

# Science Careers in Sustainability

Increasingly, scientists are choosing careers in which they can help create a more sustainable world—one where all people can live healthy, fulfilling lives. From developing new vaccines and delivery mechanisms for tropical diseases, to finding ideal conservation corridors for endangered species, to creating plastics that don't require petroleum products, there are countless ways that you can use your science skills to create a sustainable future.

While this handout aims to provide some of the more interesting sustainability opportunities available for scientists, keep in mind that you don't have to work on renewable energy or conservation biology to make a difference. Creating a sustainable world will take lots of creativity and cooperation, with scientists in all fields working together and working with the community to help solve the complex problems our world is facing. How will you put your science skills to use to create a sustainable world?

## **Geography**

Geographers may serve as *geographic information system (GIS) specialists*, using computer-based map information to evaluate alternative locations for roads, landfills, or other facilities. *Coastal zone managers* plan and manage environmentally sensitive areas, such as marshlands, bays, and river mouths, so they can survive the onslaughts of cities, ports, industries, roads, and thousands of pleasure-seeking tourists. *Area specialists* study specific countries or regions of the world and brief diplomats and other government officials to help the government set policy or take positions on key issues.

## **Sociology**

There are a number of ways that sociologists can use their understanding of human interaction to help create sustainable solutions for the future. Career paths for sociologists include: environmental policy, environmental law, urban planner, environmental outreach and communications, environmental affairs officer, participatory resource management specialist, environmental conflict mediator, college/university sustainability coordinator, sustainable development specialist, non-governmental organization campaign director, and human dimensions scientist. Sociologists may also study the interrelated economic, social and political implications of change to protect the natural ecosystem; social patterns of natural resource and energy use; the social and policy impacts of toxic exposure on human populations and ecosystems; or social factors contributing to environmental pollution and restoration, including racism and environmental justice.

## **Mathematics and Statistics**

Studies of the environment require data on the abundance and location of plants and animals, on the spread of pollution from its sources, and on the possible effects of changes in human activities. The data are often incomplete or uncertain, but statisticians can help uncover their meaning and mathematicians provide models that help find oil reserves, predict storm surge, understand complex biosystems and forecast weather.

In public health, the search for improved medical treatments rests on careful experiments that compare promising new treatments with the current state of the art. Mathematicians work with medical teams to design the experiments and to analyze the complex data they produce. They also develop models both to predict epidemics and to compare possible strategies to combat epidemics.

## **Ecology**

Whether they investigate urban, suburban, rural, forest, desert, farm, fresh water, estuarine, or marine environments, ecologists help us understand the connections between organisms and their environment. *Environmental Consultants* assess the ecological impacts of conservation, development, and industry projects and recommend solutions to environmental problems. *Natural Resource Managers* manage ecological resources for public and private organizations. *Park Naturalists* develop and deliver education programs to students of all ages. *Restoration Ecologists* plan, organize, and carry out programs to reestablish natural ecosystems.

## **Chemistry & Chemical Engineering**

Green chemists and chemical engineers design chemical products and processes that reduce or eliminate the use and generation of hazardous substances. Careers in green chemistry and engineering span the chemical enterprise, cutting across disciplines and sectors, including such varied careers as: formulators of household products and cosmetics, designers of building materials and energy efficient devices, developers of new pharmaceutical agents, and chemistry teachers.

Many chemists and engineers launch small businesses that tap into the innovative technologies achieved through green chemistry and green engineering. The growing issues around global climate change provide new jobs for chemists and engineers within local, state, and federal government, as well as non-governmental organizations. As challenges to sustainable development arise, the opportunities increase for green chemists and chemical engineers to develop solutions.

## **Psychology**

Since sustainability challenges involve group and individual behavior changes, there are many ways that psychologists—trained to study human behavior—can contribute. Some research topics include: the influence of natural and built environmental factors on human behavior; understanding environmental beliefs, attitudes and values; quantifying the psychological benefits people receive from green- and open-space; natural disaster preparedness and resilience; the psychology of risk appraisal and communication; developmental contributions of nature and place; and human relations with other species.

While many careers for psychologists are based in universities, other settings are emerging as platforms for applied and even basic psychological work. Government agencies at national to local levels that are responsible for issues such as air and water pollution control use psychologists, for example, in social marketing. The non-profit / non-governmental organization sector increasingly ask psychologist to help in assessing the value of "ecological services" in preserved areas; tapping the local ecological concepts of a native society as part of a cooperative land management system; or understanding the effects of participation in environmental education programs or of visiting a zoo or aquarium.

## **Biology**

Biologists and other medical professionals play important roles in helping to keep people healthy throughout the world. From developing new vaccines and delivery mechanisms for tropical diseases to finding ways to increase agricultural yields, biologists are at the forefront of fighting illness and malnutrition.

Biologists also work in management and conservation careers to solve environmental problems and preserve the natural world for future generations. *Park rangers* protect state and national parks, help preserve their natural resources, and educate the general public. *Zoo biologists* carry out endangered species recovery programs. In addition, *management and conservation biologists* often work with members of a community such as landowners and special interest groups to develop and implement management plans. *Science advisors* work with lawmakers to create new legislation on environmental protection, ensuring that decisions are based upon solid science. Trained professionals work with the government and other organizations to study and address the *economic impacts of biological issues*, such as species extinctions, forest protection, and environmental pollution.

## **Geosciences**

Geoscientists (geologists, geophysicists, hydrologists, oceanographers, marine scientists, atmospheric scientists, meteorologists, environmental scientists, and soil scientists) gather and interpret data about the Earth and other planets, and use their knowledge to increase our understanding of Earth processes and to improve the quality of human life. *Atmospheric scientists* study weather processes; the global dynamics of climate; solar radiation and its effects; and the role of atmospheric chemistry in ozone depletion, climate change, and pollution.

*Economic geologists* explore for and develop metallic and nonmetallic resources; they study mineral deposits and find environmentally safe ways to dispose of waste materials from mining activities.

*Environmental geologists* study the interaction between the geosphere, hydrosphere, atmosphere, biosphere, and human activities. They also solve problems associated with pollution, waste management, urbanization, and natural hazards, such as flooding and erosion.

## **Engineering**

*Civil engineers* help to create engineered systems to meet human needs for natural resources, industrial products, energy, food, transportation, shelter, and effective waste management while conserving and protecting environmental quality and the natural resource base essential for future development. Civil engineers often specialize in an area such as *water resources* or *environmental protection* or in one aspect such as design, construction, or management of these systems.

*Mechanical engineers* design and manufacture many of the products necessary for creating a sustainable world, from more efficient vehicles and power systems to renewable energy sources.

They also help design products that improve life in developing countries, and redesign products in developed nations to use less material and that are easier to recycle.

*Electrical and computer engineers* help design information infrastructure to connect people working on projects in remote areas. They create networks that allow communities to quickly report disease outbreaks, receive warning of impending natural disasters, and provide farmers or trades people in developing countries access to internet so that they can effectively participate in markets. They also design more environmentally friendly computer chips and circuit boards.

## **General Career and Sustainability Resources:**

Science Careers: [www.sciencecareers.org](http://www.sciencecareers.org)

AAAS Center for Science, Technology, and Sustainability: [www.aaas.org](http://www.aaas.org)

Forum: Science and Innovation for Sustainable Development: <http://sustainabilityscience.org>

## **Other Resources:**

American Chemical Society Green Chemistry Institute: [www.chemistry.org/greenchemistryinstitute](http://www.chemistry.org/greenchemistryinstitute)

Also: <http://acswebcontent.acs.org/careers/descriptions.html>

American Geological Institute: <http://www.earthscienceworld.org/careers/>

American Institute of Biological Sciences: <http://www.aibs.org/careers/>

American Mathematical Society: <http://www.ams.org/employment>

Also: <http://www.math.ucdavis.edu/employ/careers/profiles/abbott>

<http://www.ualr.edu/mathdept/earlycareers/Hartley.html>

<http://e-math.ams.org/ams/mm25-disease.pdf>

<http://e-math.ams.org/ams/mm1-oceans.pdf>

<http://www.mitacs.math.ca/main.php?mid=10000199&pid=158&ciy=2005&cim=3&aid=3>

American Psychological Association Population and Environmental Psychology Division: [www.apa34.org](http://www.apa34.org)

American Society of Civil Engineers: <http://www.asce.org/files/pdf/professional/cetechnicalAreasSummary.pdf>

American Sociological Association Section on Environment and Technology: [www.linfield.edu/soan/et/](http://www.linfield.edu/soan/et/)

American Statistical Association: [www.amstat.org/careers](http://www.amstat.org/careers)

Association of American Geographers: <http://www.aag.org/Careers/>

Ecological Society of America: [www.esa.org/teaching\\_learning/](http://www.esa.org/teaching_learning/)

Engineers for a Sustainable World: <http://www.esustainableworld.org/>



ADVANCING SCIENCE, SERVING SOCIETY