



Lesson Plan Example: Floods in North Texas

Introduction

- ▶ **Learning Objectives:**

- ▶ Describe how severe floods impact ecosystems and communities in North Texas
- ▶ Identify individual and community actions to prepare for severe floods

- ▶ **Prepared by:**

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Introduction

- ▶ **5E Learning Model:**

- ▶ Engage
- ▶ Explore
- ▶ Explain
- ▶ Elaborate
- ▶ Evaluate

- ▶ **Materials required:**

- ▶ Laptop, projector, powerpoint presentation, KWL charts



Introduction

- ▶ **Alignment with State Standards:**
 - ▶ TEKS 112.19, Grade 7, (8)-(A)
 - ▶ (8) Earth and space. The student knows that natural events and human activity can impact Earth systems. The student is expected to:
 - ▶ (A) predict and describe how different types of catastrophic events impact ecosystems such as floods, hurricanes, or tornadoes





Lesson Plan Content

Step 1. Engage

- ▶ Ask: Have you ever seen or experienced severe flooding?
- ▶ Show: video clip of May 2015 flooding in Texas
 - ▶ <http://reut.rs/1LjcJxL>
 - ▶ http://ktla.com/2015/05/28/death-toll-rises-in-texas-as-forecasters-predict-more-rain-amid-severe-flooding/#ooid=YIcTFkdTqclteJIV_bp2BERWBnkEPvnX
- ▶ Show: precipitation record data
 - ▶ <http://www.srh.noaa.gov/fwd/?n=dmoprecip>
- ▶ Ask: What are the key features of this event (when, where, how does it occur)?
- ▶ Students write answers in KWL chart



Step 1: Engage

Dallas/Fort Worth - Monthly and Annual Precipitation

See note [below](#) concerning the following information

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Year
2016	1.04	2.20												2016
2015	3.62	2.96	2.53	5.56	16.96	3.95	0.92	0.46	2.14	9.82	9.86	3.83	62.61	2015
2014	0.33	0.41	1.45	1.74	3.40	3.26	0.98	4.34	0.06	2.09	2.13	1.13	21.32	2014
2013	4.06	1.68	2.27	1.98	3.17	2.14	2.05	1.32	2.72	3.13	2.12	2.76	29.40	2013
2012	6.18	1.88	5.74	4.24	1.66	2.82	0.78	3.19	1.75	1.02	0.05	1.95	31.26	2012
2011	1.60	0.92	0.07	2.46	7.95	2.84	0.09	0.96	0.66	3.12	0.86	4.35	25.88	2011
2010	2.76	2.83	3.57	2.03	1.09	2.08	3.13	0.41	9.09	1.16	1.50	2.05	31.70	2010
2009	0.82	0.72	5.56	3.54	4.36	3.98	2.09	1.64	6.52	8.05	1.76	1.85	40.89	2009
2008	0.27	2.30	6.07	3.85	2.21	0.84	0.81	2.82	0.84	2.29	4.53	0.27	27.10	2008
2007	5.58	0.43	3.81	2.82	8.34	11.10	5.54	0.35	4.99	3.53	1.22	2.34	50.05	2007
2006	2.25	3.85	4.40	1.86	1.90	0.34	1.78	0.52	2.60	4.34	2.58	3.33	29.75	2006
2005	4.33	1.62	2.17	0.56	3.35	1.14	0.74	2.46	1.36	0.89	0.02	0.33	18.97	2005
2004	3.04	3.84	1.71	2.96	4.73	10.49	4.16	4.24	1.02	5.72	5.01	0.65	47.57	2004
2003	0.22	3.07	0.85	1.90	2.53	5.17	0.08	1.85	3.99	0.78	3.15	0.96	24.55	2003
2002	4.90	0.94	7.39	5.68	5.40	3.10	3.07	1.47	1.38	6.44	0.52	4.13	44.42	2002
2001	2.44	6.17	5.27	0.89	5.58	1.28	3.85	2.72	3.72	1.87	1.11	3.24	38.14	2001

Step 2. Explore

- ▶ Divide students into small groups of 3-4 members
- ▶ Each group explores a different aspect of flooding
- ▶ Each group decides a way to present what they learned



Step 2. Explore

- ▶ **Group 1: explore factors leading to floods**
 - ▶ https://www.floodsmart.gov/floodsmart/pages/flooding_flood_risks/flood_scenarios.jsp
 - ▶ <http://www.acegeography.com/causes-of-flooding.html>
 - ▶ http://wwf.panda.org/about_our_earth/teacher_resources/web_fieldtrips/natural_disasters/floods/



Step 2. Explore

▶ Group 1: explore factors leading to floods

The impact of human activities on flooding

Urbanisation

More people are living in towns and cities

Population growth and urbanisation has led to demand for land to build on - floodplains are flat and are good for housing

Concrete and tarmac, used for roads and pavements as they are impermeable, precipitation cannot infiltrate so gets into the river much more quickly

Less interception as trees and plant matter is removed so precipitation gets into the river much more quickly.

Often surface water is channelled directly into drains and sewers, so precipitation reaches the river much more quickly.

Bridges over rivers can constrict rivers, slow discharge and reduce the carrying capacity of the river.

Deforestation

In poor countries rapid deforestation has taken place.

Land is now used for farming, settlement and mining etc.

With no trees there is a greater risk of soil erosion as the precipitation is not intercepted.

Flood damage is greatest near the mouth of a river because wide, flat floodplains are most susceptible to damage. The volume of water is greatest here because many tributaries have joined the river.

River Management

The main aim of river management is to reduce the likelihood of flooding. However, in some circumstances it can actually increase the risk:

Bangladesh: flood embankments have been built along some river channels. They are designed to increase river capacity but at times have prevented floodwater draining back into the rivers

Farakka Dam, India: Lots of rainfall, meant the lake behind the dam could burst. The floodgates of the dam were opened. This stopped the dam from bursting but it greatly increased the discharge of the river in Bangladesh. This coincided with the normal floods and made the severity much worse



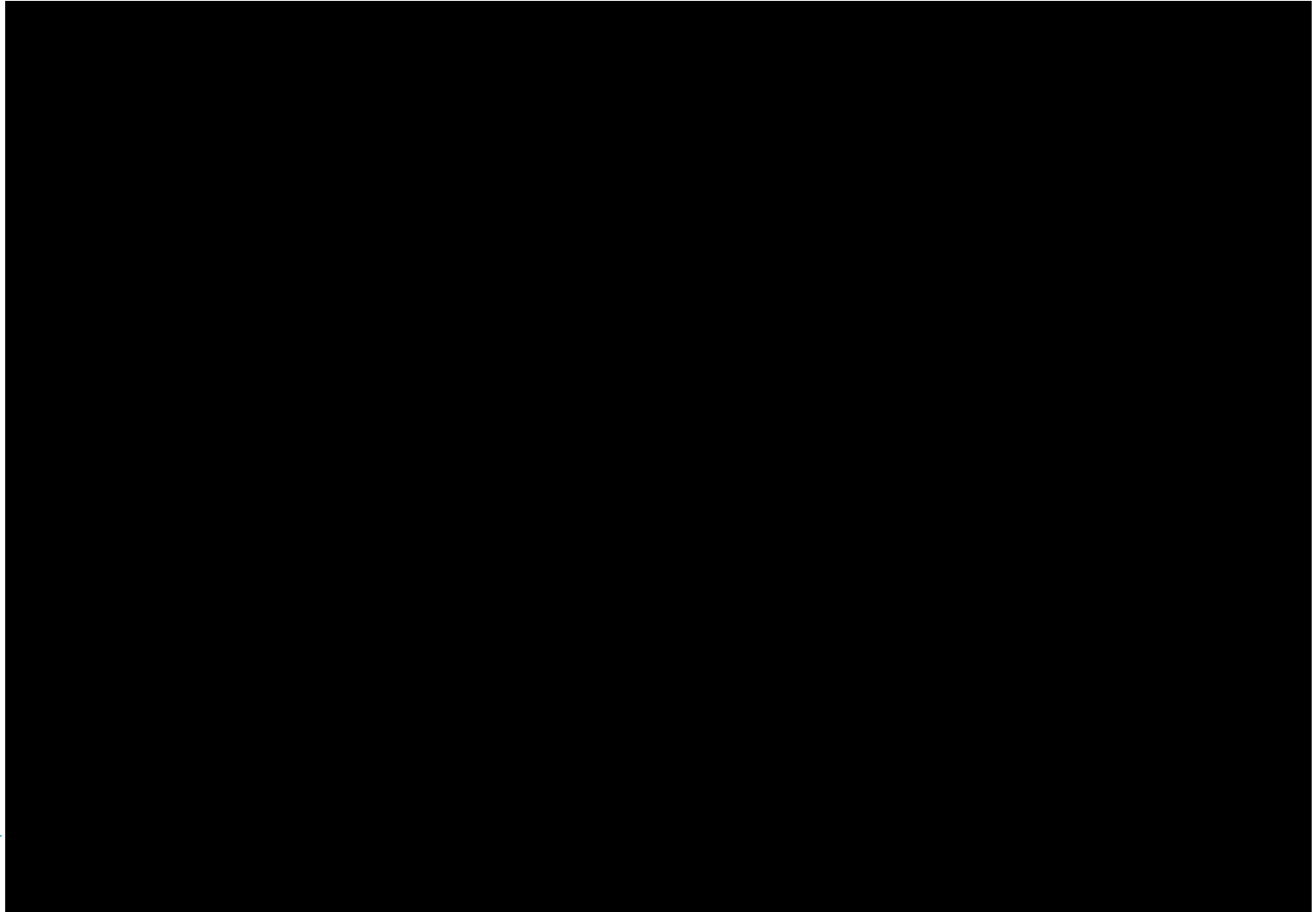
Step 2. Explore

- ▶ **Group 2: explore impacts on ecosystems**
 - ▶ Farming and Erosion:
<http://www.pbslearningmedia.org/resource/ess05.sci.ess.earthsys.flooderosion/flood-farming-and-erosion/>
 - ▶ Wetland Destruction:
<http://www.pbslearningmedia.org/resource/ess05.sci.ess.watcyc.katrinawet/hurricane-katrina-wetland-destruction/>
 - ▶ Water Pollution:
http://www.education.noaa.gov/Freshwater/Watersheds_Flooding_and_Pollution.html



Step 2. Explore

- ▶ Farming and Erosion Video



Step 2. Explore

▶ Group 3: explore impacts on communities

- ▶ Major flood events and their impacts:

<http://video.nationalgeographic.com/video/101-videos/floods>

- ▶ Rapid City, SD, flood and recovery:

<http://www.npr.org/2012/06/08/154576917/disastrous-s-d-flood-caused-national-wake-up-call>

- ▶ Social and economic impacts: <https://www.e-education.psu.edu/earth111/node/671>



Step 3. Explain

- ▶ Each group presents their findings
- ▶ All together, discuss the following questions:
 - ▶ What are the factors leading to floods?
 - ▶ How do severe floods impact ecosystems?
 - ▶ How do severe floods impact communities?
- ▶ Students write answers in KWL chart



Step 4. Elaborate

▶ Discuss:

- ▶ What precautions can be taken to ensure personal safety during severe flooding?
- ▶ <http://www.floodsafety.noaa.gov/before.shtml>
- ▶ <http://www.knowwhat2do.com/think/flood>



Step 4. Elaborate

► Personal Safety



NATIONAL WEATHER SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

HOME

FORECAST

PAST WEATHER

WEATHER SAFETY

INFORMATION CENTER

Flood Safety

Flood Warning
vs. Watch

Before
a Flood

During
a Flood

After
a Flood

During a flood, water levels and the rate the water is flowing can quickly change. Remain aware and monitor local radio and television outlets. Avoid flood waters at all costs and evacuate immediately when water starts to rise. Don't wait until it's too late!

[Stay Informed](#)

Monitor local radio and television (including NOAA Weather Radio), internet and social media for information and updates.

[Get to Higher Ground](#)

Get out of areas subject to flooding and get to higher ground immediately.

[Obey Evacuation Orders](#)

If told to evacuate, do so immediately. Be sure to lock your home as you leave. If you have time, disconnect utilities and appliances.

[Practice Electrical Safety](#)

Don't go into a basement, or any room, if water covers the electrical outlets or if cords are submerged. If you see sparks or hear buzzing, crackling, snapping or popping noises --get out! Stay out of water that may have electricity in it!

[Avoid Flood waters](#)

Do not walk through flood waters. It only takes six inches of moving water to knock you off your feet. If you are trapped by moving water, move to the highest possible point and call 911 for help.

Do not drive into flooded roadways or around a barricade; Turn Around, Don't Drown! Water may be deeper than it appears and can hide many hazards (i.e. sharp objects, washed out road surfaces, electrical wires, chemicals, etc). A vehicle caught in swiftly moving water can be swept away in a matter of seconds. Twelve inches of water can float a car or small SUV and 18 inches of water can carry away large vehicles.

Step 4. Elaborate

▶ Discuss:

- ▶ What community actions can be taken to protect our communities from severe flooding?
- ▶ Global examples: <http://mashable.com/2014/07/16/cities-rising-sea-levels/#E8VpWE2vykqN>
- ▶ Importance of trees: <http://forestsforwatersheds.org/reduce-stormwater/>
- ▶ Rain garden activities: <http://www.irwp.org/education-and-outreach/rain-gardens-for-educators/>



Step 4. Elaborate

► Importance of Trees:

What Are Some Specific Practices That Use Trees to Reduce Stormwater Runoff?



The most effective way to minimize the impacts of stormwater runoff described above is to limit the amount of paved surfaces that are created during development, and preserve as much as possible the natural topography and vegetation. Specifically, existing forests can be protected during construction and permanently managed as conservation lands. In cases where there are no existing forest stands (e.g., development of a former farmland), reforestation can help to offset these impacts.

Conserving natural areas such as forests can reduce the amount of runoff that is created



Step 5. Evaluate

- ▶ Students discuss their individual KWL charts in small groups





Small Group Discussion

Small Group Discussion

- ▶ Please discuss the questions on the handout provided to each small group
- ▶ Be prepared to share with the full group



Thank you

Questions and Discussion

