NOTE: This lesson, developed by the Virginia Geographic Alliance, focuses on the development of geographic understandings, knowledge, and skills. It incorporates selected portions of the Commonwealth of Virginia Department of Education, History and Social Science Enhanced Scope and Sequence, World History and Geography to 1500 A.D. (C.E.), Copyright 2010.

**ORGANIZING TOPIC**

**Ancient River Valley Civilizations**

**Standard(s) of Learning**

WHI.3 The student will demonstrate knowledge of ancient river valley civilizations, including those of Mesopotamia, Egypt, the Indus River Valley, and China and the civilizations of the Hebrews, Phoenicians, and Nubians, by
  a) locating these civilizations in time and place;

**Essential Understandings, Knowledge, and Skills**

Skills (to be incorporated into instruction throughout the academic year)

Use maps, globes, artifacts, and pictures to analyze the physical and cultural landscapes of the world and interpret the past to 1500 A.D. (C.E.).

Identify major geographic features important to the study of world history to 1500 A.D. (C.E.).

Content

Explain that during the New Stone Age, permanent settlements appeared in river valleys and around the Fertile Crescent.

Explain that river valleys provided water and rich soil for crops as well as protection from invasion.

Identify the location of the earliest river valley civilizations (about 3500 to 500 B.C. [B.C.E.]), using the following information as a guide:
  • Mesopotamian civilization: Tigris and Euphrates River Valleys (Southwest Asia)
  • Egyptian civilization: Nile River Valley and Nile Delta (Africa)
  • Indian civilization: Indus River Valley (South Asia)
  • Chinese civilization: Huang He Valley (East Asia)

Explain that these river valleys offered rich soil and irrigation water for agriculture, and they tended to be in locations easily protected from invasion by nomadic peoples.

Identify other early civilizations (about 2000 to 500 B.C. [B.C.E.]), using the following information as a guide:
  • Hebrews settled between the Mediterranean Sea and the Jordan River Valley (part of Fertile Crescent in Southwest Asia).
  • Phoenicians settled along the Mediterranean coast (part of Fertile Crescent in Southwest Asia).
  • Nubia was located on the upper (southern) Nile River (Africa).

Sample Resources

Below is an annotated list of Internet resources for this organizing topic. Copyright restrictions may exist for the material on some Web sites. Please note and abide by any such restrictions.


*Ancient Mesopotamia.* Penn State, College of Education. [http://www.ed.psu.edu/k-12/edpgs/su96/meso/mesopotamia.html](http://www.ed.psu.edu/k-12/edpgs/su96/meso/mesopotamia.html). This site contains a lesson plan for teaching Ancient Mesopotamia.
“Indus Valley Civilization.” MANAS: India and Its Neighbors. Social Sciences at UCLA. 
http://www.sscnet.ucla.edu/southasia/History/Ancient/Indus2.html. This site provides information on the Indus Valley Civilization.


http://www.doe.virginia.gov/testing/sol/blueprints/history_socialscience_blueprints/2008/blueprints_worldhistory_geo_to1500.pdf. This site provides assessment information for World History and Geography to 1500 A.D. (C.E.).


Session 1: Evaluating the Location of Ancient River Valley Civilizations

Materials

- Attachment A: Early River Valley Civilizations Outline Map
- Attachment B: Early River Valley Civilizations Map in Color
- Attachment C: Early River Valley Civilizations Map Key with Rivers Labeled
- Attachment D: Mesopotamian Civilization: Tigris and Euphrates River Valleys (Southwest Asia)
- Attachment E: Egyptian Civilization: Nile River Valley and Nile Delta (Africa)
- Attachment F: Indian Civilization: Indus River Valley (South Asia)
- Attachment G: Chinese Civilization: Huang He Valley (East Asia)
- Attachment H: Physical Environment of Early River Valley Civilizations Map Analysis
- Attachment I: Cradles of Civilization*
- Attachment J: Cradles of Civilization Key*


- Attachment K: Huang He River Valley Dry Areas
- Attachment L: Indus River Valley Dry Areas
- Attachment M: Nile River Valley Dry Areas
- Attachment N: Tigris and Euphrates River Valleys Dry Areas
- Attachment O: Using Layered Portable Document Files (pdfs)

Instructional Activities

1. Introduction to lesson:
   In this lesson students examine the physical environment of the early river valley civilizations. In addition to identifying the locations of the ancient civilizations, students complete a feature analysis to assist them in comparing the physical environments and determining how it afforded protection to the civilizations. Throughout the lesson focus student attention on the following questions:
   - Why was a river valley a good place for a settlement?
   - What was the significance of these river valley civilizations?

2. Have students locate and label the bodies of water important to the ancient river valley civilizations on Attachment A: Early River Valley Civilizations Outline Map. Project Attachment C: Map Key for student reference in labeling the following bodies of water.
   - Tigris and Euphrates rivers flow into the Persian Gulf
   - Nile River (Blue Nile and White Nile) flow into the Mediterranean Sea
   - Indus River flow into the Arabian Sea
   - Huang He River flow into the Yellow Sea

3. Have students use a textbook to locate and shade in the following civilizations: Mesopotamian (Southwest Asia), Egyptian (Africa), Indian (South Asia) and Chinese (East Asia). Attachment I: Cradles of Civilization map may also serve as a source for this information.

4. Have teams of students examine Attachments D through G and complete Attachment H: Physical Environment of Early River Valley Civilizations Map Analysis. This segment of the learning activity provides students with the opportunity to examine maps of the area and determine the type of barriers presented by the physical environment that protected the early river civilizations. Students also analyze the shapes of the modern-day river mouths for evidence of siltation and a clear delta shape.

   Teachers may choose to facilitate the completion of the exercise by projecting the large format Dry Areas maps in the order listed on the left-hand column of Attachment H. Complete the analysis as a whole-class activity.
5. In the discussion that follows the completion of the exercise, pose the following questions:

- What climate characteristics were shared by all of the early river valley civilizations? (For the most part, desert and semi-arid areas with limited rainfall were characteristic of the early river valley civilizations.)
- What do all of the rivers have in common? (The rivers are located in the eastern hemisphere between 15 and 45 degrees North. The civilizations border the rivers. All of the rivers have a source in the mountains. Each has built a delta at their mouths.)
- Why would early people have settled in those areas? (Early people settled here because of the protection from invasion provided by mountains and deserts. Fertile and renewable soils were enriched by sedimentation. In addition, the rivers provided water for irrigation in these dry climatic areas.)
<table>
<thead>
<tr>
<th>Attachment J: Cradles of Civilization Key</th>
<th>Attachment K: Huang He Dry Areas</th>
<th>Attachment L: Indus Dry Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Cradles of Civilization Key" /></td>
<td><img src="image2" alt="Huang He Dry Areas" /></td>
<td><img src="image3" alt="Indus Dry Areas" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Attachment M: Nile Dry Areas</th>
<th>Attachment N: Tigris &amp; Euphrates Dry Areas</th>
<th>Attachment O: Using Layered PDFs</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image4" alt="Nile Dry Areas" /></td>
<td><img src="image5" alt="Tigris &amp; Euphrates Dry Areas" /></td>
<td><img src="image6" alt="Using Layered PDFs" /></td>
</tr>
</tbody>
</table>

Click on the links above to access a full-page layered pdf of each of the maps. Maps may be customized by turning specific layers on or off before display. [Link to explanation of layered pdfs](#).
Early River Valley Civilizations

- Nile
- Indus
- Yellow River (Huang He)
- Tigris
- Euphrates
- Blue Nile
- White Nile

Map showing the locations of these rivers and the Indian Ocean.
Mesopotamia, Greek for “land between the rivers” describes the area between the Tigris and Euphrates rivers. Tributaries originating in the mountains feed the “land between the rivers.” Rain fed agriculture in the northwest part of Mesopotamia is gradually replaced by irrigation to support more intensive farming further downstream.

The two rivers and their drainage basins are almost completely within the region that has come to be known as the Fertile Crescent, an area that supported early agriculture because of the fertile river valley soils and adequate precipitation and river flow.

The rivers now meet at Basra and flow into the Persian Gulf via the Shatt al Arab waterway. In ancient times, each river had a separate mouth at the Persian Gulf, and the shore line was further north.

**Definitions**

An arid area or desert receives less than 10 inches of rain a year.
A semi-arid area generally receives between 10 and 20 inches of rain per year.
Framed by deserts, the northward-flowing Nile River is fed by two major tributaries, the Blue Nile and the White Nile that meet at the city of Khartoum.

The **Blue Nile** contributes about two-thirds of the Nile’s volume and flows through narrow gorges on its way to Khartoum. The upper part of the river is characterized by rapids, waterfalls, and water that is anything but blue. The combination of mountain rain and snowmelt from the Ethiopian Highlands in the summer months resulted in erosion and transported soil to the Nile’s downriver floodplain.

The **White Nile** originates south of the equator at Lake Victoria. Water flow and associated silt load from its tributaries are larger than that of the Blue Nile, but much of the silt is lost in small lakes or is spread over floodplains and lowland swamps.

Sedentary agriculture along the Nile was supported by predictable seasonal flooding that deposited fertile soil for agriculture. The Egyptians are credited as being one of the first groups of people to practice agriculture on a large scale. This was possible because of the ingenuity of the Egyptians as they developed basin irrigation. Their farming practices allowed them to grow staple food crops such as wheat and barley, and “industrial” crops such as flax and papyrus.

**Definitions**

An arid area or desert receives less than 10 inches of rain a year. A semi-arid area generally receives between 10 and 20 inches of rain per year.
With its source in the glaciers of the Himalaya and Karakoram mountain ranges, the Indus River flows 1,980 miles to the Arabian Sea. River flow is the highest during the summer months as the snow melts and the summer monsoon arrives. About 70% of the area's precipitation falls between July and September.

Sediment transported by the Indus has accumulated in an off-shore undersea fan, one of the largest sediment bodies on Earth. In the aerial image to the right, many tidal creeks penetrate the Indus’ delta plain along the Arabian Sea.

Since ancient times irrigation has supported agriculture during the drier months. The water of the Indus and the sediment it transports and deposits have supported agriculture for over 4,000 years in an area where water is generally scarce.

Definitions
An arid or desert area receives less than 10 inches of rain a year.
A semi-arid area receives between 10 and 20 inches of rain a year.
The **Huang He** (Yellow River in translation) is the second-longest river in China and the sixth-longest in the world, with an estimated length of 3,395 miles. The Huang He’s length has changed over the years because the delta on the Bohai Sea has wandered up and down several hundred miles of coastline over the past two thousand years.

At various points in time, the accumulation of silt has raised the water level above surrounding land. “China’s Sorrow,” “Yellow Fear”, and “Scourge of the Sons of Han” all refer to the many floods that have plagued the people along the lower reaches of the Huang He. A high silt load from the Loess Plateau, a low gradient across the plain, and excessive precipitation have all contributed to disastrous flooding in the past and present.

**Definitions**

- An arid area or desert receives less than 10 inches of rain a year.
- A semi-arid area generally receives between 10 and 20 inches of rain per year.
- Loess is a fine silt material carried by wind, probably originating from the Gobi Desert.
**Attachment H: Physical Environment of Early River Valley Civilizations Map Analysis**

Directions: The four civilizations being studied are listed down the left side of the chart. Geographic features of these civilizations are listed across the top. Examine the placards for each of the Early River Valley Civilizations (Attachments D to G) and the Cradles of Civilization map to the right. For the first four columns, determine if a barrier is present, then the direction in which the barrier is located. Underline the correct answer. For the other columns, place a plus sign (+) in the box if the criterion is met or place a zero (0) in the box if it is absent. After you complete the chart below, answer the question that follows.

<table>
<thead>
<tr>
<th>Civilization</th>
<th>Mountain Barrier</th>
<th>Desert Barrier</th>
<th>Semiarid Barrier</th>
<th>River Mouth</th>
<th>Between 15° and 30° North</th>
<th>Between 30° and 45° North</th>
<th>Sedimentation at River Mouth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huang He</td>
<td>north</td>
<td>north</td>
<td>north</td>
<td>north</td>
<td>north</td>
<td>east</td>
<td>Sedimentation at River Mouth</td>
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<td>Sedimentation at River Mouth</td>
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<td>Indus</td>
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<td>Sedimentation at River Mouth</td>
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<td>Sedimentation at River Mouth</td>
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<td>west</td>
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<td>Sedimentation at River Mouth</td>
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<tr>
<td>Tigris-Euphrates</td>
<td>north</td>
<td>north</td>
<td>north</td>
<td>north</td>
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<td>east</td>
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<td>Sedimentation at River Mouth</td>
</tr>
</tbody>
</table>

What evidence do you have that ancient river valley civilizations were protected by the physical environment?
<table>
<thead>
<tr>
<th>Civilization</th>
<th>Mountain Barrier</th>
<th>Desert Barrier</th>
<th>Semiarid Barrier</th>
<th>River Mouth</th>
<th>Between 15° and 30° North</th>
<th>Between 30° and 45° North</th>
<th>Sedimentation at River Mouth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huang He</td>
<td>north east south west</td>
<td>north east south west</td>
<td>north east south west</td>
<td>north east south west</td>
<td>0</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Indus</td>
<td>north east south west</td>
<td>north east south west</td>
<td>north east south west</td>
<td>north east south west</td>
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<td>Nile</td>
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<td>north east south west</td>
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<tr>
<td>Tigris-Euphrates</td>
<td>north east south west</td>
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<td>north east south west</td>
<td>0</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>
Using Layered Portable Document Files (pdfs)

A layered pdf provides teachers with the opportunity to turn off and on layers during a presentation. In addition, the layered pdf format gives students access to layers of a geographic information system (GIS) without the use of additional software. As students investigate the maps they can provide responses to a variety of teacher-constructed questions.

1. Download the map from the source.
2. Open the map in Adobe Reader.
3. If the navigation panel, shown on the left, is not visible, right click on the map and select View Navigation Panel.
4. Use the third icon, the stack of papers to access the layers contained within the pdf.
5. Click on the plus sign next to the folder named Layers. There may be a separate folder for Labels. (There is not for this example.)
6. Once the folder is open, click on the eye to the left of the layer’s name and the layer disappears. To turn it back on, click in the box again.
7. If you click on the eye next to the folder, the entire map disappears.

The map on the left has all of the layers turned on. This is its initial state when opened. With the various layers turned off students can predict the location of the deserts and semiarid areas.

This map illustrates the effect of having the various layers turned off.

Consider the type of questions that can be asked of this map.
- What is the likely path of the Huang He River?
- What types of physical barriers did the inhabitants of this early river valley civilization encounter?

Zooming into a selected area of the map
1. Right click on the map.
2. From the menu that opens select Marquee Zoom. A check box will appear to its left. A new icon will appear on the top menu bar—the magnifying glass with the dotted box around it.
3. Click on the icon and while holding the left mouse key down draw a square around the area of interest. The map zooms to that area. **Note:** when the map contains an image as the base map it may pixelate if you zoom in too far.
4. To return to the original map display change the percent back to 100.
5. Use the hand tool to move the zoomed-in area to the center of the display. (If the hand tool is not visible, right click on the map and select it. It will then appear on the top menu.)
Session 2: Why Does Sedimentation Matter?

Materials

- Attachment P: Delta Illustration
- Attachment Q: Images of River Deltas Today
- Attachment R: Processing Activity Exit Ticket
- Attachment S: Instructions for Making Sedimentation Models
- Attachment T: Background Information and Teacher Notes

Instructional Activities

1. Introduction to lesson:
   Moving water carries and sorts sediment, changes landforms, and creates strata. The sediment becomes the base for soil formation, and it is the material of which flood plains, deltas, and natural levees are built. Through a demonstration of the sedimentation process, students will come to understand the significance of the process and seasonal flooding to agricultural activity in the early river valley civilizations. This learning activity is focused on the following questions:
   - How does the process of sedimentation affect soil fertility?
   - Why are some river valleys good sites for human settlement?

2. In preparation for the lesson, create the sedimentation models as directed in Attachment T: Instructions for Making Sedimentation Models. The number of models is based on the number of student groups you plan to use during the learning activity. A whole-class demonstration could also be conducted, but students will not have the opportunity to directly observe the changes in the model.

3. Explain to students that rivers carry sediments of different sizes. A river’s ability to carry a ‘sediment load’ depends on (1) the river’s volume (amount of water) and (2) the river’s velocity (speed of flow). In other words, large rivers can carry more sediment than small rivers, and fast-moving rivers can carry more sediment than slow-moving rivers.

4. Provide each group of students with a sedimentation model. Have students observe the layers of materials in the model and the color of the water. Then, have students shake the sedimentation models to simulate the turbulence of a flowing river and then set the model on its end and leave it undisturbed while they participate in other learning activities. It will take at least 20 minutes for the sediment to settle. The water will remain cloudy illustrating the ability of water to transport sediment from one location to another.

5. Introduce the term “delta” using Attachment P: Delta Illustration. Explain that a river delta is a landform that is formed at the mouth of a river. Sediment carried by the river is deposited along the river’s floodplain and in the later stages, on the river bottom with the remainder being transported to the mouth of the river and flowing out into the sea. The seasonal flooding and the river’s sediment deposited along the river renews the soil. Over time, this deposit of sediment builds the characteristic geographic pattern of a river delta, similar to the Greek letter delta.

6. Use Google Earth or ArcGIS.com (http://bit.ly/175xIEG) to display images of the deltas of the Tigris and Euphrates at the Shatt al Arab, Indus, Nile, Huang He rivers today. Use bookmarks to navigate to the various locations within the map. If an Internet connection is not available, use the images provided as
Attachment Q: Images of River Deltas Today. Have students compare the river mouths for the amount of sediment and patterns of deposition. Ask students to suggest reasons why the Nile today has little sediment flowing into the Mediterranean. (Dams upstream are trapping the sediment and thus reducing the deposition downstream.)

7. Return to the sedimentation model and explain to students that what occurred in the sedimentation model also occurred in the river valleys of the earliest civilizations. As students examine their sedimentation models pose the following questions:
   - What happened to the rocks and sediment in your model?
   - What layers formed and where? What does the water look like compared to before?
   - Which of the layers is best for farming? Why?
   - Did the layer best for farming settle first or last?


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**Attachment P: Delta Illustration**

**Attachment Q: Images of River Deltas Today**

**Attachment R: Processing Activity Exit Ticket**

**Attachment S: Instructions for Making Sedimentation Models**

**Attachment T: Background Information and Teacher Notes**
Attachment Q: Images of River Deltas Today

Mouth of the Indus River
The Nile and the Suez Canal at the Southern Mediterranean
Mouth of the Huang He
Shatt al Arab Waterway Empties into the Persian Gulf
EXIT TICKET

Why were river valleys the best locations to settle?
Attachment S: Instructions for Making a Sedimentation Model

Materials:
- sand
- small gravel
- dried powdered clay (available from art or pottery supply stores)
- pint-sized jar (clear plastic or glass) with lid

Procedures:
1. Place in the jar: 1/4 cup sand, 1/4 cup dry clay powder, and 1/4 cup small gravel.
2. Close lid and shake jar to mix sand, clay, and gravel.
3. Add 1 cup water.
4. Seal tightly.
5. Shake the jar to mix the materials then allow it to settle.
6. After approximately twenty minutes, a separation of materials can be seen.

Directions for making a sediment model in a plastic water bottle can be obtained from [http://weirdsciencekids.com/Makesedimentarylayer.html](http://weirdsciencekids.com/Makesedimentarylayer.html)

Background Information on Sedimentation
- Rivers carry sediments of different sizes. Their ability to carry a ‘sediment load’ depends on (1) the river’s volume (amount of water) and (2) the river’s velocity (speed of flow). In other words, large rivers can carry more sediment than small rivers, and fast-moving rivers can carry more sediment than slow-moving rivers.
- The typical river is fast-moving when it flows out of a mountain range and slow-moving after it meets flatter land.
- Sediments are classified according to their size: gravel, sand, silt, clay. Sometimes the sediment bounces along the bottom; other times it is carried in suspension.
- When a river slows down (as it does when relief flattens out), it loses its ability to carry sediment. The largest and heaviest (gravels) settle out first, the smallest and lightest (silt and clay) settle out last.
- The sediment becomes the base for soil formation, and it is the material of which flood plains, deltas and natural levees are built.
The regional term Fertile Crescent was coined by James Henry Breasted in 1914. In 1916, its definition and a map appeared in his textbook called *Ancient Times*.

What gives this region of western Asia unity? Fertility made possible by the availability of fresh water. What is the shape of this fertile region of western Asia? It appears as a crescent. One part of the name Fertile Crescent calls attention to the region’s productivity and the other to its shape. Note that Breasted did not include the Nile Valley in the Fertile Crescent. Why? First, there is a swatch of total aridity between the western tip of the Fertile Crescent and the Nile Delta. Second, if you include the Nile Valley, the region is no longer a crescent. The Nile Valley and the Fertile Crescent are two geographically separate regions.
Ancient River Valley Civilizations
Author: Joseph D. Enedy, Ph.D., James Madison University, Harrisonburg, Virginia

Tigris-Euphrates Region
The Tigris and Euphrates Rivers and their drainage basins are almost completely within the region that has come to be known as the Fertile Crescent. This region of fertile river valley soils and adequate precipitation/river flow for agriculture was first defined by James Henry Breasted as the region extending from the Mediterranean Sea shore of the Sinai Peninsula to the Persian Gulf. The original or the larger region is bordered by deserts (Sahara and Syrian) and mountains (Zagros to the east and Anatolian highlands to the north).

Twin Rivers
The Tigris River, the eastern member, and the Euphrates to the west combine to define the region Mesopotamia (Greek for “Land between the rivers”). Like the other great river valley civilizations of the Nile, Indus, and Yellow, both the Tigris and Euphrates begin as independents in the mountains of Turkey before flowing through arid and semiarid climatic realms along their courses. The headwaters of the Tigris are in the Taurus Mountains of eastern Turkey just 18 miles from one tributary of the Euphrates.

Approximately 1,149 miles of river valley define the eastern part of the twin river system before it merges with the Euphrates at Basra. The remaining portion of the joined rivers is referred to as the Shatt-al-Arab before emptying into the Persian Gulf. Iraq’s capital, Baghdad, is situated approximately midway on the river’s course inside Iraq.

The Euphrates originates as two tributaries in the mountains of Turkey. An eastern tributary, the Murat covers about 449 miles before merging with the Karasu (western Euphrates) and continues the remaining 1,900 miles to the confluence with the Tigris at Basra.

Cradle of Civilization
An important reason for the early development of civilizations in the Nile, Indus, Yellow and the Tigris-Euphrates valleys was location characterized by mild climates, reliable water flow, and annual flooding leading to soil renewal. The physical geography (i.e., elevation) of the Fertile Crescent portion extending from Turkey and Syria through Iraq to the Persian Gulf controls the availability of water. Mountains in the tributaries of both rivers and the Zagros Mountains on the eastern boundary with Iran feed the “land between the rivers” as well as the area east of the Tigris. Rain fed agriculture in the northwest part of Mesopotamia is gradually replaced by irrigation to support more intensive farming further downstream.

Permanent settlements, domestication of plants and animals, and developments associated with agriculture (e.g., irrigation, retention dams) were possible over-time. Sumerian city states such as Ur, Uruk, Kish, and Lagash dominated the Shatt-al-Arab area.

Huang He River
The Huang He or Yellow River is the second-longest river in China after the Yangtze and the sixth-longest in the world with an estimated length of 3,395 miles. The lengths of many rivers are often in dispute because such things as the origin of the most distant tributary is in dispute, location of the river mouth, etc. have never been agreed upon. Even the Huang He’s length has changed over the years because the delta on the Bohai Sea has wandered up and down several hundred miles of coastline over the past two thousand years.
The Huang He River basin has an east-west extent of 1,180 miles from its origin in the Bayan Har Mountains to the mouth on the Bohai Sea. The north-south extent of 684 miles is primarily made up of the Ordos Loop.

The location(s) of the Huang He River basin have earned it both endearing and condemning names. They include “Cradle of Chinese Civilization”, “Mother River”, “China’s Sorrow”, “Yellow Fear”, and “Scourge of the Son’s of Han”.

**A River In Three Stages**

The Huang He River is commonly divided into three stages. These are roughly the northeast of the (1) Tibetan Plateau, (2) the Ordos Loop and the (3) North China Plain.

**Origin to Hekou Town**

The upper stage extends from the river’s origin to the NE corner of the Ordos Loop near Hekou Town—a linear distance of approximately 2,157 miles and basin of 149,000 sq. miles. The far western one third of the total distance flows between mountains, through pastures and swamps. The middle part of this section moves through gorges with a higher gradient and narrow river bed over more resistant material producing minimum erosion. Emerging from the gorges the river flows through grasslands and desert. The absence of water from major tributaries and a low gradient result in some silt deposits on the river bottom.

**Hekou Town to North China Plain**

The middle stage, eastern side of the Ordos Loop, extends about 749 miles to the southern end of the Loop where the Wei River empties into the Huang He. Over 30 major tributaries increase water flow by 43.5% and contribute over 92% of the river’s famous silts. The river cuts through China’s Loess Plateau (247,000 sq. mi.) located on the SW and SE corners of the Ordos Loop. This section of the river with its many tributaries passes through the easily eroded Loess Plateau. Loess is a fine silt material carried by winds. The silt probably originated from the Gobi Desert (500,000 sq. miles) to the north. Because of this, the Huang He is the most sediment laden river in the world.

**Wei River Tributary to Bohai Sea Delta**

In the lower reaches, a distance of just 488 miles, the river is confined to a levee-lined course as it flows to the northeast across the North China Plain before emptying into the Bohai Sea. Total elevation drop from the western edge of the Plain to the sea is a mere 370+ feet. Natural levee development over thousands of years has been supplemented by man-made levees because accumulation of silt in the river bed has raised the water level above surrounding land. A high silt load from the loess plateau of the previous section of the river deposited on the river bed, a low gradient across the plain, and periodic flooding from excessive precipitation in the mountains to the west have all contributed to disastrous flooding of surrounding lands. “China’s Sorrow”, “Yellow Fear”, and “Scourge of the Son’s of Han” all refer to the many floods that have plagued the Huang He in its lower reaches. On the other hand, “Cradle of Chinese Civilization” and “Mother River” suggests that Chinese civilization originated in the same area(s) described above.

**Huang He River Valley Civilization**

The Huang He is called “the cradle of Chinese civilization” as its basin – specifically, the Wei valley that cuts across the long Ordos loop was the birthplace of ancient Chinese civilizations and the most prosperous region in early Chinese history.

The valley of the Wei was one of the early cradles of Chinese civilization, along which the capitals of the Zhou, Qin, Han, and Tang Dynasties were located. Each contributed to both the development of China and in many ways the world.

**Nile River Tributaries**

The Nile River is the world’s longest at about 4,100 miles (6,436 Km). Like other major rivers, the Nile has several tributaries. Two main tributaries generally recognized are the Blue and White Nile.

The Blue Nile is the smaller in length (@ 900 miles, but contributes a volume flow exceeding 66% of the Nile’s total volume where it empties into the main stem at Khartoum (Elevation 1265 ft.). Originating as a spring in the Ethiopian Highlands that feeds Lake Tana (elevation 5,866 ft.), Lake Tana’s outlet on the south shore cuts narrow gorges on its way to Khartoum while dropping approximately 4,621 ft. This downcutting of river bed is characterized by rapids, waterfalls, and water that is anything but
blue. The combination of mountain rain and snowmelt from the Ethiopian Highlands (14,000 ft.) during the June through September period resulted in the erosive power of soil that ultimately found its way to the Nile’s downriver floodplain. A second tributary from the northern side of the Ethiopian Highlands is the Atbarah River. Water flow is largest during the June through September and adds the final 21% of total volume to the Nile proper upstream from the Aswan Dam.

The White Nile originates south of the equator at Lake Victoria. This second largest freshwater lake (North America’s Lake Superior is largest) feeds the White Nile that flows north before it joins the Blue Nile at Khartoum to form the main stem of the Nile. The 2,300 miles from Lake Victoria to Khartoum is characterized by deep river gorges, tropical rainforests, grasslands and desert. Water flow and associated silt load from contributing tributaries is undoubtedly larger than that of the Blue Nile, but silt is lost in small lakes, is spread over floodplains and in lowland swamps. The White Nile carries a larger volume of water between Lake Victoria and the Southern Sudan than exits the vast lowland of swamp conditions called the SUDD. Water re-entering into the main channel of the White Nile on the Sudd’s northern edge is changed:

1. Total volume is lowered because of evaporation, seepage, and diversions for human use; (Only about 15% of the flow at Khartoum is from the White Nile)
2. Sediment deposited in the SUDD basin clarifies the water flowing north.

**Ancient Nile River Agriculture**

The development of civilization of ancient Egypt was indebted to the Nile River and its dependable seasonable flooding. The river’s predictable flooding and the fertile soils it deposited allowed the Egyptians to build an empire on the basis of surplus producing agriculture. Additional physical conditions allowed the early Egyptians time to develop a sedentary form of agriculture. They included:

1. Protection from invasion: uninhabited desert to the west; mountains and the Red Sea to the east; river rapids (cataracts) and the impenetrable SUDD swamp to the south.
2. The dry subtropical (BWh Koppen) climate, supplemented with flooding and irrigation.
3. Northern hemisphere winter growing season

Egyptians are credited as being one of the first groups of people to practice agriculture on a large scale. This was possible because of the ingenuity of the Egyptians as they developed basin irrigation. Their farming practices allowed them to grow staple food crops such as wheat and barley, and the industrial crops- flax and papyrus.

**Nile River Today**

The completion of the Aswan High dam in 1970 changed the historic influence of the Nile River in many ways. Most significant in those changes was the control of flooding and the almost total elimination of the soil renewing qualities of sediment deposition on its floodplain. Nile Delta formation has also been slowed.

**Indus River**

The Indus River originates near the Lake Mansarovar in the Tibetan Plateau at an elevation of 15,000’ before flowing about 1,900 miles to the Arabian Sea. The lake has long been viewed by pilgrims as being near the sources of four of the greatest rivers of Asia- the Brahmaputra, Karnali, Indus and Sutlej. Regardless of the fact that almost two thirds of the river is flowing through Pakistan most of the tributaries originate in India. The name “Punjab” region of Pakistan is derived from these tributaries that collectively mean “five waters” or “land of five waters”.

The origin of the Indus River on the Tibet Plateau to the east of the Himalaya Mountain chain is similar to the origin of the Nile, Tigris-Euphrates, and Huang He. Each river originates in a humid region of precipitation that supplies greater flow than expected for the deserts region through which they flow. The Indus, Nile, Tigris-Euphrates, and Huang He share the “exotic” designation because they all maintain a course through a desert area in which precipitation is not adequate to support channel flow.

Indus River water flow is maximized during the “wet” or “southwest” monsoon that begins in June along the Arabian Sea coast and continues into the interior
until September. The erosion process and sedimentation at the river’s mouth (i.e., delta) is greatest during the wet monsoon rains as well as mountain snow melt. Delta formation has been slowed in recent decades by rapid population growth in the valley, withdrawal of water for irrigation to support dry season farming, and flood control dams that trap sediment.

**Indus Valley Civilization**

The Indus River valley civilization was a Bronze Age civilization (3500-1300 BCE) that developed in the northwest part of the Indian subcontinent along the Indus River valley and its tributaries. It was/is sometimes called the Harappan civilization, derived from the early 1800 discovery of a city site that lies within the limits of today’s Harappa. Mohenjodaro shares many of the same city characteristics: valley location; two story brick construction; fortification construction; administrative districts; sanitary sewer/drainage; and granaries.

While the Indus valley civilization is noted for the early development of cities, successful sedentary agriculture was key to the growth of those cities. Valley farmers sow seeds in October and November after flood waters recede and harvest in April-May before the next floods. Wheat, barley, sesame, rice, cotton, and numerous vegetables were important to the diet. Farmers kept cattle, sheep, goats, pigs, and chickens to supplement a rich vegetable diet. Larger domesticates such as cattle, donkeys, and camels were also used for field work as well as providing meat.
Huang He River Valley