20long%20walk%20to%20water?source=MainHeader&page=QuizPage&searchSource=&interacted=false&scrollDepth=4

References

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English

ALWTW+sample+teachers+guide.pdf

Activities for Teaching A Long Walk to Water - Write on With Miss G

A Long Walk To Water Analysis - 795 Words | Bartleby.

A Long Walk to Water Resources

A Long Walk to Water Activities - Book Units Teacher

Global Read Aloud: Long walk to water

Teacher-Guide-A-Long-Walk-to-Water.pdf

H2O for Life | Lesson Plans - Science - Middle School

The 21 Best A Long Walk to Water Quotes

A Long Walk to Water Summary - Lesson Plans & Activities | StoryboardThat

Literary Elements Lesson Plans & Resources Course - Online Video Lessons | Study.com

History/ Geography

Sudan | History, Map, Area, Population, Religion, & Facts | Britannica

Sudan and South Sudan Facts for Kids

Sudan - United States Department of State

How is Drinking Water Different in Other Areas of the World?

Japan: Sustainability and Home Lifestyle

Science

Once upon a time there were rivers full of water

Clean safe water lesson plans

Water Lesson Plans

Water Lesson Plans (6-8)

Clean Water for All

Lesson Plans - Water Quality

H2O for Life | Lesson Plans - Science - Middle School

Understanding Our Water Footprint: Middle School Lesson Plans

20 Fun Water Cycle Activities for Middle School Students - Teaching Expertise

Lesson Plan | Exploring Our Growing Need for Water

Resources For Educators and Groups

Introduce Water | Water: Full Curriculum | Educators | Peep

Lesson Plan: The Water Cycle

Exploring the Water Cycle | Precipitation Education
Stormwater Management Lesson Plans for Grades 3-12

Academic Standards for Environment and Ecology

Health and Wellness

The importance of hydration | Western Kentucky University

Water – a vital nutrient - Better Health Channel

7 Health Benefits of Water Backed by Scientific Research

Engineering

A Long Walk to Water – Novel Engineering
Cleaning Water Activity | NASA

All About Water! - Lesson - TeachEngineering
Treatment of Water Teacher's Guide

The Dirty Water Project: Design-Build-Test Your Own Water Filters - Activity - TeachEngineering

Water Power: Technology and Engineering | Teacher Resources | Tsongas Industrial History Center | UMass Lowell

Water Filtration DIY | Generation Genius

https://www.teachengineering.org/lessons/view/uok-2116-plastisphere-microplastics-pollution-wastewater-treatment
Test and Treat Before You Drink - Lesson - TeachEngineering

Who's Down the Well? - Lesson - TeachEngineering

Groundwater

Groundwater Dynamics- Middle School | Water on the Move

Lesson Plans
Resources – The Groundwater Foundation

Groundwater and Surface Water | National Geographic Society

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THE ANATOMY OF AN AQUIFER

Microplastics

Microplastics in Our Waters, an Unquestionable Concern.

https://oceanservice.noaa.gov/facts/microplastics.html

Microplastics in Water: Threats and Solutions | Earth.Org

California first to tackle microplastics in drinking water - CalMatters

Florida Microplastic Awareness Project: K-12 resources

Lesson Plan: Plastic, Plastic Everywhere

Microplastics in the Classroom

Salinity

NASA Salinity
Lesson 6: Ocean Layers I

Ocean Currents and Salinity | PolarTREC

Science Stars: 8 grade Lesson Plan Rainbow Water Stacking – Density and Salinity

Turbidity

Secchi disk - Wikipedia

What is Turbidity and How is it Measured? - Tip Biosystems

Turbidity measurement

Turbidity - Experiment

At Home Science Activities with South Sound GREEN: Turbidity Trials - ThurstonTalk

Turbidity Lesson Plan 5e | PDF | Earth Sciences | Water

CLARITY AND TURBIDITY

Technology

Lesson 1: The Water Crisis Teacher Materials

Life Straw

LifeStraw water filter review 2023 | CNN Underscored

How to Use Your LifeStraw Personal Water Filter

Fog Harvesting

aqualonis

How scientists are harvesting fog to secure the world's water supply

Harvesting Fresh Water from Fog

DIY Fog Fence! New Design!! Hi-Efficiency Fog Net! New Material! Harvest Water from Mist & Fog! $25

DIY Fog Fence! New Design!! Hi-Efficiency Fog Net! New Material! Harvest Water from Mist & Fog! $25."

Resources

A Long Walk to Water pdf

Activities for Teaching A Long Walk to Water - Write on With Miss G.

Articles
What are the different types of water?
Water Pollution | EHEP | Harvard T.H. Chan School of Public Health

Teacher Strategies

https://www.scribd.com/document/498605149/second-grand-challenge-cardboard-pbl-dec-2019?secret_password=GHfQcZ89QI7uzXqrGKtz#

PowerPoints

Free Water PowerPoint Templates
Water PPT
Properties of water notes.ppt

Enrichment

Global Connections . Got Water? | PBS

Students Rebuild - Water Challenge Curriculum

Lesson Plan: Yucky Water! A Water Quality Lab Investigation Laurie Rogers

Experiments/Activities

https://www.vernier.com/experiment/?term_subject=water-quality

6-8 MIDDLE SCHOOL LABS TABLE OF CONTENTS

Salinity and the Chesapeake Bay

News and More

Drinking Water Safety in the U.S. | C-SPAN Classroom

H2O Project – Water for South Sudan

SDG Resources for Educators - Clean Water and Sanitation
Water Crisis - Lesson Plans and Teachers Guide for High School through Elementary Grades

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Jackson, Mississippi

Lesson Plan: The Mississippi Water Crisis and What It Means for the Rest of the Nation - The New York Times

How Jackson, Mississippi's water crisis is a sign of larger racial inequities - PBS NewsHour Classroom

Events

International Water Safety Day Classroom Lesson Plan – Middle School Ages

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