

Lesson Plan: Major River Systems: Climate Change and the River Nile

As a **High School Geography** or **Earth Sciences** teacher, you can use this set of computer-based tools to teach about river systems, the important aspects of some of the major river systems of the world and how they may be affected by climate change.

This lesson plan can be used to teach about one or more river systems around the world; and their features that determine their significance for the region they flow through. The Nile is one of the longest rivers in the world and flows through 11 countries in North East Africa. This lesson plan includes resources to teach about its role in providing food and water security and in influencing the economies of these countries. This lesson plan also discusses the Nile as an example of a major river system affected by climate change.

Thus, the use of this lesson plan allows you to integrate the teaching of a climate science topic with a core topic in **Geography** or **Earth Sciences**.

Use this lesson plan to help your students find answers to:

1. What are river systems? Describe their fluvial processes.
2. What is the socio-economic importance of a major river system? Give examples.
3. Comment on the significance of the river Nile for Egypt. How is it affected by climate change?
4. How are the major river systems of the world being affected by climate change?

About the Lesson Plan

Grade Level: High School

Discipline: Geography, Earth Sciences

Topic(s) in Discipline: River Systems, Fluvial Processes, Drainage Basin, Floodplains, River Deltas, Hydrologic Cycle, Evapotranspiration, River Nile

Climate Topic: Climate and the Hydrosphere, Climate and the Lithosphere

Location: Global, Egypt

Access: Online, Offline

Language(s): English

Approximate Time Required: 45-50 min

1 Contents

1. Readings (20 min)

Two readings to introduce the different terms associated with river systems and their fluvial processes.

These can be accessed at:

http://www.cangeoeducation.ca/resources/learning_centre/classroom_activities/river_system.asp

https://web.ccsu.edu/faculty/kyem/GEOG272/Chapter11/Rivers_Landforms.htm

2. Webpage (20 min)

A webpage to explore various aspects of some of the major river systems of the world including the River Nile.

This can be accessed at:

<https://www.britannica.com/topic-browse/Earth-and-Geography/Physical-Geography/Rivers-and-River-Systems>

3. Video and Associated Reading (5-7 min)

A video and associated reading that describes the effect of climate change on the river Nile.

This can be accessed at:

<http://news.mit.edu/2017/nile-climate-change-droughts-floods-0424>

4. Suggested questions/assignments for learning evaluation

- What are river systems? Describe their fluvial processes.
- What is the socio-economic importance of a major river system? Give examples.
- Comment on the significance of the river Nile for Egypt. How is it affected by climate change?
- How are the major river systems of the world being affected by climate change?

2 Step-by-step User Guide

Here is a step-by-step guide to using this lesson plan in the classroom/laboratory. We have suggested these steps as a possible plan of action. You may customize the lesson plan according to your preferences and requirements.

1. Topic introduction and discussion

Use the reading, '[River Systems](#)' by Canadian Geographic Education to introduce your students to the basic terminology associated with a river system such as river source, tributary, floodplain, meander, upstream, wetlands, and watershed boundary. This document can also be downloaded.

This can be accessed at:

http://www.cangeoeducation.ca/resources/learning_centre/classroom_activities/river_system.asp

Further, use the reading, '[Fluvial Processes](#)' by Central Connecticut State University to describe the processes associated with the flowing nature of the river. Use the text to describe what the drainage basin of a river system is, and what its characteristics are. Explain the processes associated with river erosion and the transportation and deposition of eroded material. Describe the flow channel characteristics and briefly discuss strategies for river management. Finally use the set of review questions given in text to enable further discussion and to assess student understanding of the topic.

This can be accessed at:

https://web.ccsu.edu/faculty/kyem/GEOG272/Chapter11/Rivers_Landforms.htm

2. Develop the topic further by exploring the features of some major river systems of the world

Use the webpage, '[Rivers and River Systems](#)' by Encyclopedia Britannica to teach your students about some major river systems of the world. Choose a river system and navigate to different sections in the contents to teach about topics such as physiography, climate and hydrology, plant and animal life, people, economy, study and exploration. Encourage a discussion on what factors, for example climatic factors, could affect the normal functioning of the river system and what their implications could be. You may choose to specifically explore various aspects of the river Nile for better understanding of the effects of climate change on it, as discussed in the next teaching tool.

The webpage can be accessed at:

<https://www.britannica.com/topic-browse/Earth-and-Geography/Physical-Geography/Rivers-and-River-Systems>

3. Discuss the impact of climate change on the river Nile

Use the video and associated news report, '[Nile faces greater variability](#)' by David L. Chandler, Massachusetts Institute of Technology News Office to explain the impact of climate change on the river Nile, one of the major river systems of the world. This news piece reports on a study published by Prof Elfatih Eltahir and Mohamed Siam in Nature Climate Change. Use the tool to explain how the Nile basin now faces unpredictable drought or flood conditions due to a warming climate and that the variability in precipitation and evapotranspiration are influenced by the Pacific Ocean El Nino/ La Nina phenomenon. Further, use this report to discuss the future projections mentioned in the study, of how such climatic factors could further increase the flow variation in the Nile.

This can be accessed at:

<http://news.mit.edu/2017/nile-climate-change-droughts-floods-0424>

4. Questions/Assignments

Use the tools and the concepts learned so far to discuss and determine answers to the following questions:

- What are river systems? Describe their fluvial processes.
- What is the socio-economic importance of a major river system? Give examples.

- Comment on the significance of the river Nile for Egypt. How is it affected by climate change?
- How are the major river systems of the world being affected by climate change?

3 Learning Outcomes

The tools in this lesson plan will enable students to:

- understand river systems and their associated processes
- learn about various aspects of some of the major river systems of the world
- explain how river systems may be affected by climatic factors
- discuss the impact of climate change on the river Nile

4 Additional Resources

If you or your students would like to explore the topic further, these additional resources will be useful.

1. Reading (10 min)

A reading, 'Lakes and Rivers' by Climate Hot Map, Union of Concerned Scientists, that briefly describes the effect of climate change on the ecosystems of lakes and river systems.

This can be accessed at:

<https://www.climatehotmap.org/global-warming-effects/lakes-and-rivers.html>

2. Reading (30 min)

A slide presentation, 'Impacts of Climate Change on Egypt and the Nile River' by Lama El Hatow, to describe the impacts of climate change, mainly on the water resources of Egypt including the river Nile.

This can be accessed at:

http://cairoclimatetalks.net/sites/default/files/Impacts%20of%20Climate%20Change%20on%20Egypt%20and%20the_Nile.pdf

5 Credits/Copyrights

All the teaching tools in our collated list are owned by the corresponding creators/authors/organizations as listed on their websites. Please view the individual copyright and ownership details for each tool by following the individual links provided. We have selected and analyzed the tools that align with the overall objective of our project and have provided the corresponding links. We do not claim ownership of or responsibility/liability for any of the listed tools.

1. Reading; 'River Systems'

By [Canadian Geographic Education](#).

2. Reading; 'Fluvial Processes'

By [Central Connecticut State University \(CCSU\)](#).

3. Webpage; 'Rivers and River Systems'

Published by [Encyclopedia Britannica](#).

4. Video and Associated Reading; 'Nile faces greater variability'

By David L. Chandler, [Massachusetts Institute of Technology News Office](#).

5. Additional Resources

[Climate Hot Map](#), Union of Concerned Scientists.

Lama El Hatow, Phd Candidate, Erasmus University of Rotterdam, Netherlands. Hosted by [Cairo Climate Talks](#).