Teacher's Guide

Ag in the Classroom - Helping the Next Generation Understand Their Connection to Agriculture

Earth Science Careers

Additional Resources

State of Colorado, Department of Natural Resources, Division of Reclamation, Mining and Safety. This division is responsible for mineral and energy development, policy, regulation and planning. Their website provides information on the division, as well as many of the division's projects and other related topics. 1313 Sherman St., Rm. 215, Denver, CO 80203 phone(303) 866-3567
http://mining.state.co.us/
and their page for children is:
http://mining.state.co.us/kids/dmgkids.htm

American Geological Institute is a nonprofit federation of 32 geoscientific and professional associations that represent geologists, geophysicists, and other earth scientists. 4220 King Street, Alexandria, Virginia 22302-1507 phone (703) 379-2480
http://www.k5geosource.org/index.html is an online Earth science professional development tool for K-5 teachers

American Association of Petroleum Geologists
P.O. Box 979, Tulsa, Oklahoma 74101 phone: (918) 584-2555
http://www.aapg.org/k12resources/ is their website intended to assist teachers of K-12 students in finding classroom resources focusing on the Earth sciences.

Geological Society of America
3300 Penrose Place, P.O. Box 9140, Boulder, CO 80301 phone: (303) 447-2020
They have teacher's resources at
http://www.geosociety.org/educate/esw

agclassroom.org
This is the national website for Ag in the Classroom programs from across the nation. A site search will bring up a variety of lessons, books, videos and links.

Comments, questions, suggestions and feedback about the Colorado Reader are welcome.

Contact: Colorado Foundation for Agriculture
Bette Blinde, Director
PO Box 10 Livermore, CO 80536
Phone 970-881-2902
bblinde@growingyourfuture.com
www.growingyourfuture.com

INTRODUCTION:

Earth Science Benefits Everyone

Our lives and civilization depend upon how we understand and manage our planet – Earth processes affect us all. Weather patterns influence the availability of water resources and the potential for forest fires; earthquakes, volcanic eruptions, hurricanes and floods can kill large numbers of people and cause millions or even billions of dollars in property damage.

Just as Earth systems directly affect each of us, we – as individuals, communities and nations – affect our planet. Expanding technologies and growing populations increase demand of natural resources. As we extract and use these resources, we impact Earth today, which will in turn impact those who come after us. To enhance our stewardship of the environment, we must proceed into the future with a sound understanding of Earth systems.

Academic Training

The most important prerequisites for a career in the Earth sciences is a good science background in high school and a bachelor's degree from college. Geology draws on biology, chemistry, mathematics, physics and engineering. High-school courses related to these subjects plus a geology or earth science course, or a strong integrated science curriculum, will help prepare a candidate for college. A solid foundation in English is also essential.

Geology majors take four academic years of lecture and laboratory courses, usually supplemented by a special summer course in geological field work. Basic geology courses such as mineralogy, petrology, stratigraphy, paleontology and structural geology will make up the bulk of a student's training. Requirements will include additional courses in mathematics, computer science, chemistry, physics, biology, economics and technical writing. A geoscientist must have good writing skills to prepare accurate, understandable technical reports.

A master's degree is required for entry-level research positions. As in any profession, the best jobs go to the best qualified applicants. Students contemplating a professional career in the geosciences should consider getting an advanced degree. A PhD is needed for advancement in college teaching and in most high-level research positions.

More than 800 colleges and universities in the United States offer degrees in the Earth sciences. Nearly half of these colleges offer a Masters Diploma, the professional degree for pursuing a career as an Earth scientist. Training in the Earth sciences builds a foundation for work in other fields,and nearly half of those graduating with Earth science degrees establish careers in fields as varied as engineering, law, system analysis, and financial management.

Earth science provides a strong background for many career paths and instills an understanding of how the Earth system influences the many and varied aspects of human activity.

Student Activity - On a sheet of paper have students identify what subjects they like best in school. Then have them list things they like to do. Then have them pick a career in this reader that might use these subjects and activities and have the write a paragraph on why they might like to do that career.

Have your students write a letter to a person in one the careers in the reader and ask them questions about their job.

Page 7 Answers:

Now try your hand at discovering the meanings of the following words:
the root archeo means ancient or primitive
archeo + logist = someone who studies ancient people and their culture
the root bio means life
bio + logist = someone who studies living things
the root hydro means water
hydro + logist = someone who studies water
the root paleo means being ancient or old things
paleonto + logist means someone who studies old things (usually fossils)
What is a gemologist? someone who studies gems
What is a mineralogist? someone who studies minerals

Content Area: Science

Grade Level Expectation: Fourth Grade
Concepts and skills students master:
3. There is interaction and interdependence between and among living and nonliving components of ecosystems

Evidence Outcomes - Students can:
a. Use evidence to develop a scientific explanation on how organisms adapt to their habitat (DOK 1-3)
b. Identify the components that make a habitat type unique (DOK 1)
c. Compare and contrast different habitat types (DOK 2)
d. Create and evaluate models of the flow of nonliving components or resources through an ecosystem (DOK 2-3)
e. Make a plan to positively impact a local ecosystem (DOK 2-4)
f. Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate endangered habitats (DOK 1-2)

21st Century Skills and Readiness Competencies
I*nquiry Questions:*
1. How are resources shared among organisms in a specific ecosystem or habitat?
2. How do nonliving components of an ecosystem influence living components?
3. What would happen if the Sun's energy no longer reached Earth?
4. What would happen if water were removed from an ecosystem?

Relevance and Application:
1. Humans can have positive and negative impacts on an ecosystem.
2. Nonliving components are cycled and recycled through ecosystems and need to be protected and conserved.

Nature of Science:
1. Understand that models are developed to explain and predict natural phenomena that cannot be directly observed because they happen over long periods of time. (DOK 1)
2. Evaluate models that show interactions between living and nonliving components of ecosystems, identifying the strengths and weaknesses of the model in representing what happens in the real world. (DOK 2-3)

Grade Level Expectation: Fifth Grade
Concepts and skills students master:
1. Earth and Sun provide a diversity of renewable and nonrenewable resources

Evidence Outcomes - Students can:
a. Develop and communicate a scientific explanation addressing a question of local relevance about resources generated by the sun or Earth (DOK 1-3)
b. Analyze and interpret a variety of data to understand the origin, utilization, and concerns associated with natural resources (DOK 1-3)
21st Century Skills and Readiness Competencies

Inquiry Questions:
1. How can the Sun be used as an energy source?
2. How can wind be used as an energy source?
3. What types of energy sources exist on Earth?

Relevance and Application:
1. Mining operations provide nonrenewable resources.
2. Resources are not distributed evenly and require transportation systems to move them to where they are needed.
3. Towns and laws are often built around resource extraction.

Nature of Science:
1. Review and analyze scientific explanations about natural resources presented by their peers, and provide feedback to push their peers to be scientifically accurate and base their claims on adequate and reasonable scientific evidence, not opinion.
2. Earth and Sun provide a variety of renewable and nonrenewable resources. (DOK 1)

Summaries will vary.

Sedimentary
- layers of silt, sand, small pieces of rock, sometimes fossil pieces carried by water, wind or ice
- layers harden over a long time,
- sandstone is an example

Metamorphic
- start as sedimentary or igneous rocks
- made into new rocks by heat and pressure
- slate is an example

Igneous
- made from cooled and hardened lava
- basalt is example of lava that cools quickly
- granite is example of lava that doesn't come to surface and cools slowly
- Rocky Mountains made of igneous rocks