



Natural Water

(Conservation Education That Works - All About The TEKS)

Water: Why is it
important?





We ALL Use Water!



At Home:



At School:













PS4™



At Home:











At School:







But, Where Does All of This Water Come From?

Lakes?



Rivers?

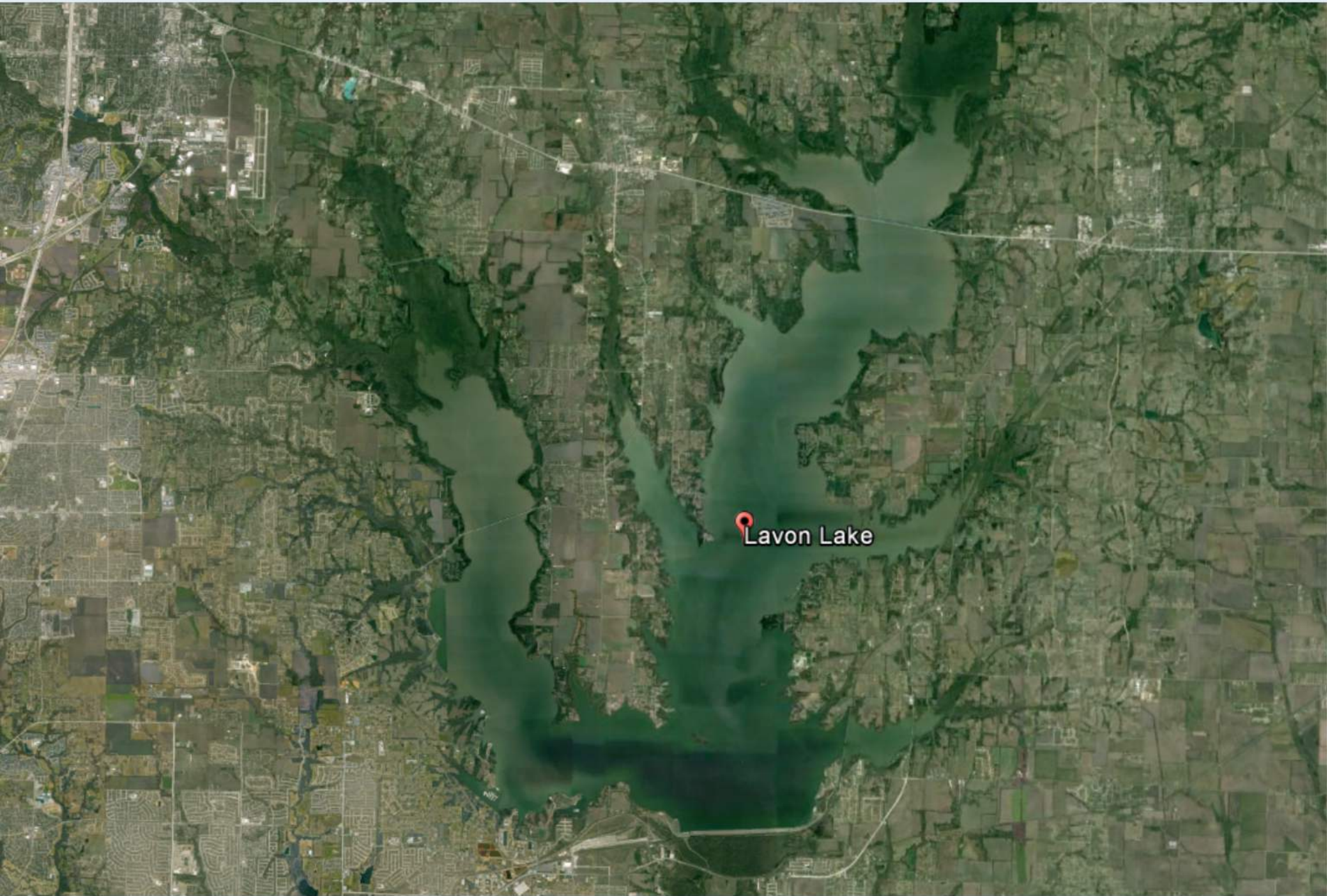


Oceans?



Lakes











Rivers







1 km

Dallas

Fort
Worth

Trinity River

Lake
Livingston

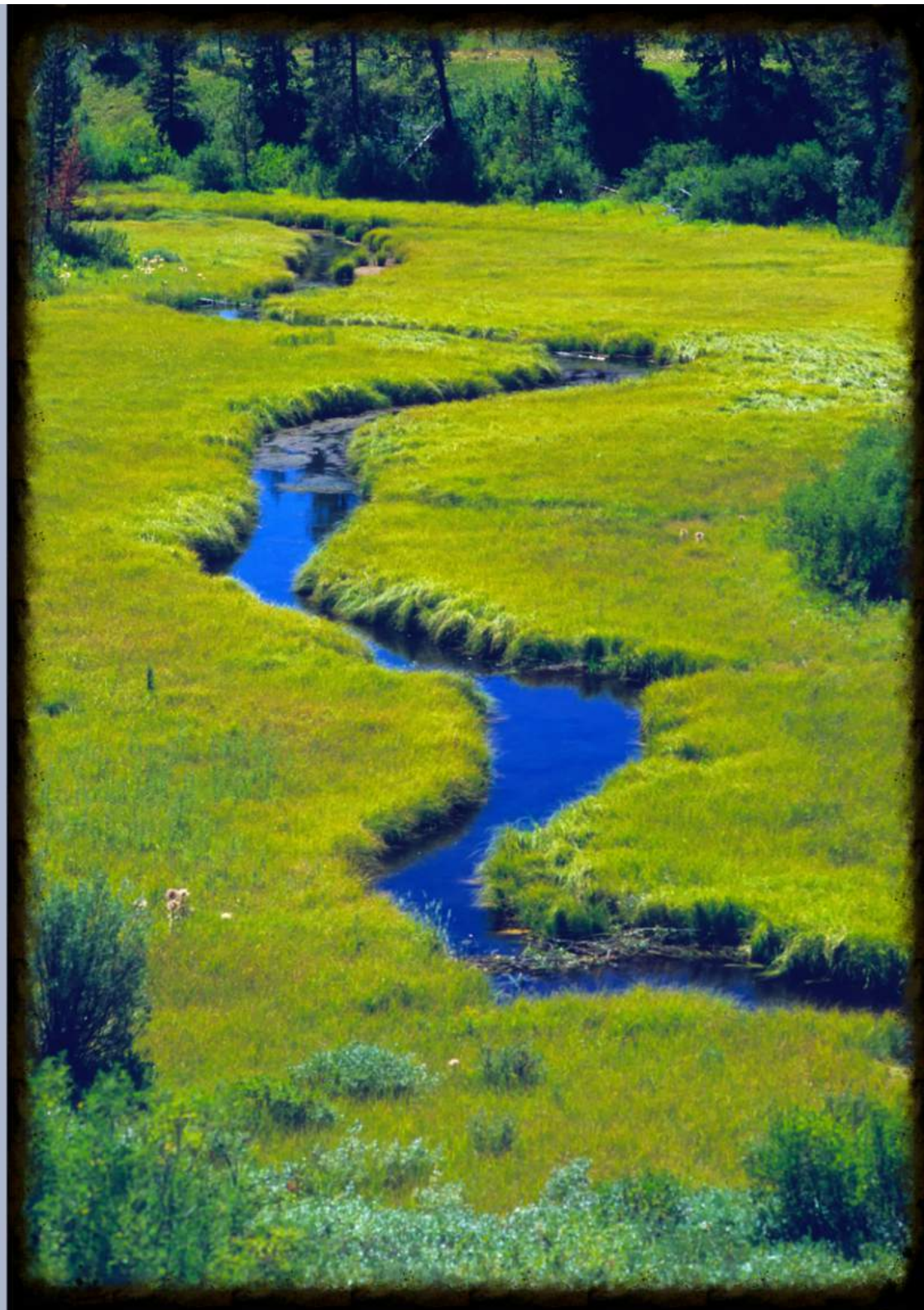
Austin

Houston

N







Oceans









www.zenchantment.com





Everyone Please Stand Up...

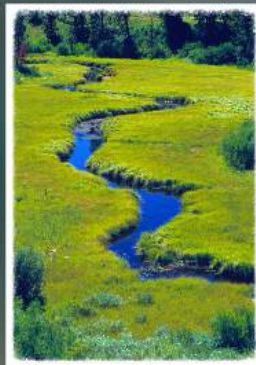




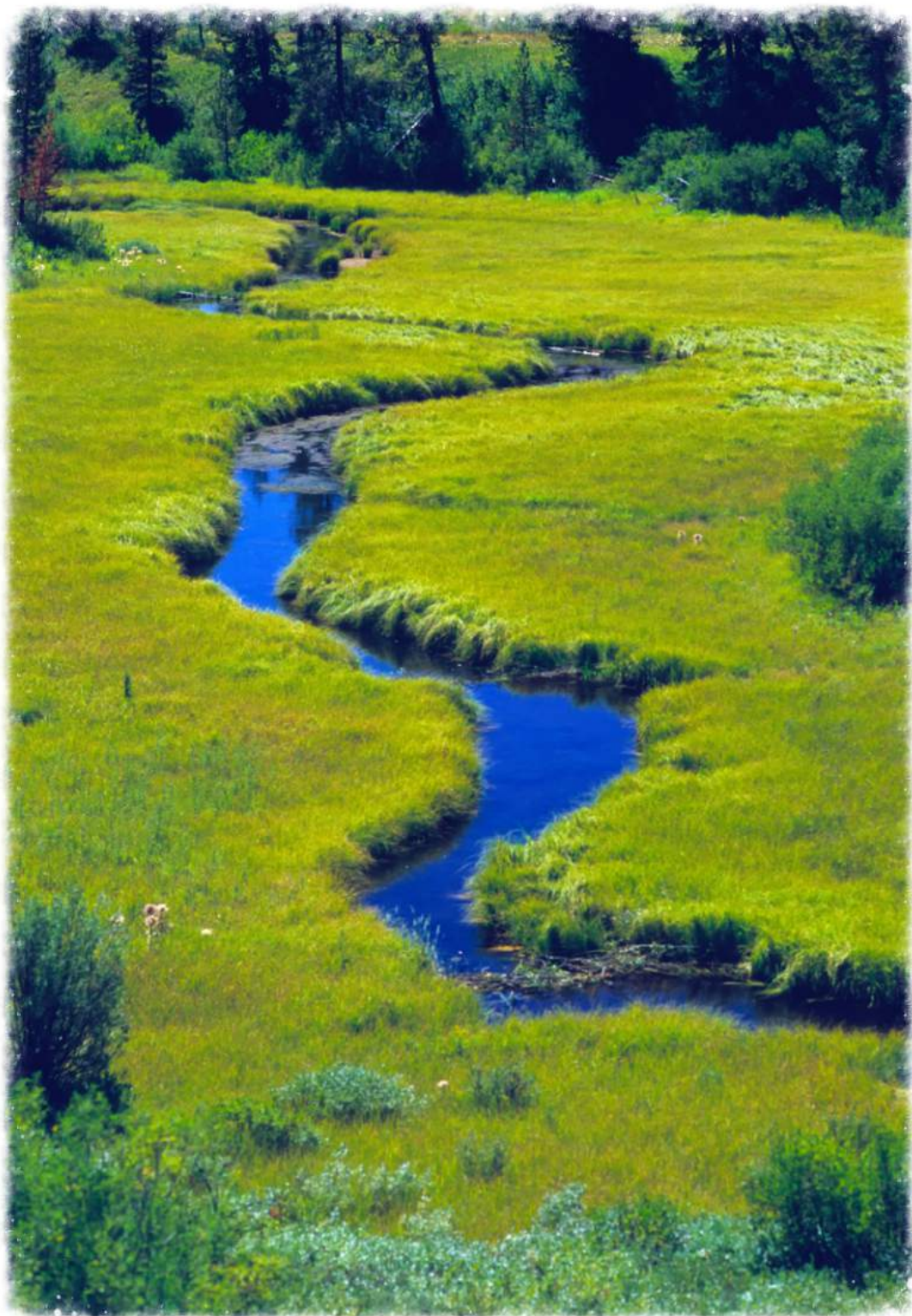


www.zenchantment.com

Trivia Challenge:











Conservation Education That Works - All About the T.E.K.S.

City of Allen - Water Conservation



RESULTS

In 4 years:

- 20 of 22 AISD schools visited
- 15,615 AISD students participated
- Eval. approval of over 98%
- 3.45% increase for TEKS standard (7th grade - 112.19(b)(8)(C))
- Cost: \$0.40 per student

Initiate

Complete

Background

- City of Allen - Population 90,753
- 30,000 Utility Connections
- 92% of Connections Residential
- North Texas Municipal Water District (NTMWD) serves 16 million people
- By 2050, this number is expected to increase to over 3.2 million.
- With over 20% of future water coming from water conservation efforts

The Opportunity

- Adult programs: SERVED (for the most part) - Adults, Adults, Seniors, etc.
- Youth (the future): UNDERSERVED - Scout groups, Festivals, After-school E-Clubs, Home schools - "Vishu Day" six water utility approach

Objectives

- Expand outreach - Allen 15.0-20.25 students
- Become relevant to the "Youth Population"
- Deliver our messages during peak academic hours



The Program

- Water conservation outreach lessons
 - Aligns with Texas Essential Knowledge & Skills (TEKS), a state-wide aptitude fabric.
 - STEM (Science, Technology, Engineering & Mathematics) criteria
 - Local AISD curriculum
- The Bigger Picture
 - Critically think about the importance of water
 - Organize dependence on water, the water cycle, waterheds, surface & groundwater, and human/environment interaction

Our Curriculum

- Based on K-12 TEKS, STEM criteria and AISD Curriculum Guidelines:
 - 7th Grade TEKS Req:
 - > 82.19(b)(8)(C) Pivotal the effects of human activity on groundwater and surface water in the watershed.
 - 8th Grade TEKS Req:
 - > 82.12 (b)(1)(B) Identify and describe a variety of natural sources of water, including streams, lakes and oceans.
- Lesson Handout!

Implementation

- Small Water Conservation Budget
- Word-of-Mouth Exposure
- Introductory Email Blast
 - > Teachers initially responded
- Scheduling:
 - Teacher contact
 - perform lesson
 - Evaluation

District Science Coordinator

Background

- City of Allen - Population: 98,415
- 30,000 Utility Connections
- 92% of Connections Residential
- North Texas Municipal Water District (NTMWD) serves 16 million people
- By 2050, this number is expected to increase to over 3.2 million...
- With over 24% of future water coming from water conservation efforts

The Opportunity

- Adult programs: SERVED (for the most part...)
 - Audits, Rebates, Seminars...etc.
- Youth (the future): UNDERSERVED
 - Scout groups, Festivals, Afterschool E-Clubs, Home schoolers
 - "Grab bag" use water wisely approach

Objectives

- Expand outreach
 - Allen I.S.D.: 20,755 students
- Become relevant to the "Youth Population"
- Deliver our messages during peak academic hours



Initiate



RESULTS

In 4 years:

- 20 of 22 AISD schools visited
- 15,615 AISD students participated
- Eval. approval of over 98%
- 3.45% increase for TEKS standard (7th grade - 112.19(b)(8)(C))
- Cost: \$0.40 per student

Background

- City of Allen - Population: 98,143
- 30,000 Utility Connections
- 92% of Connections Residential
- North Texas Municipal Water District (NTMWD) serves 1.6 million people
- By 2050, this number is expected to increase to over 3.2 million...
- With over 24% of future water coming from water conservation efforts

The Opportunity

- **Adult programs: SERVED** (for the most part...)
 - Audits, Rebates, Seminars..etc.
- **Youth (the future): UNDERSERVED**
 - Scout groups, Festivals, Afterschool E-Clubs, Home schoolers
 - "Grab bag" use water wisely approach

...from water conse

Objectives

- Expand outreach
 - Allen I.S.D.: 20,755 students
- Become relevant to the "Youth Population"
- Deliver our messages during peak academic hours





RESULTS

In 4 years:

- 20 of 22 AISD schools visited
- 15,615 AISD students participated
- Eval. approval of over 98%
- 3.45% increase for TEKS standard (7th grade - 112.19(b)(8)(C))
- Cost: \$0.40 per student

Complete

The Program

- Water conservation outreach lessons:
 - Aligned with Texas Essential Knowledge & Skills (TEKS), A statewide aptitude rubric
 - STEM (Science, Technology, Engineering & Mathematics) criteria
 - Local AISD curriculum
- The Bigger Picture:
 - Critically think about the importance of water
 - Organism dependence on water, the water cycle, watersheds, surface & groundwater, and human/environment interaction

Our Curriculum

- Based on K-12 TEKS, STEM criteria and AISD Curriculum Guidelines:
 - 7th Grade TEKS Req:
 - 12.14.(b)(8)(C)- Model the effects of human activity on groundwater and surface water in the watershed.
 - 8th Grade TEKS Req:
 - 12.12.(b)(7)(B)- Identify and describe a variety of natural sources of water, including streams, lakes and oceans.
- Lesson Handout!

Implementation

- Small Water Conservation Budget
- Word-of-Mouth Exposure
- Introductory Email Blast
 - Teachers initially responded
- Scheduling:
 - Teacher contact
 - Perform lesson
 - Evaluation

District Science Coordinator

The Program

- Water conservation outreach lessons:
 - Aligned with Texas Essential Knowledge & Skills (TEKS); A statewide aptitude rubric
 - STEM (Science, Technology, Engineering & Mathematics) criteria
 - Local AISD curriculum
- The Bigger Picture:
 - Critically think about the importance of water
 - Organism dependence on water, the water cycle, watersheds, surface & groundwater, and human/environment interaction

on water, ...
face & groundwater,
ent interaction

Our Curriculum

- Based on K-12 TEKS, STEM criteria and AISD Curriculum Guidelines:
 - 7th Grade TEKS Req.:
 - 112.19.(b)(8)(C): Model the effects of human activity on groundwater and surface water in the watershed;
 - 1st Grade TEKS Req.:
 - 112.12.(b)(7)(B): Identify and describe a variety of natural sources of water, including streams, lakes and oceans;
- Lesson Handout!



HOW CLEAN IS YOUR WATER? (GRADES 5-12)

The water is cloudy, the pH is high and fish are dying by the dozens. What's wrong with the water? Students sample a local stream to test for pH, dissolved oxygen, temperature and turbidity as they learn about the interdependency of water and surrounding life.

STREAM BANK EROSION TRAILER (GRADES 5-12)

It's a lesson on wheels! Let students get their hands dirty as they create erosion patterns, explore natural vs. manmade erosion control measures, and learn about siltation and water quality using the Texas A&M AgriLife Extension stream trailer.

WATER AHEAD! (GRADES 7-8)

Students will model the effects of human activity on groundwater and surface water in their local watershed in this presentation and hands-on lesson. Agriculture, sediment, industry and oil pollutants will be added to the watershed to mimic surface water runoff and groundwater infiltration.

TEXAS STREAMS & AQUIFERS (GRADES 11-12)

Learn about the interdependency of surface and ground waters by studying the 18,000 square-mile Trinity River Basin, Lake Lavon's watershed, and a few of the most historic Texas groundwater cases to date. This engaging lesson will also cover riparian law, rule of capture and prior appropriation.

STORMWATER POLLUTION 101 (GRADES 11-12)

Murky waters ahead! Students research the East Fork Trinity River to uncover potential threats of point source and non-point source pollution. This lesson covers bioaccumulation, E. coli, ammonia, phosphates, pharmaceuticals and more.

H₂O
YOUTH EDUCATION

H₂O
YOUTH EDUCATION
EXPLORING WATER ON EARTH



CITY OF ALLEN
WATER CONSERVATION
305 Century Parkway
Allen, Texas 75013

William Nahas
Education Specialist
wnahas@cityofallen.org
214.509.4553



CITY OF ALLEN
Water Conservation

H₂O YOUTH EDUCATION

T.E.K.S. based lessons offered by the Water Conservation Division

Current teaching lessons are prepared at the K-12 grade level and include subjects on the water cycle, our watershed, water conservation, environmental modeling, water quality, urbanization and stormwater pollution prevention. Some lessons can be catered to specific grade level requirements.

EVERY DROP COUNTS (ALL GRADES)

This lesson delves into the importance of water conservation. Students will understand the importance of indoor and outdoor water conservation, strategies to reduce consumption, learn about the local watershed, local climate, drought and participate in the 1-gallon challenge. Students will learn that every drop counts!

H2O GUESSTIMATE (ALL GRADES)

This lesson engages students in regard to how much water is used in everyday items, while developing a conscientious attitude about the true worth of water. Students will "guesstimate" how much water is used for making a piece of paper, a hamburger, blue jeans and more!

NATURAL WATER: OCEANS, RIVERS AND LAKES (GRADES 1-2)

In this lesson, students will identify and describe a variety of natural sources of water, including rivers, lakes and oceans. A short presentation is provided with videos and a memory game to conclude. Students will also participate in an interconnected water model demonstration, as well as color and label their own river, lake and ocean template.

THE INCREDIBLE JOURNEY (GRADES 3-8)

Students will become water molecules moving through various stages of the water cycle. Students will journey through stations including groundwater, rivers, lakes, glaciers and clouds. Along their journey they will design a memory bracelet with beads to recount their incredible journey.

FREDDY THE FISH (GRADES 1-5)

Freddy the Fish will be our guide as students learn how water becomes polluted from everyday activities. The lesson builds awareness of how various local sources impact our natural waterways, potentially causing stormwater mayhem!

RELAY FOR WATER (GRADES 3-6)

Students will illustrate how multiple users of water resources can affect water quality and quantity, as well as examine the complexities of providing water for all users. The lesson consists of a hands-on activity where students are timed through rounds to simulate water depletion. They will learn that water is a finite resource and critically think about water use and consumption.



BIOTIC VS. ABIOTIC (GRADES 5-6)

Do you know the difference between biotic and abiotic factors? Is water a biotic or abiotic factor? How about algae? This lesson provides a fundamental understanding of the difference between biotic and abiotic factors. Students will enjoy a presentation and trivia game, followed by a worksheet reinforcing the lesson. Students will also have the opportunity to draw their own ecosystem and include their own biotic and abiotic factors.

PUMP STATION FIELD TRIP (GRADES 3-12)

Start your water adventure with a presentation about the North Texas Municipal Water District's water treatment plant in Wylie and the City of Allen's water distribution system. After the presentation, classes will split into smaller groups to tour the pump station. Field trips offered on limited basis.

JEOPARDY H2O (GRADES 3-12)

Water Jeopardy is an interactive game based on the popular television show. It includes questions about the water cycle, water conservation, stormwater, water quality and more. This game can be catered to grade level and T.E.K.S. requirements. This is a great review in preparation for end-of-year testing or reinforcing any water unit you may cover.

WATER: FROM SOURCE TO TAP AND BACK! (GRADES 4-12)

Have you ever wondered what happens to the water we use? This hands-on EnviroScape demonstration will explain how drinking water is delivered in residential, commercial, rural and urban areas. Students will learn where the water originates and what happens after we use it.



A VERY IMPERVIOUS SITUATION: STORMWATER ENVIROSCAPE (GRADES 4-12)

From fertilizers to pesticides to dog waste, whatever we dump into a storm drain discharges into a river, lake or stream without being treated. The EnviroScape model will show just how damaging pollution can be to our surrounding environment. Students will create "pollution" and watch it run off into our local watershed.

MORE LESSONS
THIS WAY! >

Implementation

- Small Water Conservation Budget
- Word-of-Mouth Exposure
- Introductory Email Blast
 - 11 teachers initially responded
- Scheduling:
 - Teacher contact
 - perform lesson
 - Evaluation

****District Science Coordinator****



RESULTS

In 4 years:



RESULTS

In 4 years:

- 20 of 22 AISD schools visited
- 15,615 AISD students participated



- Eval. approval of over 98%
- 3.45% increase for TEKS standard (7th grade - 112.19(b)(8)(C))
- Cost: \$0.40 per student

The Numbers - A.I.S.D. Only

Year:	A.I.S.D. Classroom Only:	# Increase:	% Increase:	% Increase Overall (Base 2013/14):
2013/14	736	n/a	n/a	n/a
2014/15	2374	1638	222.0%	322.0%
2015/16	3954	1580	66.5%	437.0%
2016/17	4489	535	13.5%	509.0%
2017/18	4798	309	10.60%	551%



RESULTS

In 4 years:

- 20 of 22 AISD schools visited
- 15,615 AISD students participated



- Eval. approval of over 98%
- 3.45% increase for TEKS standard (7th grade - 112.19(b)(8)(C))
- Cost: \$0.40 per student



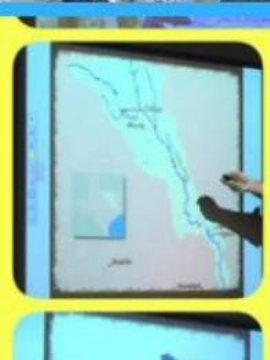
H₂O

YOUTH EDUCATION

EXPLORING WATER ON EARTH



Rountree Roadrunners Retweeted
NIKKI @Duncanroutree1
Learning how our city uses and conserves water @routreer



Questions?

William Nahas

Stormwater Program Manager

City of Allen

wnahas@cityofallen.org

214.509.4585

THANK YOU!