



Agents of Change Lessons

Websites

Rivers: The Force of Water

[Artwork Depicting Rivers](#)

View paintings by the Hudson River School artists.
(<http://www.artcyclopedia.com/history/hudson-river-school.html>)

[Water Science for Schools](#)

Learn about rivers, rainwater, stream flow, the water cycle, water erosion, and conservation.
(<http://www.ga.usgs.gov/edu/mearth.html>)

[Geography Action 2001: Rivers](#)

Information on how to take action to protect rivers, as well as lots of games, activities, and fact sheets about rivers.
(<http://www.nationalgeographic.com/geographyaction/rivers/>)

[BBC Education: Rivers and Coasts](#)

This site focuses on rivers and coasts. There is great information on how people affect rivers and coastlines.
(<http://www.bbc.co.uk/schools/landmarks/riversandcoasts/mainmenu.shtml>)

[NASA: Aerial Images of Rivers and Streams](#)

This site has aerial and satellite photos that show how rivers, streams, floods, lakes, and wetlands shape the surface of the earth.
(http://visibleearth.nasa.gov/view_set.php?categoryID=671)

[The Cave of Chauvet–Pont-d’Arc](#)

Explore the Stone Age rock paintings and engravings discovered in a cave in Chauvet, France in 1994.
(<http://www.culture.gouv.fr/culture/arcnat/chaudet/en/>)

[Sea Caves](#)

This site explores sea caves, another type of cave formed by water.
(<http://www.goodearthgraphics.com/virtcave/seacaves/seacaves.html>)



[USGS: Exploring Caves](#)

There are lesson plans, lots of information about caves, and a great online kid's book on this site.

(<http://egsc.usgs.gov/isb/pubs/teachers-packets/exploringcaves/>)

Glaciers: The Force of Ice

[NOVA and PBS: Anatomy of a Glacier](#)

This site has a great overview of what glaciers are and how they shape the land, with excellent photos and easy-to-read text.

(<http://www.pbs.org/wgbh/nova/everest/earth/glacier.html>)

[NOVA and PBS: Cracking the Ice Age](#)

View articles about the greenhouse effect, how continents move, climate change, and how ice has shaped the earth's surface.

(<http://www.pbs.org/wgbh/nova/ice/>)

[Solcomhouse: Glaciers and Ice Sheets](#)

A simple overview of how glaciers shape the earth's surface, a collection of research articles, and a large photo collection. The Solcomhouse site is great science education resource.

(<http://www.solcomhouse.com/icecap.htm>)

[NASA: Aerial Images of Glaciers](#)

See aerial and satellite images of glaciers around the world.

(http://visibleearth.nasa.gov/view_set.php?categoryID=649)

[Glaciers](#)

This interactive website allows students to adjust mountain snowfall and temperature to see a glacier grow and shrink. Students use scientific tools to measure thickness, velocity and glacial budget.

(<http://phet.colorado.edu/en/simulation/glaciers>)

[Fastest Glacier](#)

This video segment adapted from NOVA scienceNOW features western Greenland's Jakobshavn Glacier, dubbed the world's fastest-flowing glacier. Scientists attempt to explain why this glacier is moving at a rate that far exceeds the average speed of glaciers and is contributing to a rise in global sea level.

(<http://www.pbs.org/wgbh/nova/teachers/earth/fastest-glacier.html>)



[All About Glaciers](#)

This website, sponsored by the National Snow and Ice Data Center, offers students and teachers background information about glaciers.

(<http://nsidc.org/glaciers/>)

[Greenland's Receding Ice](#)

Background information about Greenland's receding ice can be found on this website.

(<http://svs.gsfc.nasa.gov/stories/greenland/>)

[Mountain of Ice : Life Cycle of a Glacier](#)

Students can follow the journey of a single snowflake as it takes a ride through a glacier, a process that can take as much as 30,000 years to complete, on this interactive website.

(<http://www.pbs.org/wgbh/nova/vinson/glacier.html>)

[Hoodoos and Sand Dunes: The Force of Wind](#)

[North American Drought — A Paleo Perspective](#)

A comprehensive site on drought. This NOAA site looks at the big picture of climate change through time.

(http://www.ngdc.noaa.gov/paleo/drought/drght_home.html)

[Cataclysmic Events](#)

[NOAA: The Kid's Natural Hazards Quiz](#)

Explore thunderstorms, tornadoes, hurricanes, floods, winter storms, earthquakes, tsunamis, volcanoes, landslides, wildfires, and family disaster planning.

(<http://www.ngdc.noaa.gov/hazard/kqStart.shtml>)

[U.S. National Weather Service and NOAA](#)

This site provides national updates on floods, snow storms, and other weather hazards, including national warnings, local weather, world weather, and current issues. Includes U.S. weather maps.

(<http://iwin.nws.noaa.gov/iwin/graphicsversion/bigmain.html>)

[The Hurricane Research Center](#)

This comprehensive site on hurricanes has in-depth fact sheets and great photos. There are links to current hazards information.

(http://www.aoml.noaa.gov/hrd/weather_sub/faq.html)



Agents of Change Lessons

Books

General

If you have a budget for purchasing books, the Science Companion development team especially recommends the following six titles to supplement the Earth's Changing Surface unit:

The Big Rock

By Bruce Hiscock. (1999, Aladdin Books)

This age-appropriate picture book tells the story of a rock and how it was shaped through time. It explains how the rock emerged from a volcano, ended up on the bottom of the ocean, was uplifted by a mountain, transported by a glacier, and finally weathered by wind and rain.

Earth (Eyewitness Books)

By Susanna Van Rose. (2005, DK Children)

An extraordinary visual guide to earth science and the forces that shape the earth, this book takes children on a visual journey of the earth's landscapes and highlights how the study of earth science has developed through the ages.

Erosion (A Carolrhoda Earth Watch Book)

By Cherie Winner. (1999, Carolrhoda Books, Inc.)

This book describes how water, glaciers, and wind shape our planet. Excellent photographs support age-appropriate text. A 2000 National Science Teachers Association Outstanding Trade Book for Children.

Our Planet Today (21st Century Science)

By Claude Lafleur. (2001, World Almanac Library)

This book is the perfect challenge for students who want to supplement their learning. The detailed computer-generated images use arrows, cut-aways, and enlargements to provide detailed explanations of the processes that shape the earth's surface. Other sections on map-making and the continents help teachers integrate social studies concepts with this unit.



Planet Earth (Visual Factfinder)

By Neil Curtis and Michael Allaby. (1993, Kingfisher Books)

Explores how the earth's landscapes are shaped through weathering, erosion, deposition, and forces such as mountain uplift and volcanoes. Includes hundreds of detailed color illustrations and photographs with interesting fact captions throughout. Although out of print, this book is well worth searching for in a local library.

Shaping the Earth

By Dorothy Hinshaw Patent; photography by William Munoz. (2000, Clarion Books)

This colorful and informative book shows how the earth's surface is shaped by shifting tectonic plates, mountain uplift, volcanoes, glaciers, rivers, and wind. It explains the role of living organisms in landscape formation and the profound influence of human beings on the landscapes of our planet. The text is splendidly illustrated with color photographs.

Picture Books and Read-Alouds

Caves: One Small Square

By Donald Silver; illustrated by Patricia Wynne. (1997, McGraw-Hill)

Children explore a single square of a petroglyph that depicts cave life. A great introduction to caves and caving. A good resource for emergent readers.

How Much Is a Million?

By David Schwartz; illustrated by Steven Kellogg. (1997, Perfection Learning)

This early-elementary book helps children conceptualize the immensity of numbers, such as a million, billion, and trillion, that come up when talking about how landforms change over long periods of time.

Maroo of the Winter Caves

By Ann Turnbull; illustrated by Ann Nicol. (2004, Sandpiper)

This fictional story depicts the life of Maroo, a young girl living during the last Ice Age, and the trials and tribulations she and her family endure.



Out of the Dust

By Karen Hesse. (1999, Scholastic)

This Newberry Award winning book describes the tragedy of the Dust Bowl as experienced through the eyes of 14-year old Billie Jo, an adolescent living in Oklahoma in the 1930's.

The River (Brian's Saga Series #2)

By Gary Paulsen. (1998, Delacorte Press)

This child-friendly sequel to Paulsen's Hatchet tells the fictional story of the boy Brian who returns to the woods to relive his epoch survival experience. When things go awry, Brian must build a raft and navigate a wild river to return to civilization. This adventurous tale will keep your advanced readers on the edge of their seats.

River Friendly, River Wild

By Jane Kurtz; illustrated by Neil Brennan. (2007, Aladdin)

This wonderful collection of poems for early-elementary readers describes how a girl and her family survived the disastrous 1997 Red River flood near Grand Forks, North Dakota.

A River Ran Wild

By Lynne Cherry. (2002, Sandpiper)

This beautifully illustrated book for early-elementary readers traces the ecological evolution of New England's Nashua River. Children learn how the river was respected by generations of Indians, polluted and deadened by the Industrial Revolution, and restored in recent years through the efforts of concerned citizens.

The Summer Sands

By Sherry Garland; illustrated by Robert Lee. (1995, Harcourt Press)

This wonderful storybook for early-elementary readers has beautiful illustrations that show how sand dunes form along the ocean coast. It tells a story about how people use trees to rebuild sand dunes destroyed by storms. Excellent for showing that humans can positively impact the delicate ecological balance of our planet.



Nonfiction Books

Digging Deeper: Investigations into Rocks, Shocks, Quakes, and Other Earthy Matters

By Sandra Markle. (1987, Lothrop, Lee & Shepard Books)

This book discusses various aspects of geology, such as plate tectonics, erosion, and minerals. It includes experiments and other activities.

Glaciers (True Books: Earth Science)

By Larry Dane Brimmer. (2000, Children's Book Press)

Beautiful photographs and concise text make this an excellent introduction to glaciers. The text is suitable for advanced readers only.

Glaciers (Worldlife Library)

By John Gordon. (2001, Colin Baxter Photography Ltd)

This excellent introduction to glaciers for advanced readers, with beautiful photographs throughout, vividly describes what glaciers are, how they form, and how they have shaped landscapes around the world.

Glaciers: Ice on the Move (A Carolrhoda Earth Watch Book)

By Sally M. Walker. (1990, Carolrhoda Books)

Describes the formation and movement of different types of glaciers, their effects on the land, and how scientists study glaciers. Nice text for independent readers and fantastic photographs.

Icebergs and Glaciers

By Seymour Simon. (1999, HarperCollins)

Discusses how glaciers form, where they are located, and how they move. Contains beautiful photographs of glaciers with easy to read, informative text.

Mountains (Geography Detective)

By Philip Sauvain; illustrated by David Hogg. (1996, Carolrhoda Books)

This age-appropriate book highlights the major features seen in mountains around the world and describes the processes that form and shape them.



Painters of the Caves

By Patricia Lauber. (1998, National Geographic Society)

This book describes the 1994 discovery, in Chauvet, France, of a cave with Stone Age rock paintings, and discusses the significance of cave art to people living in prehistoric as well as modern times.

Planet Earth (Time-Life Student Library)

By Karin Kinney. (1998, Time-Life Books)

This age-appropriate resource book contains content on a wide variety of topics, including volcanoes, weather, rivers, and earthquakes. It also highlights the effect that earth forces have on humans around the world. There are hundreds of excellent photos and illustrations.

Rivers and Lakes (The Land Around Us)

By Mary Tull. (2004, National Geographic Society)

This comprehensive look at rivers and lakes focuses on geography and human interactions with these features. Bright photographs and easy-to-read text make this an excellent resource for emergent readers. Includes a glossary and a section about how to read bar graphs for information.

Sand Dunes (A Carolrhoda Earth Watch Book)

By Jan Gumprecht Bannan. (1989, Lerner Publishing Group)

Discusses dune areas in Oregon and elsewhere in the western hemisphere. Describes with detailed photographs the formation of sand and the forces which shape it into dunes. A good book for independent readers.

Other Recommended Reference Books for Teachers

Geology Crafts for Kids: 50 Nifty Projects to Explore the Marvels of Planet Earth

By Alan Anderson, Gwen Diehn, and Terry Krautwurst. (1998, Sterling Publishing)

A fun collection of 50 activities and craft projects that teach children about geology topics such as minerals, crystals, volcanoes, erosion, and fossils. Includes great full-color illustrations and easy-to-follow directions.



Glacial Geology: How Ice Shapes the Land

By Jon Erickson. (1996, Facts on File, Inc.)

Details the science of glacial geology. A good reference book for teachers who would like to learn more about the ice ages, causes and effects of glaciations, and glacial structures.

How the Earth Works (How It Works)

By John Farndon. (1999, Dorling Kindersley Publishers)

This exploration of earth science topics is designed for adults and children and offers a hands-on approach to learning. It has detailed instructions on how to build models and carry out experiments, as well as suggestions for how to record experimental data and draw conclusions.

Janice VanCleave's Earth Science for Every Kid: 101 Easy Experiments that Really Work

By Janice Pratt VanCleave. (1991, John Wiley & Sons, Inc.)

This book has 101 easy experiments that cover topics such as rocks and minerals, crust movements, erosion, mountain building, weather, and the oceans. There are detailed step-by-step instructions and illustrations, as well as a scientific explanation of the results. The experiments are fun and use inexpensive, easy-to-find materials.

The Map that Changed the World: William Smith and the Birth of Modern Geology

By Simon Winchester (2009, Harper Perennial)

More than a biography, this is a compelling account of one quiet genius's struggle against the educated elites and scientific dogma that helped create a new field of science. The author provides rich detail about Smith's life and work, recreating the excitement that accompanies scientific discovery. A fascinating tale that weaves together the best features of history, science, and travelogue.

Origins: The Evolution of Continents, Oceans, and Life

By Ron Redfern. (2002, Weidenfeld Nicolson Illustrated)

This coffee table-style book has extraordinary panoramic photographs that reveal how the earth was formed and how it evolved through time. The text examines the dynamic processes that have shaped and continue to shape the earth's surface. The text is advanced, but the stunning images could be a useful resource and reference.



DVDs

Desert (Eyewitness Series)

DK Children, 2010

This film has a great general overview of desert habitats and examines how deserts form, humans' relationship to them, and the types of creatures that live there. (35 minutes)

Natural Disasters (Eyewitness Series)

DK Children, 2007

This film explores the cataclysmic forces that shape our planet and affect our lives, from hurricanes to volcanoes. Rare footage reveals the earth at its most violent. (35 minutes)

Pond & River (Eyewitness Series)

DK Children, 2007

This video looks at the range of plants and animals found in fresh water, examining the living conditions and survival mechanisms of creatures dwelling at the edge of water, on its surface, or under the mud. (35 minutes)

Weathering and Erosion (Physical Geography)

TMW/Media Group, 2008

This film provides a sweeping overview of landscapes around the world that have been shaped by water, ice, wind, and storms. Beautiful footage and clear explanations make this an engrossing exploration of the earth's changing landscapes.