



Learning on the Great Lakes Seaway Trail

One of America's Byways

Lesson #6

Subject: Erie Canal and Eisenhower Locks

Grade Level: 4-6

Irene F Sullivan

Anticipatory Set:

Ask the students if they have ever heard of the Erie Canal or the St. Lawrence Seaway. Ask the students what was the purpose of building these water systems.

New York State Standards:

Standard 1.1, 1.2 - History of the United States and New York

Objectives:

Students will have the understanding about the New York Waterways and how they work by reading a story "*Minnie the Mule and the Erie Canal*", by Lettie A. Petrie. Students will visit websites that have animated video on the sites showing how the canal system works. The students will reconstruct a model of the lock system.

Purpose:

To have students understand the importance of the Erie Canal and the St. Lawrence Seaway had on our Nation.

Summary: Erie Canal

What is a Canal?

A canal is man made channel of water. They are use to connect natural bodies of water such as rivers and lakes. The waterways made traveling and transporting of goods easier and quicker. Canals have been around for a very long time. The Grand Canal of China is the oldest canal still in existence today. They began building the canal in the 4th century B.C. and took centuries to build. The canal is over 1,000 miles long.

After the American Revolutionary War, settlers started to move out west into the lands between the Appalachian Mountains and the Mississippi River. New York was the only eastern state that had natural land passages that cut through mountains to land near the lakes. New York State farmers and businesses were looking for expansion by finding an easier way to transport goods from one part of the state to the other. They wanted to have a more feasible way for them to move raw materials and manufactured goods from the Atlantic Ocean to the Great Lakes and in return be able ship produce and products from Western New York to the Eastern New York markets. Up to this point travel and transporting was limited. In 1817 a plan for a man-made waterway fed by the Mohawk River was made. The plan was to build a canal that connected Albany and the Hudson River in the east with Buffalo and the Great Lakes in the west.

DeWitt Clinton, mayor of New York City became governor in 1817. He was able to convince the state legislator to finance a canal. The construction of the Erie Canal started on July 4, 1817 and it was completed and opened on October 26, 1825. Crews of untrained men built the canal without professional engineers. It was America's first grand



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canal at a cost of \$7 million. The 363 mile long canal connected the Hudson River to Lake Erie. Albany and Buffalo were the eastern and western entrances to the canal. Now the 524-mile New York State Canal System connects a number of rivers and lakes throughout the Empire State. The Great Lakes are now connected to the Hudson River and to five waterways in Canada. The canal made it possible for the first time to travel entirely by water between New York City and the Great Lakes.

The Erie Canal and its laterals: Champlain Canal, Oswego Canal, Cayuga and Seneca Canal, Chemung Canal, Crooked Lake Canal, Oneida Lake Canal, Chenango Canal, Genesee Valley Canal, and the Black River Canal.

Also located in New York State are the Delaware & Hudson Canal, Junction Canal, Long Island's Canal, and St. Lawrence Seaway and the New York State Barge.

The Erie Canal turned the New York Harbor into America's number one port, and it shaped the social and economic development of the nation. Immigrants crowded the canal boats looking for new lands and opportunities in the west. The canal cut travel time in half. As the shipping costs dropped, cities and industries along the canal grew and flourished. Farmers in Western New York could now ship crops, lumber and furs to the markets in the East. New York City could ship these products all over the world. This opened opportunity for New York State businesses to expand and helped the nation's economy grow. The success of the canal brought business to the state. More than \$120 million in tolls were collected on it during the ninetieth century; this paid for the original building cost, the cost of the first extension and for any maintenance costs. The Erie Canal has enlarged three times to accommodate heavy traffic, most recently between 1905 and 1918 when the present-day Canal system was configured.

The New York State Canal System helped form a whole new type of culture. Many immigrants worked long and hard to create the canal. Folklore, songs and speech lingo emerged from the people working on the canal. At one time, more than 50,000 people depended on the Erie Canal for their livelihood. Many families used the canal boats as floating houses. The father was the captain of the boat. The mother would cook for the family and the crew. The children when old enough would walk alongside the mules to lead them down the canal. The canal had passenger vessels for people to travel. There was gambling and entertainment on the canal. The canawlers created their own language.

Vocabulary: Language and terms

Aqueduct: A structure that carries a canal across another body of water.

Basin: A wider, deeper section of the canal, where boats can be moored and cargo loaded or unloaded.

Berm, Heelpath: The side opposite the towpath.

Buffer beam: A beam placed across the head of a lock as a protection to the lock gates.

Canawl (canawler): Pronunciation of canal – Those who worked on the canal. There was Dutch and Irish derivation.



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Capstan: A cleated cylinder (called a barrel) revolving around a spindle built on a wall and operated by electricity. A rope fastened to a barge can be thrown around the capstan for the purpose of towing a barge into a lock.

Controller box: A steel box located on a lock wall containing switches for the control of the lock machinery.

Dam: A structure built across a watercourse to confine and keep back flowing water. A fixed dam is a permanent structure without movable parts. A movable dam is one that can be set up or thrown down as desired.

Durham: A big, clumsy, flat-bottomed boat used by early settlers.

Feed culverts: Hollow spaces, or tunnels, within lock walls through which water for filling, or “feeding” a lock and for emptying it is conducted.

Fog-gang: Workers who cleaned out the canal as an annual routine.

Foosfoos: Immigrant workers; foreigners.

Grog: A tankard of ale

Hoggee: A mule driver who was paid pitifully low wages.

Hoodledasher: A hook-up of two or more empty boats tied to a full-cargo boat, pulled by one team of mules.

Jigger-boss: A boy given the task of doling out half-gills of whiskey to each workman, 16 times a day.

Land line: That part of a canal, which is an artificial channels-not in a river or lake.

Lateral canals: Branch canals leading into the main channels.

Lockage: The passage of a boat or boats through a lock. The raising or lowering of a boat or boats from one water level to another water level.

“Low bridge”: The warning cry to hit the deck because the canal boat was about to pass under a bridge. Bridges were built low to save money.

Mitre gates: Two gates, which swing together into the form of a wide letter V.

Mudlarked: A boat grounded due to insufficient water level, frequently from a leak or a break out.

Mule: The sterile offspring of a male donkey and a female horse; sometimes call a long-eared robin by canawlers or a hayburner.

Prism: The traditional shape of the canal ditch with a narrow bottom and angled sides.

Prog: food

Rhino: Ready money, cash; a person with a great deal of ready money was a rhino fat.

Runners and scalpers: Agents, often-young boys, hired to secure passengers or cargo.

Shipshape macaroni: A sportily attired canal boat captain.

Spillway: A passageway for surplus water from a canal or reservoir.

Summit level: The highest level or elevation reached.

Siphon lock: A lock in which the water for filling and emptying is controlled by an application of the siphon principle, as distinguished from a lock filled and emptied by water controlled by valves.

Tide water level: The level affected by the flow of the tide.(In the Hudson River the tide reaches as far as Troy.)

Tons capacity: The carrying content of a boat state in town.

Trippers: Long-haul workmen who traveled back and forth between Albany and Buffalo.



Waste weir: An overflow, or weir, for the escape of surplus water from a canal or reservoir.

Today the canals use or run parallel to the original waterways. The focus is more on pleasure boating than shipping. The old Erie Canal has turned into a linear park that has become a boaters' paradise. The towpath today serves as a path for hikers, joggers and cyclists. People enjoy shaded picnic areas and shops along the canal.

The St. Lawrence Seaway:

The St. Lawrence Seaway is one of the world's most comprehensive inland navigation systems. The construction of the Seaway started in 1954. The construction moved 192.5 million cubic meters of earth and added 5.7 million cubic meters of concrete, building 72km of dikes and digging 110km of channels. It replaced a 14-foot deep waterway with 30 locks with a 27-foot deep channel with 15 locks.

One construction problem they faced was relocating people in areas that had to be flooded to provide sufficient depth as well as power pools. The Canadian side had more riverside towns that had to be flooded, such towns were **Iroquois, Morrisburg, Ingleside and Long Sault**. The flooding of this section involved the relocation of 6,500 people to new towns built at the expense of the project. Different sections of the Seaway were subject to different construction works depending of the power generation potential. Provincial (or State) governments were mainly responsible to finance and undertake power projects (Hydro Ontario and New York State Power Authority) while federal governments were concerned with navigation projects.

The St. Lawrence Seaway was opened April 25, 1959 that linked the Atlantic Ocean to the Great Lakes. The official opening was held on June 26th with **Queen Elizabeth** (representing Canada) and **President Dwight D. Eisenhower** present. The overall cost of the project was 470 million US dollars with Canada paying \$336.2 million and the United States paying \$133.8 million.

The St. Lawrence Seaway can be divided into four major sections.

1. **Lachine Section:** This 50km section is the doorway of the St. Lawrence Seaway where it begins by the **Jacques Cartier Bridge**. Two locks provide a 45 feet climb, the **St. Lambert Lock** and the **Cote Ste. Catherine Lock**.
2. **Beauharnois Section:** This 74km section extends from the end of Lake St. Louis to Cornwall in Ontario. This section serves two purposes, navigation and power generation. Two 42 feet lift dams were built, the **Upper and Lower Beauharnois Locks**.
3. **International Section:** This section is 71 km long and consists of a set of dams (**Long Sault and Iroquois**), powerhouses, locks (**Iroquois, Dwight D. Eisenhower and Bertrand H. Snell**), channels and dikes, creating vast power pools. This section climbs 93 feet.
4. **Great Lakes Channels:** This section is composed of a series of channels and locks linking the Great Lakes together. The **Welland Canal** climbs 326 feet between **Lake Ontario** and **Lake Erie** using eight locks. Another part of this



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system is the channels linking **Lake Erie** and **Lake Huron**. The channels include **St. Claire River, Lake St. Claire and Lake Huron and Lake Superior**

The Seaway is generally open for navigation from early April to mid December. It can accommodate ships up to 730 feet long and 76 feet wide. The ship designed to use the Seaway is known as a **Laker**. It can carry about 25,000 tons and is 222 meters long and 23 meters wide. It takes 8 to 10 days for a ship to go from Lake Superior to the Atlantic Ocean. On average 50 million tons of cargo are handled each year through the Seaway. The St. Lawrence Seaway generates around 40,000 jobs and supports a vast array of industries.

Grain: Accounts for about 40% of all cargo handled. Most of the grains come from the American and Canadian prairies and is exported to the international market through the Seaway.

Iron ore: Iron ore is the second most important commodity. It is shipped from mines in Labrador, Quebec, Ontario and Minnesota to ports along the St. Lawrence or the Great Lakes and then to steel mills.

Coal: The Appalachians are a major coal extraction region of the United States. The coal is shipped from the mines to the ports of Lake Erie. Coal is used for steel making or for heat thermal plants.

Steel: Steel is about 10% of the total annual tonnage and is used by heavy industries for construction and for automotive industry.

The St. Lawrence Seaway Lock System:

The St. Lawrence Seaway lock system works by having a ship approach a lock from either a higher or lower water elevation. The ship enters one end of the lock system and once the door closes the water will either increase or decrease as the water is either being pumped out or more water is being added in. Once the water has reached its level of elevation the doors at the other end will open up and the ship moves out of the lock and on down the canal. A lock system has four main features for operation; the two doors at either end of the lock, a filling valve and an emptying valve.

Materials:

1. "Minnie the Mule and the Erie Canal", by Lettie A. Petrie (This book could be used as a ELA lesson that connects with the Social Studies.
2. Shoebox or some kind of box to represent the lock.
3. Construction paper, blue and other colors.
4. Popsicle sticks.
5. Sting
6. A small toy horse, mule
7. Small sticks or twigs
8. Scissors, glue
9. White blank labels



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Teach:

This lesson can be used for both the Erie Canal and the St. Lawrence Seaway Water Systems.

1. Go over the history of the Erie Canal and the St. Lawrence Seaway Water System.
2. Take the students to the computer lab so the students can visit the website: <http://www.eriecanal.org> the web site has an animated video of the operation of the canal system. And visit the web site: <http://huron.lre.usace.army.mil/SOO/alock.html> this web site has another animated video of the lock system.
3. Once the students have viewed the videos instruct the students on making a model of either the Erie Canal Lock or the Seaway Lock System.
4. Have materials available by asking students to bring in a shoebox or another kind of box that has the same shape.
5. The construction of the model:
 - a) The shoebox could have the ends cut to represent the door system of a lock or a canal.
 - b) Have the students use the construction paper to create the water and the ships.
 - c) The sticks and twigs could be used to decorate the canal.
 - d) The Popsicle sticks could be used at the bottom of the shoebox as a way to raise and lower the boat.
 - e) The string could be used to hook onto the small toy horse or mule.
 - f) Have other materials available for students to use in creating their model.
6. Have the students take the labels and label the parts of the locks.
7. Have the students take the models to the other classrooms to explain how the lock system works by using their models to assist them. Students could also display their lock system out in the hallway.

Guided Practice:

Assist by reviewing how the lock system works as the students had seen on the website videos. Assist the students as they work on creating their models and making sure they label all the parts of the lock.

Closure:

Ask the students to explain how the lock system works. Ask the students why were the canals and water systems built. What are the benefits our state and country gained from having these canals and water systems?

Independent Practice:

Complete the model project.

Extended Activities:

1. Take the students on a field trip a lock system in your area. Take the students to one of the ports to see the laker vessels that travel the Seaway system.



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2. Have the students write a journal about a week's journey on the canal or the St. Lawrence River.
3. Teach the songs about the Canal System. Talk about the lifestyle the people on the canal had.
4. Create math word problems where students have to figure distance or weight of cargo.
5. Have students research canal systems in other countries and what were the benefits the countries gain from using the canals.

Web Sites:

Erie Canal:

1. <http://www.westernny.com/erie.html>
The web site offers a number of pages of information on the Erie Canal. It gives you a brief summary, glossary, and what is new on the old Erie Canal. Students and teachers can find a lot of information about the canal.
2. <http://www.dpp.schoolprojects.com/eriecanal/images/3.jpg>
The web site is a teacher's guide for the Erie Canal curriculum. It offers lesson plans and a lot of information on the history of the Erie Canal. The site has worksheets for students to use. It is a great site for teachers to visit.
3. <http://www.canals.state.ny.us/cculture/index.html>
The web site offers a great summary with a lot of information and classroom ideas. The summary also gives a number of definitions for students to learn. The site has the words for the Erie Canal song "Fifteen years on the Erie Canal." This site is great for teachers to use in preparation and for students to find information as well.
4. <http://www.eriecanal.org>
This web site is great for teachers and students to use. The site has great photos and paintings of the Erie Canal throughout history. It has an animated video on how the canal system works.

St. Lawrence Seaway:

1. http://collections.ic.gc.ca/stlauren/econ/ec_consseaway.thm
The web site has a great summary on the St. Lawrence Seaway Water System. The site gives a lot of number facts in the cost of building the Seaway water system, types of ships and the cargo they carry.
2. <http://www.boatnerd.com/pictures/fleet>
The web site has pictures of the ships that sail the Great Lakes. The site offers a lot of information about each ship, their history, size and how much it can carry. This site gives the students a great visual of the types of ships that sail in the Great Lakes.
3. http://www.great-lakes.net/teach/buisness/ship/ship_1.html
The site has about six pages of information. The site has a number of links. One gives you a detail map of the Seaway, details about the different ports, type of



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cargo. Go to page five of the site and go to “The Soo Locks”, the site takes you to <http://huron.lre.usace.army.mil/SOO/alock.html> where there is an animated demo on how the locks work.

4. <http://www.ogdensburg.neric.org/~jputman/Seaway.htm>
The web site is a great site for students to find information on the Seaway Water System. The site has colorful site with photos of the locks when they were under construction.

References:

Erie Canal:

1. “Canal Boatman: My Life on Upstate Waterways”, Richard Garrity, Syracuse University Press, 1997.
2. “New York State Canals: A Short History” Daniel F. Larkin, Purple Mountain Press, 1998
3. “Erie Water West: A History of the Erie Canal 1792-1854” Ronald E. Shaw, University of Kentucky Press 1990
4. “Artificial River: The Erie Canal and the Paradox of Progress, 1817-1862” Carol Sheriff, Hill and Wang, NY 1996

St. Lawrence:

1. “River Song: Sailing the History of the St. Lawrence” Phil Jenkins, Penguin Books, May 2001, ISBN 0670880094
2. “Know Your Ships – Guide to Boats and Boat watching: Great Lakes and St. Lawrence Seaway”, Roger A. Lelievre, Marine Publishing Co., April 2000 ISBN 1891849026

Children's Books:

Erie Canal:

1. “Minnie the Mule and the Erie Canal”, Lettie A. Petrie, Petrie Press, 2001, ISBN 0971163804
2. “The Erie Canal”, Ralph K. Andrist, American Heritage Publishing Co., 1964
3. “The Amazing, Impossible Erie Canal”, Cheryl Harness, Macmillan, NY 1995
4. “Always Know Your Pal; Children on the Erie Canal”, Debbie A. Stack, Donald J. Wilson, Erie Canal Museum, 1993

St. Lawrence Seaway:

1. “St. Lawrence Seaway” Ann Armbruster, Children's Press, March 1997, ISBN 0516261142 (ages 9-12)
2. “St. Lawrence River and Seaway”, Terri Willis, Raintree/Steck Vaughn, Sept 1994, AISN 0811463702 (ages 9-12)
3. “The Great St. Lawrence Seaway”, Gail Gibbons, Harpercollins, March 1992, AISN 0688069851 (ages 4 – 8)