

NetNotes

The NetNotes for *Environmental Geology* are meant to help the reader locate useful websites easily. Some are sites from which data in the text have come, and may be sources of newer, similar data published after the text went to press. Others provide background material on chapter contents, or lead to additional case studies. In general, they have been chosen from types of websites that are relatively stable in the fluid world of the Internet – government agencies, academic institutions, professional organizations, and such. However, links change and sometimes disappear even on these kinds of websites, so the sites listed in the NetNotes are periodically checked and URLs updated as necessary. Additional useful sites may also be added from time to time as they are identified.

Just use the bookmarks bar (see icon at upper right) to go to the NetNotes for a particular chapter.

Section One Foundations

Chapter 1 Planet and Population: An Overview

Chapter 2 Rocks and Minerals -- A First Look

Section Two Internal Processes

Chapter 3 Plate Tectonics

Chapter 4 Earthquakes

Chapter 5 Volcanoes

Section Three Surface Processes

Chapter 6 Streams and Flooding

Chapter 7 Coastal Zones and Processes

Chapter 8 Mass Movements

Chapter 9 Ice and Glaciers, Wind and Deserts

Chapter 10 Climate -- Past, Present, and Future

Section Four Resources

Chapter 11 Groundwater and Water Resources

Chapter 12 Weathering, Erosion, and Soil Resources

Chapter 13 Mineral and Rock Resources

Chapter 14 Energy Resources -- Fossil Fuels

Chapter 15 Energy Resources -- Alternative Sources

Section Five Waste Disposal, Pollution, and Health

Chapter 16 Waste Disposal

Chapter 17 Water Pollution

Chapter 18 Air Pollution

Section Six Other Related Topics

Chapter 19 Environmental Law and Policy

Chapter 20 Land-Use Planning and Engineering Geology

Appendix A Geologic Time, Geologic Process Rates

Chapter 1 NetNotes

As a starting point for information on the solar system from the National Aeronautics and Space Administration:

www.nasa.gov/topics/solarsystem/index.html

National Space Sciences Data Center (NSSDC) lunar and planetary home page is at nssdc.gsfc.nasa.gov/planetary/

Data on Earth's moon and missions to it are available through nssdc.gsfc.nasa.gov/planetary/planets/moonpage.html

For photos of planets and moons from many missions (Apollo, Mariner, Voyager, Galileo, and more) see nssdc.gsfc.nasa.gov/photo_gallery/

For the "Astronomy Picture of the Day," with a discussion of the feature shown and links to related information: apod.nasa.gov/apod/astropix.html

A related site features the "Earth Science Picture of the Day": epod.usra.edu/

A wide selection of earth images and animations is accessible at visibleearth.nasa.gov/

NASA's Earth Observatory site features "Images of the Day" taken from space (some of which appear in this text) at earthobservatory.nasa.gov/IOTD/

Excellent satellite images of a variety of environmental developments are available as "Earthshots" presented by the U.S. Geological Survey: earthshots.usgs.gov/earthshots/

"Ask-A-Geologist" e-mail service: U.S. Geological Survey staff and others answer geologic questions walrus.wr.usgs.gov/ask-a-geologist/

The USGS also maintains links to resources for K-12 education at "The Learning Web": education.usgs.gov/

Earth images can be beautiful as well as educational, as you can see from USGS's "Earth as Art" collection <https://eros.usgs.gov/image-gallery>

You can also watch Landsat Satellite imagery displayed in near-real time as the satellites track across the globe, at earthnow.usgs.gov/observer/

A variety of facts about Earth can be found in "The Encyclopedia of Earth" at https://editors.eol.org/eoearth/wiki/Main_Page

An online geology/paleontology museum offers information on the history of life and geology, at the University of California at Berkeley Museum of Paleontology site: www.ucmp.berkeley.edu/

The Vertebrate Paleontology Lab at the University of California at Davis hosts an online 3D fossil museum at which you can manipulate the fossil images: 3dmuseum.org/

and for 3D views and photographic tours of geology in the national parks, see 3dparks.wr.usgs.gov/

The Population Reference Bureau provides a variety of population information at www.prb.org

An additional source of world population information is the United Nations Population Information Network (POPIN): www.un.org/popin/

A wealth of U.S. census data is available at www.census.gov/programs-surveys/decennial-census/decade.2010.html

For general resource/population/environmental information see the World Resources Institute: www.wri.org

Chapter 2 NetNotes

A listing of state, U.S., provincial, and various international geological surveys and associations: www.lib.berkeley.edu/EART/surveys.html

Information from and about the U.S. Geological Survey: geology.usgs.gov/

The USGS photo library has thousands of images online at:
<https://library.usgs.gov/photo/#/>

In particular, see "Minerals close-up" at geomaps.wr.usgs.gov/parks/rxmin/mineral.html

The USGS also has an online booklet, "Natural Gemstones":
pubs.usgs.gov/gip/gemstones/

The Mineral Resources Program of USGS is at minerals.usgs.gov

The Mineralogical Society of America's home page includes a link to "Collector's Corner" (advice on starting a mineral collection) and rock and mineral identification information:
www.minsocam.org/

A site with extensive information about, and images of, a great variety of minerals is the Mineralogy Database: www.webmineral.com

The Smithsonian Institution's Mineral Science department home page is
<https://mineralsciences.si.edu/>

and images of gems and minerals, rocks, and meteorites from the collections of the National Museum of Natural History are found at <https://geogallery.si.edu/gems-minerals-meteorites-rocks>

"Rocks Under the Microscope, views of thin slices of rocks that often reveal interesting textural details, are online at www.earth.ox.ac.uk/~oesis/micro/

"The Mineral Gallery," a collection of images of and information about many minerals is found at www.theimage.com/mineral/minerals1.html

A site featuring minerals and gems on stamps ("Philatelic Mineralogy") from many countries, Afghanistan to Zimbabwe, is mineralstamps.rbnet.net/

Snowflakes are crystals, too. For a comprehensive look at the beauty of snowflakes and the physics behind their development, see www.snowcrystals.com

The U.S. Environmental Protection Agency has a "Learn About Asbestos" site at www.epa.gov/asbestos/learn-about-asbestos

For specific EPA information on the Libby, Montana site, see www.epa.gov/superfund/libby-asbestos

Chapter 3 NetNotes

"This Dynamic Earth" is a U.S. Geological Survey (USGS) publication on plate tectonics, with related links online

pubs.usgs.gov/gip/dynamic/dynamic.html

The National Park Service maintains a page with links to information and graphics related to plate tectonics, at

www.nature.nps.gov/geology/education/concepts/concepts_platetectonics.cfm

And a number of animations related to plate tectonics are found at

www.nature.nps.gov/geology/usgsnps/animate/pltecan.html

"This Dynamic Planet" is a reference with global maps of volcanoes, earthquakes, impact craters, and plate-tectonic features:

pubs.usgs.gov/imap/2800/

U.S. National Geophysical Data Center provides data on and images of global relief maps, many of which reveal plate-tectonic features:

www.ngdc.noaa.gov/mgg/global/global.html

A collection of 3D interactive maps relating to plate tectonics is found at

www.platetectonics.com/

A variety of geologic animations, including several relating to plate tectonics, can be found at

emvc.geol.ucsb.edu/1_DownloadPage/Download_Page.html

You can investigate the complex and sometimes bizarre communities of organisms around the vents at seafloor spreading ridges, and explore other highlights of underwater research, at

oceanexplorer.noaa.gov/

The Indian and Australian plates were once regarded as one; the story of how they were found to be breaking apart is at

www.columbia.edu/cu/pr/95/18688.html

"2012: Magnetic pole reversal happens all the (geologic) time" is, in part a NASA response to doomsday predictions for 2012 that postulated disaster resulting from a reversal of earth's magnetic field:

www.nasa.gov/topics/earth/features/2012-poleReversal.html

For a short explanation of how seismic tomography works, see

http://www.iris.edu/hq/files/programs/education_and_outreach/lessons_and_resources/docs/es_tomography.pdf

Chapter 4 NetNotes

The home page of the U.S. Geological Survey's Earthquake Hazards program, with plentiful links to a variety of information, is at <https://earthquake.usgs.gov/>

Since 2002, USGS has produced posters summarizing key information for significant earthquakes, with both text and graphics. Such posters have been produced for the 2004 Sumatran, 2010 Haitian, 2010 Chilean, 2011 New Zealand, and 2011 Japanese earthquakes, among many others, at <https://earthquake.usgs.gov/learn/posters.php>

Following on the bicentennial of the 1811-12 New Madrid earthquakes, see <https://earthquake.usgs.gov/earthquakes/events/1811-1812newmadrid/summary.php>

The USGS has earthquake-related publications online; some are exclusively online, including "Earthquakes" at <pubs.usgs.gov/gip/earthq1/> and "The San Andreas Fault" at <pubs.usgs.gov/gip/earthq3/>

Some relevant USGS fact sheets also available online include:

"The Parkfield experiment—capturing what happens in an earthquake"
<pubs.usgs.gov/fs/2002/fs049-02/>

"Rupture in south-central Alaska—The Denali Fault earthquake of 2002"
<pubs.usgs.gov/fs/2003/fs014-03/>

"Forecasting California's Earthquakes—what can we expect in the next 30 years?"
<pubs.usgs.gov/fs/2008/3027/>

"Monitoring earthquake shaking in buildings to reduce loss of life and property"
<pubs.usgs.gov/fs/2003/fs068-03/>

The Advanced National Seismic System is designed to improve U.S. ability to respond to earthquake, volcanic, and tsunami disasters; see <earthquake.usgs.gov/monitoring/anss/>

A joint venture of the USGS and other agencies to create ShakeMaps of earthquake intensity is explained at: <https://earthquake.usgs.gov/data/shakemap/>

Have you experienced an earthquake? Help create a real-time intensity map: <earthquake.usgs.gov/data/dyfi/>

Tsunami simulations and links to many tsunami-related sites can be found at <walrus.wr.usgs.gov/tsunami/>

The International Tsunami Information Center is found at <itic.ioc-unesco.org/index.php>

Seismological Society of America home page: www.seismosoc.org/

Information on the Canadian National Earthquake Hazards Program—including a link to information on the use of seismology in monitoring compliance with the nuclear test ban treaty—can be found at "Earthquakes Canada"

www.earthquakescanada.nrcan.gc.ca/index-en.php

The National Information Service for Earthquake Engineering maintains an online database of over 10,000 images of photos and art works (some hundreds of years old) relating to earthquakes; see

<https://nisee.berkeley.edu/elibrary/>

Two information-rich sites inspired by the centennial of the 1906 San Francisco earthquake are:

bancroft.berkeley.edu/collections/earthquakeandfire/splash.html

www.exploratorium.edu/faultline/index.html

A 2006 study of the use of satellites to analyze uplift and subsidence from the 2004 Sumatran earthquake, "Rise and Fall", is at

earthobservatory.nasa.gov/Features/Aceh/aceh2.php

Chapter 5 NetNotes

A wealth of information, and links to related sites such as the Hawaiian, Alaskan, Cascades, Yellowstone, and other volcano observatories, can be found at the U.S. Geological Survey's Volcano Hazards Program page volcanoes.usgs.gov/

One especially useful link is to a photoglossary of terms: <https://volcanoes.usgs.gov/vsc/glossary/>

Another link of special interest describes the USGS's Volcano Disaster Assistance Program, which involves the world's only volcano crisis response team. See <https://volcanoes.usgs.gov/vdap/>

The "Weekly Volcano Activity Report" is a feature of the Global Volcano Program, a joint venture of USGS and the Smithsonian Institution: http://volcano.si.edu/reports_weekly.cfm

"Volcano World" is a very popular site, maintained with support from NASA to promote public access to and use of space science data, with links to a tremendous variety of information about terrestrial volcanoes *and* those on other planets, including lists of current/recent volcanic activity. See volcano.oregonstate.edu/

Michigan Technological University maintains a particularly informative "Volcanoes Page" including abundant references at <http://www.geo.mtu.edu/volcanoes/>

"The Electronic Volcano" includes many links to volcano information and volcano observatories worldwide: www.dartmouth.edu/~volcano/

Take virtual tours of volcanoes and explore the history of Stromboli at "Stromboli Online": www.swisseduc.ch/stromboli/perm/index-en.html

A wealth of volcano information, imagery, and eruption accounts, including information on extraterrestrial volcanoes, is at "How Volcanoes Work", a NASA-sponsored site hosted by San Diego State University: www.geology.sdsu.edu/how_volcanoes_work/

The U.S. Geological Survey now makes many reports and fact sheets available online, including:

"Monitoring ground deformation from space" (2005)
<https://pubs.usgs.gov/fs/2005/3025/>

"Mount Mazama and Crater Lake: Growth and destruction of a Cascade volcano" (2002)
pubs.er.usgs.gov/fs/2002/fs092-02/

"Mount Rainier -- Living safely with a volcano in your back yard" (2008)
<https://pubs.er.usgs.gov/publication/fs20083062>

"Mount St. Helens, 1980 to now – What's going on?" (2013)
<https://pubs.er.usgs.gov/publication/fs20133014>

"Steam explosions, earthquakes, and volcanic eruptions—What's in Yellowstone's future?" (2005)
<pubs.usgs.gov/fs/2005/3024/fs2005-3024.pdf>

"Tracking changes in Yellowstone's restless volcanic system" (2004)
<pubs.usgs.gov/fs/fs100-03/>

"The National Volcano Early Warning System (NVEWS)" (2006)
<pubs.usgs.gov/fs/2006/3142/2006-3142.pdf>

"Airborne volcanic ash - a global threat to aviation" (2010)
<pubs.usgs.gov/fs/2010/3116/>

"California's restless giant: the Long Valley Caldera" (2014)
<https://pubs.usgs.gov/fs/2014/3056/>

The Alaska Volcano Observatory has put a number of AVO and USGS publications online, including:

"The eruption of Redoubt Volcano, Alaska, December 14, 1989-August 31, 1990" (1990)
(USGS Circular 1061)
<dggs.alaska.gov/webpubs/usgs/c/text/c-1061.pdf>

and "Preliminary volcano-hazard assessment for Redoubt Volcano, Alaska" (1997) (USGS Open-File Report 97-857)
www.avo.alaska.edu/pdfs/redoubt.hazards.ofr.pdf

Chapter 6 NetNotes

The U.S. Geological Survey provides a variety of hydrologic and water-resource information. Their official site for maps and graphs on streamflow, with links to National Weather Service and other related data, is "Waterwatch":

<https://waterwatch.usgs.gov/>

For real-time hydrologic (stream-gaging) data for many states and links to historical streamflow data see

waterdata.usgs.gov/nwis/rt

Many flood-related USGS Fact Sheets and circulars, including those in the reference list, are available online, often in both PDF and HTML format; see

water.usgs.gov/osw/

Some of special note include

"Large floods in the United States: Where they happen and why" (2003) USGS Circular 1245

pubs.usgs.gov/circ/2003/circ1245/

"The world's largest floods, past and present: Their causes and magnitudes" (2004) USGS Circular 1254

pubs.usgs.gov/circ/2004/circ1254/pdf/circ1254.pdf

"Flood hazards— A national threat" (2006) USGS Fact Sheet 2006-3026

pubs.usgs.gov/fs/2006/3026/2006-3026.pdf

"StreamStats: A U.S. Geological Survey Web application for stream information" (2005) USGS Fact Sheet FS 2004-115

md.water.usgs.gov/publications/fs-2004-3115/

"Streamflow trends in the United States" (2005) USGS Fact sheet 2005-3017

pubs.usgs.gov/fs/2005/3017/

"Trends in the water budget of the Mississippi River basin, 1949-1997" (2005) USGS Fact Sheet 2005-3020

pubs.usgs.gov/fs/2005/3020/

"1976 Big Thompson flood, Colorado—Thirty years later" (2006) USGS Fact Sheet 2006-3095

pubs.usgs.gov/fs/2006/3095/

"Research furthers conservation of Grand Canyon sandbars" (2007) USGS Fact Sheet 2007-3020

pubs.usgs.gov/fs/2007/3020/

"Mapping a flood . . . before it happens" (2005) USGS Fact Sheet 2004-3060

pubs.usgs.gov/fs/2004/3060/pdf/fs20043060.pdf

And for a link to a demonstration of this system on the Web, see

wa.water.usgs.gov/projects/pugethazards/urbanhaz/MappingNWS.htm

"The 100-year flood" (1996) USGS Fact sheet 229-96

pubs.usgs.gov/fs/FS-229-96

"WaterWatch -- maps, graphs, and tables of current, recent, and past streamflow conditions" (2008) USGS Fact Sheet 2008-3031

pubs.usgs.gov/fs/2008/3031/

"Popular myths about flooding in western Washington" (2011) USGS Fact Sheet 2011-3146

pubs.usgs.gov/fs/2011/3146/

"Ground water and surface water: a single resource" (1998) USGS circular 1139
pubs.usgs.gov/circ/circ1139

An online USGS poster, "100-year flood—It's all about chance" by Robert R. Holmes, Jr. and Karen Dinicola (2010) is available in several formats at
pubs.usgs.gov/gip/106/

Information about the 1997 Red River flooding is available in USGS Open-File Report 97-575 at
<https://pubs.usgs.gov/of/1997/0575/report.pdf>

NASA has an informational site dealing with the many aspects of the hydrologic cycle and water-related stories; see
<https://earthobservatory.nasa.gov/Features/Water>

Images and information on the Scientific Assessment and Strategy Team (SAST), formed to assess the 1993 Mississippi River basin flooding and to develop a long-term floodplain management plan, are found in USGS Fact Sheet 103-99 at
pubs.er.usgs.gov/publication/fs10399

For flood safety information from the National Weather Service, see:
www.nws.noaa.gov/os/water/resources/flood_brochure12A.pdf

The Great Salt Lake, which has no outlet streams, flooded badly in the 1980s; see
earthshots.usgs.gov/earthshots/node/15#ad-image-0

The Dartmouth Flood Observatory at Dartmouth College has created a site through which information on and high-resolution images of floods since 1 January 1994 can be accessed at
www.dartmouth.edu/~floods/

Chapter 7 NetNotes

The home page of the U.S. Geological Survey Coastal and Marine Geology Program is <https://marine.usgs.gov/>

The USGS National Assessment of Coastal Change Hazards is at marine.usgs.gov/coastalchangehazards/

Several key components of the assessment are:

The National Assessment of Coastal Change Project

marine.usgs.gov/coastalchangehazards/research/long-term-change.html

the National Assessment of Coastal Vulnerability to Sea-Level Rise

<https://marine.usgs.gov/coastalchangehazards/research/sea-level-rise.html>

and the National Assessment of Storm-Induced Coastal Change Hazards at

coastal.er.usgs.gov/hurricanes/

The USGS St. Petersburg Coastal and Marine Science Center offers links to a variety of case histories and images as well as basic information:

coastal.er.usgs.gov/

The USGS Pacific Coastal and Marine Science Center provides links to case studies of a variety of issues affecting coastal and nearshore areas at

walrus.wr.usgs.gov/coastal_processes/

The National Oceanic and Atmospheric Administration (NOAA), alone or in collaboration with other agencies, conducts a great deal of oceanographic and coastal research. For example, see the following:

Marine geology and geophysics

www.ngdc.noaa.gov/mgg/

Great Lakes Environmental Research Labs

www.glerl.noaa.gov/

NOAA/National Geophysical Data Center coastal relief models

www.ngdc.noaa.gov/mgg/coastal/coastal.html

Excellent data on hurricanes and other major storms are available through the Frequently Asked Questions page of NOAA's Hurricane Research Division, at

www.aoml.noaa.gov/hrd/tcfaq/tcfaqHED.html

The home page of NOAA's National Centers for Environmental Information is

www.ncdc.noaa.gov/

For information on past, current, and anticipated near-future hurricanes, see NOAA's National Weather Service National Hurricane Center at

www.nhc.noaa.gov/

You can compare striking before-and-after Hurricane Sandy pictures through the National Geodetic Survey at

www.ngs.noaa.gov/web/news/NGS_Responds_to_Hurricane_Sandy_Nov14.shtml

The California Coastal Records Project is developing an extensive archive of photographs to document change along the California coast:

www.californiacoastline.org

Among online USGS publications relevant to this chapter are:

Collins, B., Minasian, D., Reiss, T., and Gibbons, H. 2006. USGS scientists revisit New Orleans levee breaks to collect high-accuracy survey data.

soundwaves.usgs.gov/2006/05/

Nichols, F.H. 2007. The San Francisco Bay and Delta - An estuary undergoing change.

sfbay.wr.usgs.gov/general_factsheets/change.html

Stockdon, H. and Sallenger, A. 2010. *Impacts and predictions of coastal change during hurricanes*. USGS Fact Sheet 2010-3012.

pubs.usgs.gov/fs/2010/3012/

Williams, S. J., Dodd, K., and Gohn, K. K. 1997. *Coasts in crisis*. USGS Circular 1075.

pubs.usgs.gov/circ/c1075/

See also Vitousek, S., *et al.* 2017. Doubling of coastal flooding frequency within decades due to sea-level rise. *Nature* online:

www.nature.com/articles/s41598-017-01362-7

The National Park Service's Geologic Resources Division specifically addresses "Coastal geology in our national parks":

www.nature.nps.gov/geology/coastal/index.cfm

And for a NASA Earth Observatory feature on coastal change, see

<https://earthobservatory.nasa.gov/WorldOfChange/CapeCod>

Chapter 8 NetNotes

The USGS Landslide Hazards Program home page, with links to information on and images of many slides, is found at

www.usgs.gov/natural-hazards/landslide-hazards

You can check out real-time landslide-monitoring data for current monitoring sites at

www.usgs.gov/natural-hazards/landslide-hazards/monitoring

and for advice on landslide preparedness and response, see

www.usgs.gov/natural-hazards/landslide-hazards/science/landslide-preparedness

Among the landslide-related USGS publications available online are:

"Rates of landsliding and cliff retreat along the Big Sur coast, California – Measuring a crucial baseline." 2005. USGS Fact Sheet 2004-3099.

<https://pubs.usgs.gov/fs/2004/3099/>

"Landslides mapped using LIDAR imagery, Seattle, Washington." 2004. USGS Open-File Report 2004-1396.

pubs.usgs.gov/of/2004/1396/

"Landslide types and processes." 2004. USGS Fact Sheet 2004-3072.

pubs.usgs.gov/fs/2004/3072/

"A NOAA-USGS demonstration flash-flood and debris-flow early-warning system." 2005. USGS Fact Sheet 2005-3104.

pubs.usgs.gov/fs/2005/3104/

and a more comprehensive document, "NOAA-USGS debris-flow warning system --final report." 2005. USGS Circular 1283.

pubs.usgs.gov/circ/2005/1283/pdf/Circular1283.pdf

"Southern California landslides—an overview." 2005. USGS Fact Sheet 2005-3107.

pubs.usgs.gov/fs/2005/3107/

"Landslide hazards at La Conchita, California." 2005. USGS Open-File Report 2005-1067.

pubs.usgs.gov/of/2005/1067/

"Estimating landslide losses—preliminary results of a seven-state pilot project." 2006. USGS Open-File Report 2006-1032.

pubs.usgs.gov/of/2006/1032/

"Landslide hazards in the Seattle, Washington, Area." 2007. USGS Fact Sheet 2007-3005.

pubs.usgs.gov/fs/2007/3005/

"The landslide handbook - A guide to understanding landslides." (2008) USGS Circular 1325.

pubs.usgs.gov/circ/1325/

"Field reconnaissance report of landslides triggered by the January 12, 2010 Haiti earthquake." 2011. USGS Open-File Report 2011-1023.

pubs.usgs.gov/of/2011/1023/

A NASA study describing the use of satellites to monitor landslide-triggering rains is found at earthobservatory.nasa.gov/Features/LandslideWarning/

The Avalanche Education Center has links to technical information on avalanches, avalanche reports, avalanche safety information, and other avalanche-related sites, at www.avalanche-center.org/Education/

Chapter 9 NetNotes

The National Snow and Ice Data Center (U.S.) provides a variety of information on snow and ice processes and interactions with atmosphere and oceans:

nsidc.org/

NSIDC is creating an inventory of glaciers, the GLIMS (Global Land Ice Measurements from Space) Glacier Database; see

nsidc.org/glims/

Current data and trends are available through their “State of the Cryosphere” site:

<https://nsidc.org/cryosphere/sotc/>

The NSIDC’s glacier photo gallery is at

nsidc.org/data/glacier_photo/index.html

The USGS repeat-photography project in Glacier National Park is at

www.usgs.gov/centers/norock/science/repeat-photography-project

Take a virtual field trip in Glacier National Park:

www4.uwsp.edu/geo/faculty/lemke/gnp_vft/home.html

INSTAAR, the Institute of Arctic and Alpine Research at the University of Colorado, offers glacier-related information through

instaar.colorado.edu/

For additional information on glacier terminus changes and glacier water resources, contact North Cascade Glacier Climate Project at

<https://glaciers.nichols.edu/>

The British Antarctic Survey presents a variety of information on snow and ice studies and related climate issues at

www.bas.ac.uk/

NASA’s Global Hydrology and Climate Center is accessible via the Earth Science Office at

<https://weather.msfc.nasa.gov/>

A NASA study on desertification in Africa’s Sahel region is at

<https://earthobservatory.nasa.gov/Features/Desertification>

NOAA reports annually on the state of alpine glaciers; see, for example,

<https://www.climate.gov/news-features/featured-images/2017-state-climate-mountain-glaciers>

The Desert Research Institute engages in a wide variety of geologic, ecologic, and archeological studies of deserts; their comprehensive website is located at

www.dri.edu/

The International Arid Lands Consortium home page offers a variety of links to information about drylands; see <https://ialc.world/>

For the USGS publication "Deserts: Geology and Resources" see <pubs.usgs.gov/gip/deserts/>

Charles Sturt University has set up a site assembling links to a variety of sites pertinent to weather and global monitoring, grouped by topic and region; see <http://csusap.csu.edu.au/~lbenton/>

Chapter 10 NetNotes

The Intergovernmental Panel on Climate Change (IPCC) was established jointly by the World Meteorological Organization and the U.N. Environment Programme to evaluate information relevant to climate change and its impacts, and to suggest possible responses. Its home page is

www.ipcc.ch/

The IPCC issues periodic climate assessments and projections; for a synthesis of the 2014 report, see

<http://www.ipcc.ch/report/ar5/syr/>

NASA offers an excellent series of features on paleoclimatology (study of ancient climates) linked from

earthobservatory.nasa.gov/Features/Paleoclimatology/paleoclimatology_intro.php

A discussion of oxygen isotopes in seawater and precipitation is found at

earthobservatory.nasa.gov/Features/Paleoclimatology_OxygenBalance/oxygen_balance.php

The National Oceanic and Atmospheric Administration has a collection of annotated slides of climate-related studies and features online:

www.ncdc.noaa.gov/data-access/paleoclimatology-data

Information about El Niño/La Niña and the Pacific Decadal Oscillation can be found at

<https://sealevel.jpl.nasa.gov/science/elninopdo/>

NOAA's Climate Program Office is found at

www.climate.noaa.gov/

and the Climate Prediction Center of the National Weather Service, which produces both weather and climate forecasts, is at

www.cpc.ncep.noaa.gov/

NOAA's National Centers for Environmental Information maintains a tally of billion-dollar extreme-weather events; see

<https://www.ncdc.noaa.gov/billions/events/US/1980-2017>

The Global Monitoring Division of NOAA's Earth System Research Laboratory is found at

www.esrl.noaa.gov/gmd/

The U.S. Global Change Research Information Office is at

<http://www.gcrio.org/>

One of the functions of the Earth Observing System (EOS) satellites is to monitor climate-related phenomena. EOS imagery and related graphics on such subjects as the greenhouse effect, ocean processes, clouds and storms can be searched through NASA's Earth Science Projects Division:

<https://espd.gsfc.nasa.gov/>

Among NASA's online features are "Carbon dioxide controls Earth's temperature"

www.nasa.gov/topics/earth/features/co2-temperature.html

NASA's Earth Observatory site features global warming at earthobservatory.nasa.gov/Features/GlobalWarming/?src=eoq-features

and in its World of Change series,

"El Niño, La Niña, and rainfall"

<https://earthobservatory.nasa.gov/WorldOfChange/enso.php>

"Arctic sea ice"

earthobservatory.nasa.gov/Features/WorldOfChange/sea_ice.php

"Antarctic sea ice"

earthobservatory.nasa.gov/Features/WorldOfChange/sea_ice_south.php

The USGS Landsat site offers a number of annotated images that reflect global changes; see the gallery at

<https://remotesensing.usgs.gov/gallery/>

Charles Sturt University has set up a site assembling links to a variety of sites pertinent to weather and global monitoring, grouped by topic and region; see

csusap.csu.edu.au/~lbenton/

Human impacts of global change are evaluated by the Center for International Earth Science Information Network at Columbia University:

www.ciesin.org

NOAA maintains a paleoclimatology page that explores climate fluctuations over different periods of time, from days to hundreds of thousands of years:

www.ncdc.noaa.gov/data-access/paleoclimatology-data

NASA has assembled a climate Q & A site, with many references to additional information sources:

earthobservatory.nasa.gov/blogs/climateqa/

The Carbon Dioxide Information Analysis Center of Oak Ridge National Laboratory accumulated decades of data; that information, as of 2017, is now archived by the U.S. Department of Energy through Lawrence Berkeley Laboratory at

cdiac.ess-dive.lbl.gov/

The U.S. Global Change Research Program assessments can be found at

www.globalchange.gov/

The British Antarctic Survey presents a variety of information on snow and ice studies and related climate issues, particularly as they involve Antarctica

www.bas.ac.uk/

The National Snow and Ice Data Center (U.S.) provides a variety of information on snow and ice processes and interactions with atmosphere and oceans:

nsidc.org

A special report of the Australian government's Bureau of Meteorology concerning the 2009 heat wave is online at

www.bom.gov.au/climate/current/statements/scs17c.pdf

Chapter 11 NetNotes

The U.S. Geological Survey offers a variety of water-resource information at www.usgs.gov/science/mission-areas/water-resources

and for specific groundwater-related information, see <https://groundwaterwatch.usgs.gov/>

The latest national water-use summary as of this writing is "Estimated use of water in the United States in 2010" (USGS Circular 1405, 2014)
<https://pubs.usgs.gov/circ/1405/>

Three notable water-related fact sheets are:

"Saltwater intrusion in Los Angeles area coastal aquifers -- the marine connection" (USGS Fact Sheet 030-02, 2002)
pubs.usgs.gov/fs/2002/fs030-02/

"Climatic fluctuations, drought, and flow in the Colorado River Basin" (USGS Fact Sheet 2004-3062, 2004)
pubs.usgs.gov/fs/2004/3062/

"Principal aquifers can contribute radium to sources of drinking water under certain geochemical condition " (USGS Fact sheet 2010-3113, 2012)
<https://pubs.usgs.gov/fs/2010/3113/>

Two key circulars:

"Climate change and water resources management: A Federal perspective" (USGS Circular 1331, 2009)
pubs.usgs.gov/circ/1331/

"Ground-water availability in the United States" (USGS Circular 1323, 2008)
pubs.usgs.gov/circ/1323/

And one special-investigations report, "Selected approaches to estimate water-budget components of the High Plains, 1940 through 1949 and 2000 through 2009" (USGS Special Investigations Report 5183,2011)
pubs.usgs.gov/sir/2011/5183/

The USGS maintains a site known as "Earthshots" at which they offer series of satellite or other images of places of environmental interest, spanning a period of time, with notes on the significance of what is happening there. The home page, at which you can select from the whole set of available sites, is at <https://earthshots.usgs.gov/earthshots/>

Some examples specific to this chapter are more on Lake Chad at

<https://earthshots.usgs.gov/earthshots/node/34>

information on the Aral Sea

<https://earthshots.usgs.gov/earthshots/node/91>

on karst in Florida

<https://earthshots.usgs.gov/earthshots/node/47>

and on the rapid expansion of irrigation in Saudi Arabia

<https://earthshots.usgs.gov/earthshots/node/22>

The US Department of Agriculture's Natural Resources Conservation Service operates the National Water and Climate Center:

www.wcc.nrcs.usda.gov/

The Climate Prediction Center of the National Weather Service engages in short-term climate predictions, which involves considering historic climate trends. Historic precipitation data, U.S. and foreign, can be accessed via links at

www.cpc.ncep.noaa.gov/

The United Nations Division for Sustainable Development has a website with water-related information at

sustainabledevelopment.un.org/index.php?menu=220

NASA has a site examining the current status of Lake Chad:

earthobservatory.nasa.gov/Features/LakeChad/?src=eo-features

The EPA addresses issues relating to drinking water at

www.epa.gov/ground-water-and-drinking-water

and questions about bottled water at "Bottled water Basics"

www.epa.gov/sites/production/files/2015-11/documents/2005_09_14_faq_fs_healthseries_bottledwater.pdf

Chapter 12 NetNotes

The U.S. Department of Agriculture Natural Resources Conservation Service (formerly USDA Soil Conservation Service) site, which includes an extensive photo gallery, is at www.nrcs.usda.gov/

Their "Soils" website, including the World Soil Resources Office, is www.nrcs.usda.gov/wps/portal/nrcs/site/soils/home/

with the National Cooperative Soil Survey at www.nrcs.usda.gov/wps/portal/nrcs/site/national/home/

A set of online posters illustrating and describing the twelve soil orders is found at www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053588

and a photo gallery of soil-related features and problems is at photogallery.nrcs.usda.gov/res/sites/photogallery/

The National Park Service engages in soil inventory and mapping activities; see www.nps.gov/subjects/geology/sri.htm

The Smithsonian Institution and Soil Science Society of America have an online soils exhibit: forces.si.edu/soils/index.html

The U.S. Geological Survey has published a comprehensive report "Surficial materials in the conterminous United States" (USGS Open-File Report 03-275) which includes a large map and information about soils: pubs.usgs.gov/of/2003/of03-275/

and a newer publication with much more comprehensive soil information, published in 2013 is "Geochemical and mineralogical data for soils of the conterminous United States" (USGS Data Series 801): pubs.usgs.gov/ds/801/

The National Wetland and Aquatic Research Center home page is www.usgs.gov/centers/wetland-and-aquatic-research-center-warc/

The Canadian Soil Information System is at sis.agr.gc.ca/cansis/

The International Union of Soil Sciences world soil information center is at www.isric.org/

and the International Erosion Control Association at www.ieca.org/

A feature on the use of soil-chemistry mapping to address the selenium contamination at Kesterson is at minerals.cr.usgs.gov/gips/na/elemap.html

A listing of publications resulting from various aspects of the National Geochemical Database Project is at
minerals.cr.usgs.gov/projects/geochem_database/index.html

A new website of the International Union of Geological Sciences devoted to those with an interest in forensic geology is
www.forensicgeologyinternational.com

and the forensic-geology page of specialist Raymond C. Murray is
www.forensicgeology.net

Chapter 13 NetNotes

The functions of the former U.S. Bureau of Mines, longtime source of mineral-resource information, have been folded into the Division of Energy and Mineral Resources of the U.S. Geological Survey. The USGS Mineral Resource Surveys Program maintains a site with numerous links to U.S. and international resource data at minerals.usgs.gov/

Fact sheets on individual mineral commodities can be found at <https://minerals.usgs.gov/mineralcommodityFS/>

A feature of general interest, "Do we take minerals for granted?" is at minerals.usgs.gov/granted.html

Many of the data in this chapter come from "Mineral Commodity Summaries", published annually; the 2017 edition is at <https://minerals.usgs.gov/minerals/pubs/mcs/2017/mcs2017.pdf>

If you've ever wondered what gemstones your state may produce, see "Gemstones -- An overview of production of specific U.S. gemstones," U.S. Bureau of Mines Special Paper 14-95 at minerals.usgs.gov/minerals/pubs/commodity/gemstones/sp14-95/

Among USGS publications relating to rare-earth elements are

"The principal REE deposits of the United States -- A survey of domestic deposits and a global perspective" (USGS Scientific Investigations Report 2010-5220, 2010) pubs.usgs.gov/sir/2010/5220/

"Rare-earth elements -- End use and recyclability" (USGS Scientific Investigations Report 2011-5094, 2011) pubs.usgs.gov/sir/2011/5094/

"The rare-earth elements -- Vital to modern technologies and lifestyles" (USGS Fact Sheet 2014-3078, 2014) <https://pubs.usgs.gov/fs/2014/3078/pdf/fs2014-3078.pdf>

See also "A world of minerals in your mobile device" (USGS General Information Product 167, at <https://pubs.er.usgs.gov/publication/gip167>

The USGS Spectroscopy Lab is engaged in a number of projects, including imaging relating to mineral prospecting. The home page is speclab.cr.usgs.gov/

and information specifically about the application of remote sensing to mineral prospecting at Cuprite, Nevada, is at speclab.cr.usgs.gov/map.intro.html

Some additional publications of interest:

Menzie, D., *et al.*, 2004. *China's growing appetite for minerals*. USGS Open-File Report 2004-1374.

<https://pubs.usgs.gov/of/2004/1374/2004-1374.pdf>

Rogich, D. G., and Matos, G. R. 2008. *The global flows of metals and minerals*. USGS Open-File Report 2008-1355.

pubs.usgs.gov/of/2008/1355/pdf/ofr2008-1355.pdf

_____. 2001. *Obsolete computers, "gold mine" or high-tech trash? Resource recovery from recycling*. USGS Fact Sheet 060-01

pubs.usgs.gov/fs/fs060-01/

Maps of mineral-resource data can be created online

mrdata.usgs.gov/

The U.S. Office of Surface Mining Reclamation and Enforcement is found at

www.osmre.gov/

The Minerals Education Coalition is a nonprofit organization dedicated to educating the public about minerals and other geologic resources; they offer a wealth of informational and educational materials at

www.MineralsEducationCoalition.org/

Natural Resources Canada, which deals with a broad range of resources, including minerals, energy, and forestry, has its home page at

www.nrcan.gc.ca/home

The United Nations Division for Sustainable Development site is found at

<https://sustainabledevelopment.un.org/>

The National Park service Geologic Resources Division can be found at

<https://www.nps.gov/subjects/geology/index.htm>

and the home page of its Geologic Resource Inventory program is

www.nps.gov/subjects/geology/gri.htm

Chapter 14 NetNotes

The U.S. Department of Energy's Energy Information Administration publishes online a wealth of energy-related data, including *Annual Energy Review*, *International Energy Annual*, and *International Energy Outlook*. For 2012 and earlier, these are downloadable in PDF. More recently, the "publications" have gone strictly online, and there is interactive capability whereby you can construct graphs over a period of interest showing how one or more things (oil prices, coal reserves, etc.) has varied over time. The general Energy Information Administration site is www.eia.gov/

see "Annual Energy Review" at www.eia.gov/totalenergy/data/annual/

"International Energy Outlook" at www.eia.gov/outlooks/ieo/

As of this writing, a beta site for examining international energy statistics is at www.eia.gov/beta/international/

EIA has a whole series of "Energy explained" features accessible at www.eia.gov/energyexplained/

A short item on where our gasoline comes from is found at www.eia.doe.gov/energyexplained/index.cfm?page=gasoline_where

General information about energy is accessible at <https://www.usgs.gov/science/science-explorer/Energy>

The USGS Energy Resources Program home page is at energy.usgs.gov/

and USGS World Petroleum Assessment Project home page is energy.usgs.gov/OilGas/AssessmentsData/WorldPetroleumAssessment.aspx

The USGS National Assessment of Oil and Gas is online at energy.usgs.gov/OilGas/AssessmentsData/NationalOilGasAssessment.aspx

Several pertinent USGS publications online:

"Arctic National Wildlife Refuge, 1002 Area, Petroleum assessment, 1998, including economic analysis" (Fact Sheet 0028-01, 2001)
pubs.usgs.gov/fs/fs-0028-01/fs-0028-01.pdf

"U.S. Geological Survey 2002 petroleum resource assessment of the National Petroleum Reserve in Alaska (NPRA)" (Fact Sheet 045-02, 2002)
pubs.usgs.gov/fs/2002/fs045-02/fs045-02.pdf

"Oil and gas assessment of Central North Slope, Alaska, 2005" (Fact Sheet 2005-3043)
pubs.usgs.gov/fs/2005/3043/

"Economic analysis of undiscovered oil and gas of the Central North Slope of Alaska, 2005" (Fact Sheet 2005-3120)

pubs.usgs.gov/fs/2005/3120/

"Geology and resources of some world oil-shale deposits" (Scientific Investigations Report 2005-5294)

pubs.usgs.gov/sir/2005/5294/

"Assessment of gas hydrate resources on the North Slope, Alaska, 2008" (Fact Sheet 2008-3073)

pubs.usgs.gov/fs/2008/3073/pdf/FS08-3073_508.pdf

"Water quality studied in areas of unconventional oil and gas development, including areas where hydraulic fracturing techniques are used, in the United States (2012)" (Fact Sheet 2012-3049)

pubs.usgs.gov/fs/2012/3049/

"Estimating national water use associated with unconventional oil and gas development" (Fact Sheet 2016-3032)

<https://pubs.er.usgs.gov/publication/fs20163032>

For a description of USGS short-term earthquake predictions associated with induced seismicity, see

<https://earthquake.usgs.gov/hazards/induced/>

NASA's Earth Observatory site has a feature on mountaintop-removal mining, "Coal Controversy in Appalachia":

earthobservatory.nasa.gov/Features/MountaintopRemoval/mountaintop_removal.php

a feature focused on the Hobet mine:

earthobservatory.nasa.gov/Features/WorldOfChange/hobet.php?all=y

and one of the development of Athabasca oil sands is at earth observatory.

earthobservatory.nasa.gov/Features/WorldOfChange/athabasca.php?all=y

A sequence of images with information about the *Deepwater Horizon* spill is at

earthobservatory.nasa.gov/Features/OilSlick/

The Federal government has established a central site for information on the *Deepwater Horizon* oil spill and related issues:

www.restorethegulf.gov/

and the home page of the Bureau of Ocean Energy Management, Reclamation and Enforcement -- recently renamed the "Bureau of Ocean Energy Management" -- is

www.boem.gov/

For information on the EPA's oil spill prevention and preparedness regulations, see

www.epa.gov/oil-spills-prevention-and-preparedness-regulations

EPA has also issued a "Final report on impacts from hydraulic fracturing activities on drinking water" (2016):

www.epa.gov/hfstudy

The archived USGS Oil Spill Response page offers both general information and material specific to particular spills at

<https://archive.usgs.gov/archive/sites/www2.usgs.gov/oilspill/index.htm>

As the lead agency working with the Coast Guard on oil and toxic chemical spills in U.S. coastal waters, NOAA also has an Office of Response and Restoration at

<https://response.restoration.noaa.gov/oil-and-chemical-spills/oil-spills>

The Office of Surface Mining Reclamation and Enforcement , which provides information specifically about coal mining, can be reached at

www.osmre.gov/

The National Park Service maintains an inventory of geologic resources on park lands; see

www.nps.gov/subjects/geology/gri.htm

Chapter 15 NetNotes

A major U.S. Government source of domestic and international energy statistics is the Department of Energy's Energy Information Administration, with home page at www.eia.gov

Some especially useful documents linked from this site include *Annual Energy Review* and *Annual Energy Outlook*, which focus on the U.S., and *International Energy Annual* and *International Energy Outlook*, which take the global view. The latest edition of *Annual Energy Review* is found at

www.eia.gov/totalenergy/data/annual/

and the annual *International Energy Outlook* is at www.eia.gov/outlooks/ieo/

A historical perspective "Estimated primary energy consumption in the United States, 1635-1945" is at

www.eia.gov/totalenergy/data/annual/pdf/sec16_1.pdf

The results of the national Residential Energy Consumption Survey are available for 2015: <https://www.eia.gov/consumption/residential/data/2015/>

The U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy site is energy.gov/eere/office-energy-efficiency-renewable-energy

The National Renewable Energy Laboratory's site is www.nrel.gov/

A selection of maps and data relating to various renewable energy sources is at www.nrel.gov/gis/maps.html

The U.S. Geological Survey's Energy Resources Program is at <https://energy.usgs.gov/>

The International Energy Agency home page is www.iea.org

For data and graphics concerning worldwide use of nuclear fission power and other related issues, see the International Atomic Energy Agency: www.iaea.org/

and for information on nuclear power reactors in particular, see the Power Reactor Information System: www.iaea.org/resources/databases/power-reactor-information-system-pris

The IAEA has sponsored conferences looking back at Chernobyl and Fukushima; see, respectively, www.iaea.org/NewsCenter/Focus/Chernobyl/ and www.iaea.org/NewsCenter/Focus/Fukushima/

Information on U.S. reactors specifically is available from the Nuclear Regulatory Commission:
www.nrc.gov/

A study on the relationship between fluid injection and seismicity at The Geysers geothermal area is found at
https://www1.eere.energy.gov/geothermal/pdfs/peer_review_2010/seismic_majer_lake_county.pdf

The story of a Brazilian doctoral student assessing his country's offshore wind - energy resources is at
earthobservatory.nasa.gov/Features/WindEnergy/

The American Wind Energy Association site is
www.awea.org

Information on such hydropower operations as Hoover Dam and Glen Canyon dam is available from the Bureau of Reclamation
www.usbr.gov

Chapter 16 NetNotes

The U.S. Environmental Protection Agency's "Land, Waste, and Cleanup Topics" page is at www.epa.gov/environmental-topics/land-waste-and-cleanup-topics

Information about municipal waste and related topics is found at "Advancing Sustainable Materials Management: Facts and Figures" www.epa.gov/smm/advancing-sustainable-materials-management-facts-and-figures

EPA's consumer guide for reducing solid waste ("Reduce, Reuse, Recycle") is available online at www.epa.gov/recycle

and there is a "Primer for Municipal Wastewater Treatment Systems" at www.epa.gov/sites/production/files/2015-09/documents/primer.pdf

Some 70% of residences in the U.S. are single-family homes. If you're curious about the impact of each one, see "Analysis of the life cycle impacts and potential for avoided impacts associated with single-family homes" www.epa.gov/sites/production/files/2015-11/documents/sfhomes.pdf

Hazardous-waste issues of selected industries are addressed in EPA's "RCRA In Focus" at www.epa.gov/rcra/resource-conservation-and-recovery-act-rcra-tools-and-resources#RIF

See also a report "Quantitative Characterization of Domestic and Transboundary Flows of Used Electronics," the result of international efforts to address the issue of e-waste, at www.epa.gov/international-cooperation/cleaning-electronic-waste-e-waste#understanding

Superfund has its own site at www.epa.gov/superfund

The Organization for Economic Cooperation and Development maintains statistical profiles for member countries that include much information, such as waste generation (and lots more). The home page for OECD datasets is <https://data.oecd.org/>

The United Nations Environment Programme's GRIDArendal site offers two sets of annotated graphics relating to global waste generation, transport, and disposal: Vital Waste Graphics at www.grida.no/publications/264

and Vital Waste Graphics 2 at www.grida.no/publications/257

The Recycling Council of Ontario is a nonprofit organization founded in 1978 whose site offers information on waste generation and recycling in Ontario, in Canada, and in North America, at <https://rco.on.ca/>

WIPP has a comprehensive information site, at
www.wipp.energy.gov/

The International Atomic Energy Agency Web site is
www.iaea.org/

and a page devoted to links on "Radioactive Waste and Spent Fuel Management" is
www.iaea.org/topics/radioactive-waste-and-spent-fuel-management

While the Yucca Mountain Project site is no longer active as of this writing, archival images
can be found at
www.energy.gov/photos/yucca-mountain

and links to a variety of archival documents are at
www.energy.gov/yucca-mountain-archival-documents

See also the links in "Exploring Further" item 5 in the chapter.

Chapter 17 NetNotes

A comprehensive (and continually expanding) source of water-quality data for the U.S.- through which a number of water-quality reports by individual investigators can be accessed-is collectively identified as the National Water Quality Assessment Program of the U.S. Geological Survey.

water.usgs.gov/nawqa/

A fascinating selection of national maps relating to water quality is at

water.usgs.gov/nawqa/digmap.html

and a listing of NAWQA publications is at

water.usgs.gov/nawqa/bib/

One of particular interest may be "Quality of water from domestic wells in the United States"

water.usgs.gov/nawqa/studies/domestic_wells

and another is "Groundwater quality in four principal aquifers"

water.usgs.gov/nawqa/home_maps/gw_prinaq.html

A series of "National Synthesis Assessments" dealing with various specific pollutant types can be found at

water.usgs.gov/nawqa/studies/national_assessments.html

The USGS Toxic Substances Hydrology Program is at

toxics.usgs.gov/

Some papers especially relevant to this chapter include:

"Volatile organic compounds in the nation's ground water and drinking-water supply wells" (USGS Circular 1292, 2006)

pubs.usgs.gov/circ/circ1292/

"Pesticides in the nation's streams and ground water, 1992-2001" (USGS Circular 1291, 2005; revised 2007)

pubs.usgs.gov/circ/2005/1291/

"Quality of water from domestic wells in principal aquifers of the United States, 1991-2004" (USGS Circular 1332, 2009)

pubs.usgs.gov/circ/circ1332/

"Water quality in the High Plains Aquifer....1999-2004" (USGS Circular 1337, 2009)

pubs.usgs.gov/circ/1337/

"Nutrients in the nation's streams and ground water" (USGS Circular 1350, 2010)

pubs.usgs.gov/circ/1350/

"Mercury in the nation's streams – levels, trends, and implications" (USGS Circular 1395, 2014)

pubs.usgs.gov/circ/1395/

Two papers relevant to the acid-drainage study at Leadville, Colorado, are found at

speclab.cr.usgs.gov/PAPERS.Leadville95/leadville1.html

and

speclab.cr.usgs.gov/PAPERS/leadville99/ldv99.html

Environment Canada provides information on a variety of pollution and waste-management issues at

www.canada.ca/en/services/environment/pollution-waste-management.html

The Environmental Protection Agency is responsible for many aspects of water-pollution control and water-quality monitoring; see

www.epa.gov/environmental-topics/water-topics

For local information on drinking-water quality, see your "Consumer Confidence Report" at

www.epa.gov/ccr

and for the complete U.S. National Primary Drinking Water Standards go to

www.epa.gov/dwstandardsregulations

EPA offers links to fish advisories and related information at

www.epa.gov/choose-fish-and-shellfish-wisely

The Great Lakes Environmental Research Laboratory of the National Oceanic and Atmospheric Administration is at

www.glerl.noaa.gov/

The National Library of Medicine maintains the TOXMAP site, which allows you to map information from the EPA's Toxics Release Inventory and Superfund to look at where U.S. pollutants are being released and examine trends over time:

toxmap.nlm.nih.gov/toxmap/

Chapter 18 NetNotes

The U.S. Environmental Protection Agency publishes various air-quality and emissions trends reports. The latest comprehensive issue online at this writing was "Our Nation's Air 2017" at

<https://gispub.epa.gov/air/trendsreport/2017/#home>

Links to much other air-quality data are at the Air Trends home page:

www.epa.gov/air-trends

Links to a variety of information on air quality can be found at

www.epa.gov/environmental-topics/air-topics

Comprehensive data on ozone and the underlying scientific issues are available through the Environmental Protection Agency at

www.epa.gov/ozone-layer-protection

See also their online report about ozone, "Good Up High, Bad Nearby" at

www3.epa.gov/airnow/gooduphigh/ozone.pdf

USGS Open-File Report 96-0346 analyzes effects through 1994 of the Clean Air Act Amendments of 1970 and is found online at

pubs.usgs.gov/acidrain/

USGS booklet "Acid Rain and Our Nation's Capital" is at

pubs.usgs.gov/gjp/7000003/report.pdf

and more comprehensive USGS information on acid rain and chemistry of precipitation is at

bqs.usgs.gov/AcidRain/

USGS has published a report, "Geophysical delineation of Mg-rich ultramafic rocks for mineral carbon sequestration" (USGS Open-File Report 2009-1127, 2009) at

pubs.usgs.gov/of/2009/1127/

A link to a series of more-general FAQs on carbon sequestration is

www.usgs.gov/faqs/what-carbon-sequestration?

The National Atmospheric Deposition Program, from which maps such as those of figures 18.20 and 18.27 come, is at

nadp.sws.uiuc.edu/

NASA's Ozone Watch, with links to a variety of ozone-related information and global ozone maps from 1979 to the present, is at

ozonewatch.gsfc.nasa.gov/

NASA has an online feature on aerosols, "Aerosols: Tiny particles, big impact" at

earthobservatory.nasa.gov/Features/Aerosols

and one on the carbon cycle at
earthobservatory.nasa.gov/Features/CarbonCycle/

Information about market-based air-pollution regulations, and links to laws relating to acid rain (including transboundary issues), are available at
www.epa.gov/airmarkets/index.html

An international group including representatives of the World Meteorological Organization (WMO), United Nations Environment Programme (UNEP), NOAA, and NASA reviews aspects of the ozone situation, air quality, and climate change; see
www.esrl.noaa.gov/csd/assessments/

The Intergovernmental Panel on climate change has issued a special report on carbon dioxide capture and storage. The "Summary for Policymakers" is at
www.ipcc.ch/pdf/special-reports/srccs/srccs_summaryforpolicymakers.pdf

and a selection of key graphics from the report is at
www.ipcc.ch/publications_and_data/publications_and_data_figures_and_tables.shtml

Chapter 19 NetNotes

The American Geological Institute's governmental-affairs arm tracks U.S. environmental legislation and provides links to other information sources:

www.americangeosciences.org/policy-critical-issues

The Department of Energy's Office of NEPA Policy and Compliance is at

energy.gov/nepa/office-nepa-policy-and-compliance

The "Citizen's Guide to NEPA" is found at

energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/G-CEQ-CitizensGuide.pdf

For information on NEPA, how to file an EIS, and more, see

www.epa.gov/nepa

and for access to information on dozens of civil and criminal cases in which EPA has prosecuted alleged polluters, 1998 to the present, see

www.epa.gov/enforcement/summary-criminal-prosecutions

The complete EPA drinking-water standards are found at

www.epa.gov/dwstandardsregulations

EPA's Clean Air Markets home page, with links to much information about emissions, acid rain, and more, is at

www.epa.gov/airmarkets/

A discussion of cap-and-trade programs is found at

www.epa.gov/emissions-trading-resources/tools-trade-guide-designing-and-operating-cap-and-trade-program

The Trump administration is having EPA modify its website in accordance with administration policies, removing certain information, but archived historical information on U.S. greenhouse-gas emissions can be found at

19january2017snapshot.epa.gov/climatechange_.html

The Bureau of Land Management is the agency that controls the largest fraction of federal land; its home page is

www.blm.gov/

The USGS Water Resources Division maintains environmental data links on a variety of topics; see at

water.usgs.gov/wsc/information.html

Its Environmental Affairs Program (EAP) includes information on NEPA generally, and EISs referred to USGS for comment specifically, accessible via the EAP home page at

water.usgs.gov/eap/

USGS is involved in seafloor mapping that is relevant to the definition of the U.S. EEZ.

Information on the mapping program is at

coastalmap.marine.usgs.gov/gloria/

The Carbon Dioxide Information Analysis Center provides regional and global information on CO₂ and its emission. The home page is <http://cdiac.ess-dive.lbl.gov/>

NOAA's Earth System Research Laboratory Global Monitoring Division investigates trace gases including CFCs, HFCs, and so on: www.esrl.noaa.gov/

The United Nations Environment Programme's Climate Change home page is www.unenvironment.org/explore-topics/climate-change

For information on many U.N. Environment conventions, see www.unenvironment.org/about-un-environment/why-does-un-environment-matter/secretariats-and-conventions

Comprehensive information on the U.N. Framework Convention on climate change is at unfccc.int/

and a "Beginner's Guide to the Convention" online at http://unfccc.int/resource/docs/publications/beginner_en.pdf

Information on the Stockholm Convention on Persistent Organic Pollutants can be found at chm.pops.int/

A description of and historical perspective on the U.N. Convention on the Law of the Sea is at www.un.org/Depts/los/convention_agreements/convention_historical_perspective.htm

A wealth of information on the Montreal Protocol specifically and ozone generally is available via the Ozone Secretariat of the U.N. Environment Programme at <http://ozone.unep.org/>

The main web page for the Paris Agreement is unfccc.int/process/the-paris-agreement/what-is-the-paris-agreement

Materials from the Canadian Environmental Assessment Agency can be found via <https://www.canada.ca/en/environmental-assessment-agency.html>

NASA's Earth Observatory site maintains an image gallery of "National Parks from Space" at <https://earthobservatory.nasa.gov/Features/NationalParks/>

Chapter 20 NetNotes

NASA maintains a wonderful archive of images taken from space, many of which show land-use changes and curiosities, at the Earth Observatory "Image of the Day" site:

earthobservatory.nasa.gov/IOTD/

The U.S. Geological Survey global geographic information systems database is available at

webgis.wr.usgs.gov/globalgis/

The Earth Explorer System provides access to maps, satellite imagery, and aerial photographs:

earthexplorer.usgs.gov/

The National Map home page is at

www.usgs.gov/core-science-systems/national-geospatial-program/national-map

and GIS imagery like that of figures 20.9 and 20.10 can be created to order through the National Map Viewer site at

viewer.nationalmap.gov/advanced-viewer/

The USGS Spectroscopy Lab works extensively with imaging spectroscopy. Its home page is

speclab.cr.usgs.gov

and an introduction to aspects of imaging-spectroscopy maps is at

speclab.cr.usgs.gov/map.intro.html

The primary USGS site for remote-sensing imagery is the Earth Resources Observation and Science Center at

eros.usgs.gov/

A variety of satellite images illustrating environmental change has been collected as "Earthshots," and an explanation of the imaging techniques is featured at the same site:

earthshots.usgs.gov/earthshots/

A recent USGS fact sheet relevant to this chapter is: Zientek, M. L., and Kropschot, S. J. 2005. *Mineral resources research supports land-use planning in the northern Rocky Mountains.*

(USGS Fact Sheet 2005-3155)

pubs.usgs.gov/fs/2005/3155/

Another is *Natural hazards - A national threat* (USGS Fact Sheet 2007-3009):

pubs.usgs.gov/fs/2007/3009/2007-3009.pdf

and *Geographical overview of the Three Gorges Dam and Reservoir, China – Geologic hazards and environmental impacts* by L.M. Highland (USGS Open-File Report 2008-1241):

pubs.usgs.gov/of/2008/1241/

Information on the Landsat program and its history can be found at

landsat.gsfc.nasa.gov/

The Earthquake Engineering Research Institute's home page, with links to much information on earthquakes and earthquake response, is found at

www.eeri.org/

The U.S. Army Corps of Engineers engages in a variety of projects. The Corps home page is at www.usace.army.mil/

and their environmental missions can be investigated through www.usace.army.mil/Missions/Environmental.aspx

The U.S. Department of Agriculture's Natural Resources Conservation Service home page is www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/nri/

and the 2015 edition of its "National Resources Inventory," released in late 2018, is at https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcseprd1422028.pdf

The 2000 report of the World Commission on Dams, including case studies from the United States and six other nations and country studies for China, India, and Russia, is found at: https://www.internationalrivers.org/sites/default/files/attached-files/world_commission_on_dams_final_report.pdf

The official website of Boston's Big Dig is <https://www.mass.gov/the-big-dig>

The 2018 report of the independent forensic team investigating the Oroville Dam spillway incident is at damsafety.org/sites/default/files/files/Independent%20Forensic%20Team%20Report%20Final%2001-05-18.pdf

and the California Department of Water Resources maintains a photo library, with several subject-specific galleries including one on the spillway incident; the photo library is at pixel-ca-dwr.photoshelter.com/index

Appendix A NetNotes

NASA maintains a wonderful archive of images taken from space, many of which show land-use changes and curiosities, at the Earth Observatory "Image of the Day" site:
earthobservatory.nasa.gov/IOTD/

For more on the kinds of information that can be obtained from the Jack Hills zircons, see "Ancient crystals suggest earlier ocean" at
earthobservatory.nasa.gov/Features/Zircon/

The Earthtime site, supported by the National Science Foundation, provides links to a wealth of information about earth's history and how scientists study it, at
www.earth-time.org/

U.S. Geological Survey information on a variety of geochronologic techniques can be found at
<https://geology.cr.usgs.gov/capabilities/gronemtrac/geochron/geochron.html>

and at
<https://geomaps.wr.usgs.gov/common/geochronology.html>

and in the publication "Geologic Time" at
<https://pubs.usgs.gov/gip/geotime/>

For a handy bookmark-style summary of the geologic time scale, see
<https://pubs.usgs.gov/gip/141/>

which is drawn from USGS Fact Sheet 2010-3059:
<https://pubs.usgs.gov/fs/2010/3059/>

The Berkeley Geochronology Center also maintains a public-outreach site with information and links relating to geochronology:
www.bgc.org/