Rivers and Flooding Module

Summary
This unit will provide students with an understanding on how rivers affect that landscape and development around them. This unit is designed to cover 9 days of 50-minute class periods. Lessons 1 and 2 establish a foundation on river anatomy and how rivers change over time. Lesson 3 will use cross sections of river flow to determine where they are located on a river and where the thalweg is located. Lessons 4 and 5 will have students utilize stream tables to demonstrate erosion, deposition, and natural flood risk management strategies. Lesson 6 will investigate the factors that lead to flooding as students will study two local severe flood events. Lesson 7 will study flood control structures and risk management. Finally, in lesson 8, students will complete a summative project where they act as city engineers to develop a response to a scenario dealing with building along a river and the effects of the river on the land surrounding it.

Connection to Civil Engineering
This module looks at the basics of water resource engineering and the decision-making process that is involved in city planning and development. Lesson 7 specifically looks at the various flood control structures that are designed by civil engineers to manage the risks associated with flooding.

Subject Area and Grade Level

Earth Science / Environmental Science
Grades 9-12

Keywords
Rivers, Flooding, Flood Risk Management

National Standards (Next Generation Science Standards)

HS-ESS2-5. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

Required Resources

See Pacing Guide.

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Acknowledgements

The curriculum was developed under National Science Foundation RET grant #1953102. However, these contents do not necessarily represent the policies of the National Science Foundation, and you should not assume endorsement by the federal government.

Pacing Guide

Title	Time	Objective	Resources
Lesson 1 – River Anatomy	50 min	SWBAT identify and describe parts of a river.	● River Anatomy Notes ● Access to Google Earth
Lesson 2 – Age of Rivers	50 min	SWBAT discuss how a river changes over time.	● Age of Rivers Notes ● White boards/dry erase markers OR large paper/markers
Lesson 3 – Mapping the Thalweg	50 min	SWBAT analyze data from a river to determine where erosion, deposition, and the thalweg will occur in a river.	● Quiz – River Anatomy and Age of Rivers ● Mapping the Thalweg Worksheet ● Mapping the Thalweg Activity Map ● Mapping the Thalweg Activity Profiles
Lesson 4 – Young Stream and Stream Cutoffs Lab	50 min	SWBAT demonstrate how erosion and deposition occur in different ages of rivers.	● Stream Tables (2) ● Young Stream and Stream Cutoffs Worksheet
Lesson 5 – The Great Flood Lab	50 min	SWBAT identify components that lead to flooding and natural erosion control methods.	● Stream Tables (2) ● Materials for bank stabilization ● The Great Flood Worksheet
Lesson 6 – Flooding Causes	50 min	SWBAT interpret information from primary source document to define the causes that lead to flooding.	● Flooding Causes Worksheet ● Inforum Article PDFs
Lesson 7 – Flood Risk Management	50 min	SWBAT describe flood risk management strategies and their benefits and drawbacks	● Flood Risk Management Worksheet
Lesson 8 – Flood Management Scenario	100 min	SWBAT generate a flood management plan that explains how a river interacts with the land surrounding it.	● Flood Management Scenario Worksheet