

## NATURAL RESOURCE CAREER SPOTLIGHTS

Below you will find detailed information about several natural resource occupations. We chose occupations that together represent the variety of jobs in skill, duties, and education requirements across the natural resource industry. You can find more information about these careers and others in the Occupational Outlook Handbook on the Bureau of Labor Statistic's Website ([www.bls.gov/ooh/](http://www.bls.gov/ooh/)).

### Land Management: Soil Scientist

#### Career Overview



Agriculture and soil science have always been closely linked. Soil scientists in Colorado use their knowledge of the earth to find out which crops grow best in which soils, what fertilizers to use and what the best methods of plowing and planting might be. “Soils within a country determine the quality of that nation’s environment, because soil acts like a kidney,” says John Beck, a soil scientist. “Water is purified as it moves through the soil to the groundwater. Plants growing in the soil purify the air we breathe.”

#### A Day on the Job

Soil scientists study the chemical, physical and biological properties of soils. They research anything from global topics like climate change or acid rain to local issues like well contamination. Soil scientists work in a variety of environments: labs, offices and the field. In the field, they collect soil samples and survey the environment. They then take the information and samples to the lab, where they test the soil for quality and look for solutions. Once testing is done, they work in offices, writing up research findings.

“Most soil scientists would tell you they chose this profession because they liked the combination of field and laboratory work,” says soil scientist Ivan Fernandez.

#### Personal Attributes

People that become soil scientists usually share similar personal characteristics. They share a love of science, enjoy working outdoors, have enthusiasm for maps, exhibit strong analytical and critical thinking skills, and have the desire to be an integral voice in environmental decisions related to soil conservation, land use, water quality, or waste management.

#### Skills Needed

A strong background in math and science is necessary for admission into graduate soil science programs.

#### Education

Most soil scientists have earned at least a Bachelor’s degree in biology, chemistry, agronomy, engineering or environmental studies from a major university. At many universities, two choices are available for specialized training in soils. The Soil Science option prepares students to enter

the agricultural sector as farm advisors, crop consultants, soil and water conservationists, or as representatives of agricultural companies. The Environmental Soil Science option prepares soil scientists for careers in environmental positions dealing with water quality concerns, remediation of contaminants or for on-site evaluation of soil properties in construction, waste disposal, or recreational facilities.<sup>ii</sup> To get out of the field and into the lab, most soil scientists recommend a Master's degree. "With only a Bachelor's degree, you'll probably end up in the field for the remainder of your career, doing somebody else's research," says soil scientist John Beck.

### **Experience and Training**

Soil scientists can be certified by the Soil Science Society of America to recognize their expertise and enhance their application status among fellow job seekers. According to the Soil Science Society of America, certification of professional expertise is broadly based on education, a comprehensive exam, and previous professional experience. Scientists may need to take continuing education courses every year to keep their certification, and they must follow the organization's code of ethics.

Some states require soil scientists to be licensed to practice. Licensing requirements vary by state, but generally include holding a Bachelor's degree with a certain number of credit hours in soil science, a certain number of years working under a licensed scientist, and passage of an examination.

### **Pay and Job Outlook**

The average annual salary of a soil scientist is \$65,980. The job's forecast is stable with a predicted growth of 7% from 2014 to 2024.

## **Water Management: Water Treatment Technician**

### **Career Overview**

Before you take a sip of water from the faucet, a water treatment technician or operator has ensured that it is safe for you to drink. Fresh water is pumped from wells, rivers, streams, or reservoirs to water treatment plants, where it is treated and distributed to customers. Water treatment technicians and system operators run the equipment, control the processes, and monitor the plants that treat water to make it safe to drink.



### **A Day on the Job**

A water treatment technician typically works for a city government at a water treatment facility. Depending on the size of the city, the facility could be large or small. In a typical day, a water treatment technician may record meter and gauge readings, add chemicals to disinfect and deodorize water and other liquids, clean and maintain equipment and work areas, collect and test water samples, or operate and adjust controls on equipment to purify and

clarify water. Because water treatment occurs 24-hours-a-day, water treatment technicians may work weekends or shift work. Most water treatment technicians work full-time.

### **Personal Attributes**

A person in this job should like physical activities and work. You may be expected to do heavy lifting, stooping, climbing and walking. Everyone in the plant is exposed to unpleasant odors. And it can be a dirty job. For success in this career, someone needs to have good skills in general learning ability, spatial perception, form perception, manual dexterity and critical thinking.<sup>iii</sup>

### **Skills Needed**

Being a water treatment technician requires both scientific and mechanical abilities. Specifically, a water treatment technician needs good analytical skills to conduct tests and inspections on water or wastewater and evaluate the results. One also needs to be detail oriented as he/she must monitor machinery, gauges, dials, and controls to ensure everything is operating properly. Because tap water and wastewater are highly regulated by the U.S. Environmental Protection Agency, operators must be careful and thorough in completing these tasks. Math skills are also important. Water treatment technicians must have the ability to apply data to formulas that determine treatment requirements, flow levels, and concentration levels. Finally, a water treatment technician must have good mechanical skills and know how to work with machines and use tools. They must also be familiar with how to operate, repair, and maintain equipment.

### **Education**

Water treatment technicians typically need a high school diploma and a license to work. They also typically undergo on-the-job training. As competition for jobs continues to increase, completion of an Associates degree in water quality and wastewater treatment also increases the chances of employment and a higher starting salary.

### **Experience and Training**

All states require certification, or licensure from the Association Boards of Certification, in the state in which they plan to work. States licenses typically have four levels, which indicate the operator's experience and training. Each increase in license level allows the operator to control a larger plant and more complicated processes without supervision.

### **Pay and Job Outlook**

Colorado has approximately 2,800 wastewater districts and 4,000 water districts statewide. The U. S. Department of Labor's Bureau of Labor Statistics estimates that between 2014 and 2024, there will be a six percent increase in wastewater and water jobs. Water treatment is a field that can never be outsourced and is considered recession-proof since water is a vital part of every household and community. Based on 2015 income statistics from the Department of Labor, a water or wastewater treatment technician with an introductory license earns an average annual salary of \$44,790. Pay increases are typically incremental with additional and higher licenses. Employment opportunities in water treatment can be found in spring and early summer while jobs in wastewater treatment are more readily available in the fall and winter months.<sup>iv</sup>

## Forestry: Assistant Fire Management Officer



### Career Overview

Assistant Fire Management Officers (AFMOs) make significant contributions to the overall natural resource conservation master plans. They work with the fire management team from their agency to identify where the greatest threats to life and infrastructure are and design operational plans to mitigate those threats, such as prescribed burns, forest thinning, or a rapid response plan for an emergency. They also work alongside the

biology department to determine how strategic use of fire—whether through prescribed burns or managing natural-start fires—may positively affect habitat space for animals. AFMOs also frequently lend their firefighters to other conservation projects, such as trail building, when not assigned to a fire.

### A Day on the Job

The duties of this job vary widely depending on whether the fire season is active or not. During the season, an AFMO will report to active forest fires in a leadership role. On a large fire an AFMO may supervise an entire section of the fire, work in the Incident Command Center to determine strategy, or fly in helicopters or planes to analyze the fire behavior. On a smaller fire, he or she may be in charge of the entire incident, directing all of the operations until the fire is out. When an AFMO is not on a fire during the active season, they supervise all the firefighters assigned to their station and oversee activities such as trainings, physical fitness activities, and maintenance of technical equipment such as fire engines and water pumps. When it is not active fire season, AFMOs help plan prescribed burns to manage forest health, and continue to take courses and trainings to qualify for regional Fire Management Officer positions or other high-level opportunities such as Fire Investigator.

### Personal Attributes

Nearly all aspects of firefighting require significant physical exertion so strong conditioning is important. Forest fires are fought around the clock and shifts may last 20 hours so a very strong work ethic is critical. The personal safety of firefighters is always at stake so attention to detail, good judgment, and the ability to accept and process direct feedback is necessary. Fighting fire is a coordinated effort, oftentimes involving hundreds of firefighters, so the ability to work with others is required.

### Skills Needed

AFMOs need to be well-versed in fire behavior and suppression techniques, skills that are taught to beginning seasonal firefighters and refined in further trainings. AFMOs need to understand how firefighting equipment works and is maintained such as water pumps and chainsaws. They need to understand the science involved with fighting fires, such as how wind and humidity may affect operations.

## Education

AFMOs typically must have at least an Associates degree in a fire-related field such as forestry or fire science. They must have served as a firefighter for several years, have experience working with fire-oriented budgets, and successfully completed increasingly complex fire-specific trainings that are offered each season, such as managing aircrafts on a fire, managing controlled burns, and commanding small fires.

## Experience and Training

Gaining experience and training are the only ways to achieve an AFMO position. Each season as a firefighter qualifies you for additional trainings and openings in the fire hierarchy as many of these positions require a certain number of days on an active fire. AFMOs typically have at least six to seven years of experience as a firefighter before earning their position. Most AFMOs begin their career as an entry-level firefighter with a federal agency—but not necessarily the same agency that they currently serve. It is common to begin as a first-year firefighter with the National Park Service and move to the U.S. Forest Service for a more senior position to advance, for example.

## Pay and Job Outlook

The national average salary of an AFMO is \$54,790 but wages can climb much higher depending on how active fire season is. AFMOs earn hourly hazard pay during their time on an incident so there is significant earning potential in his position. The national outlook for AFMOs is stable with an annual growth estimate of 6%.

## Fisheries and Wildlife: Wildlife Biologist



### Career Overview

A wildlife biologist studies the origins, behavior, diseases, genetics, and life processes of animals and wildlife. Some professionals specialize in wildlife research and management, including the collection and analysis of biological data, to determine the environmental effects of present and potential use of land and water areas.

### A Day on the Job

Each day as a wildlife biologist is different. Some days a wildlife biologist may be in the field studying animals in their natural habitats, conducting inventories or estimates of plant and wildlife populations, or assessing the effects of environment and industry. Other wildlife biologists may spend their days organizing and conducting experimental studies with live animals in a lab or preparing collections of preserved specimens or microscopic slides for species identification and the study of development or disease.

Other days, a wildlife biologist may be in meetings with other natural resource professionals

to discuss the results of this research and make decisions about management systems, plan for wildlife populations and habitat, and coordinate preventative programs to control the outbreak of wildlife diseases.

Finally, on other days a wildlife biologist may spend his/her time consulting with stakeholders, disseminating information to the public through written materials and interpretive programs, and responding to the public regarding wildlife and conservation issues, such as plant identification, hunting ordinances, and nuisance wildlife.

### **Personal Attributes**

Wildlife biologists need good skills working with the public and interacting with people of all ages, interests, viewpoints and backgrounds. Skills in critical thinking, problem solving and creativity also help wildlife biologists in their daily responsibilities.

### **Skills Needed**

A high level of skill is needed in analyzing data, explaining life science concepts, operating computers and biological data-measuring instruments, and executing field-data collection procedures.

### **Education**

Most wildlife biologists today have a Master's degree in biology, wildlife management or a related field. While a Bachelor's degree may qualify someone to work as a research technician or teacher, most jobs in applied research, management or inspection require a Master's degree. A Ph.D. degree usually is necessary for independent research, particularly in academia, as well as for advancement to management positions.

People interested in becoming a wildlife biologist can start their training as early as high school. Some relevant high school and college courses include Wildlife, Fish and Wildlands Science and Management, Zoology/Animal Biology, Entomology, Animal Physiology, Animal Behavior and Ethology, Wildlife Biology and Ecology.

### **Experience and Training**

Many opportunities exist for people of all ages to get experience in wildlife biology. Volunteer opportunities are available at federal agencies such as the U.S. Fish and Wildlife Service, state departments including the Colorado Parks and Wildlife as well as most county and city open space and parks departments. Some internships may also be available. A number of non-profit organizations also offer programs to get citizens involved in wildlife management. Any skills you can acquire or equipment used through these positions such as the use of mist netting, Global Position System (GPS) units, presence/absence surveys, etc. are helpful to include on your resume.

### **Pay and Job Outlook**

The average annual salary of a wildlife biologist is \$64,230. The job's forecast is stable with a predicted annual growth of 4% between 2014 and 2024.

## Geosciences: Geologist



### Career Overview

Geologists conduct research to find ways to best manage the land, energy, and mineral resources, and solve problems related to hazards.

### A Day on the Job

The daily life of a geologist can vary widely depending on the focus of the position. When performing fieldwork, conditions can range from established research posts to challenging backcountry conditions. Fieldwork can involve travel to locations around the world, sometimes for weeks at a time. When working at the home duty station, daily duties range from working in a laboratory to computer-based analysis and recording.

### Personal Attributes

Geologists generally work within research teams so the ability to work well with others is important. They also have strong problem-solving skills as much of the research involves collating a significant amount of data related to a complex issue.

### Skills Needed

Geologists present their findings through written documents and oral presentations so strong communication skills are required. Fieldwork requires significant time in the field so outdoor skills such as hiking and camping are used frequently. Fieldwork also requires physical stamina because field conditions may require significant hiking while carrying equipment. Computer skills are critical as geologists use complex programs for modeling, analysis, and digital mapping.

### Education

While a Bachelor's degree may earn an entry-level position, many positions require a Master's degree to begin and upper-level positions eventually require a Ph.D. The most common degree program is geoscience but any of physics, chemistry, biology, mathematics, engineering, or computer science may suffice if geology was incorporated into the program. The core of geoscience programs is mineralogy, petrology, and structural geology; most programs will also require courses in other physical sciences, mathematics, and engineering. The following colleges offer a geosciences program: Colorado College; University of Northern Colorado, Colorado Mesa University, Western State Colorado University, Colorado School of Mines, and Colorado State University.

### Experience and Training

Field and laboratory experience is critical during work towards a geosciences degree. Internships and summer programs offer opportunities to acquire this valuable experience. Experience and training on the specific software programs commonly used by geologists is also an advantage.

### Pay and Job Outlook

The national average pay of a geoscientist is \$105,720. The job growth outlook for geologists is strong with predicted growth of 10% between 2014 and 2024.

## Parks and Recreation: Environmental Educator



### Career Overview

Environmental educators – also called park interpreters, interpretive guides or outreach specialists – plan, develop and conduct programs to inform the public about the historical, natural or scientific features of a park, open space or artifact.

### A Day on the Job

An environmental educator may spend his/her day providing visitor services by explaining regulations, answering visitor requests, needs and complaints, and providing information about a park and surrounding areas. Other times an environmental educator may prepare and present illustrated lectures and interpretive talks about park features or conduct field trips to point out scientific, historic, and natural features of parks, forests, historic sites or other attractions. Environmental educators also may prepare informational brochures and write newspaper articles. An environmental educator may work outside in a natural setting or indoors at a museum, aquarium, zoo or at a school. Many environmental educators are seasonal positions with variable hours including those during evenings and weekends.

### Personal Attributes

Because environmental educators are always working with the public, they must be comfortable with and enjoy interacting with people of all ages and backgrounds. They must also know their science and how to take technical scientific information and re-word it for a general audience. Specifically, they must have both good written and verbal communication skills. Finally, environmental educators must be creative. A good educator uses a variety of methods – written materials, visual displays, interactive games, costumes, storytelling and artifacts – to present their information.

### Skills Needed

An environmental educator must have a solid background in biology, ecology, geology or another natural resource field but also have training in education theory and practice and communication.

### Education

Although some positions do not require a specific degree, most environmental educators have an Associates or Bachelor's degree in park management, communications, or another natural resource field.

### Experience and Training

A number of non-profit organizations offer experience and training in environmental education. The Colorado Alliance for Environmental Education offers certification for Environmental Educators and the National Center for Interpretation offers certified interpretive guide training workshops. Both certifications can be included on your resume and help give you a leg-up on your competition for environmental educator positions. Paid summer internships are also

available at non-profit organizations such as The Greenway Foundation, which provide teaching experience working with elementary students, paid professional development workshops, and valuable job-readiness skills.

### **Pay and Job Outlook**

No data from the Bureau of Labor Statistics is available for Environmental Educators, however generally speaking entry-level seasonal positions may start as low as minimum wage and full-time professionals may make upwards of \$60,000 annually.

## **Environmental Engineer**

### **Career Overview**

Environmental engineers use the principles of engineering, soil science, biology, and chemistry to develop solutions to environmental problems. They are involved in efforts to improve recycling, waste disposal, public health, and water and air pollution control. They also address global issues, such as unsafe drinking water, climate change, and environmental sustainability.

### **A Day on the Job**

Most environmental engineers work full time. Those who manage projects often work more than 40 hours per week to monitor the project's progress, ensure deadlines are met, and recommend corrective action when needed. Environmental Engineers work in a variety of settings because of the nature of the tasks they do. When working with other engineers and with urban and regional planners, environmental engineers typically work in offices. However, they also work at specific sites outdoors when studying, designing or carrying out solutions to environmental problems.



### **Personal Attributes and Skills Needed**

Environmental engineers must possess creativity, critical-thinking and good interpersonal and communication skills. Because environmental engineers sometimes have to design systems that will be part of larger ones, they must be able to foresee how the proposed designs will interact with other components of the larger system. Additionally, environmental engineers must be able to work with others including other engineers, scientists, technicians, businesspeople, lawyers, and others outside their profession. Finally, environmental engineers must be good problem-solvers and be able to develop solutions to complicated issues that involve multiple parts.

### **Education**

Entry-level environmental engineering jobs require a Bachelor's degree. Some colleges and universities offer cooperative programs in which students gain practical experience while completing their education. At some colleges and universities, a student can enroll in a 5-year program that leads to both a Bachelor's and a Master's degree. A graduate degree allows an engineer to work as an instructor at some colleges and universities or to do research and development, and some employers prefer candidates to have a Master's degree. Students

interested in becoming an environmental engineer should take high school courses in chemistry, biology, physics, and math, including algebra, trigonometry, and calculus.

### **Experience and Training**

Employers value practical experience. Therefore, cooperative engineering programs, in which college credit is awarded for structured job experience, can be a great way to start getting experience in the field while earning a degree. Licensure is not required for entry-level positions as an environmental engineer. However, a Professional Engineering (PE) license can be earned later in one's career for those seeking more independence, or to oversee the work of other engineers, sign off on projects, and provide services directly to the public.

### **Pay and Job Outlook**

The median annual wage for environmental engineers was \$83,360 in May 2014. Employment of environmental engineers is projected to grow 12 percent from 2014 to 2024, faster than the average for all occupations.