Rachel Louise Carson (marine biologist, writer, and ecologist)

(May 27,1907 – April 14, 1964)

When Rachel Carson published her book “Silent Spring” in 1962 she didn’t expect it to have a huge impact on the world. The title came from the image of a spring which has gone silent because the songbirds are gone. The book was attacked by the chemical industry and Congress held hearings and wrote new laws. The book discussed the effects of pesticides on the population of birds in the United States, specifically, the effects of Dicholorodiphenyltricholoroethane (DDT) on birds and other animals. Scientists have found out that DDT causes eggshell thinning in birds, especially predator birds like bald eagles, by disrupting calcium metabolism, making shells brittle and prone to cracking during incubation by the mother bird. DDT is often metabolized into Dichlorodiphenyldichloroethylene (DDE), which interferes with enzymes that deposit calcium carbonate, resulting in weak eggshells that break easily. This caused the population of birds to decline. After the book was published, public outcry pushed President John F. Kennedy to create a special panel of the President’s Science Advisory Committee to investigate pesticide use. Rachel presented her warnings directly to television audiences with a special interview on CBS Reports in April 1963. Grassroot environmental groups pushed for passage of federal laws protecting the environment. In 1972, after long battles in court, DDT was banned in the United States.

Her science journey began when Rachel Louise Carson was born in Springdale, Pennsylvania, about 17 miles northeast of Pittsburgh. Her parents were Robert Warden Carson and Maria Frazier McLean. The hills of western Pennsylvania were her first classroom. The family was poor and life was hard but little Rachel enjoyed the meadows and fields nearby – they were teaming with insects, and with fireflies on summer nights. Her mother Maria Carson read poetry and nature essays aloud to Rachel. Maria taught her daughter the names of the wildflowers and the stories of constellations. She encouraged Rachel to observe and ask questions about the world around her. Even as a child, Rachel was different. She loved to sit alone under a tree and write in her notebook. She wrote stories about birds and animals. At school, she read books about animals and far-away places. At the age of 10 she was writing stories for local children's magazines. When she was eleven, her story "A Battle in the Clouds" won a prize and was published in *St. Nicholas Magazine,* a highly respected magazine for children. By the time she reached high school, she decided that she would become a writer. She excelled in English and Literature. She often wrote essays that impressed her teachers. When she graduated near the top of her class, she enrolled at the Pennsylvania College for Women (now called Chatham University) in Pittsburgh, on a scholarship.

Rachel enjoyed her writing classes in college but her path to being a writer changed when she enrolled in a required biology course in her sophomore year. The class, taught by Miss Mary Scott Kinker, changed her life. The class included a field trip to a local river, where students collected specimens and studied them under microscopes. Rachel was fascinated! She decided to become a biologist! She wanted to learn

about animals and plants. Then she realized that she did not have to choose between writing and biology. She could merge them and use words to describe the unseen wonders of the natural world! She could write about the oceans, the birds, and other animals.

Friends and families were surprised when she changed her major to biology. A writing profession for women is acceptable, even admirable. But scientists are males and science is not the right profession for a woman! The transition wasn't easy! Rachel lacked the mathematics and chemistry background that most of her classmates have. But she persisted, patiently working through equations and experiments.

She continued writing, contributing articles to the college magazine. By her senior year she had applied for a master's degree program in zoology at Johns Hopkins University, one of the few institutions at the time that admitted women to advanced science programs. In 1929, she graduated *magna cum laude* from Pennsylvania College for Women. The summer before she started graduate school at Johns Hopkins University, Rachel went to Woods Hole, Massachusetts to study at a marine biology lab. When she saw the Atlantic Ocean, she fell in love with the sea, the surf, and the seabirds.

John Hopkins University was filled with ambitious students, mostly men. Rachel's family struggled financially; the Great Depression had begun. Every penny mattered! Rachel took on tutoring jobs and worked as a lab assistant to pay her tuition. She received her master's degree in zoology in 1932. Her studies focused on fish populations in Chesapeake Bay.

As she prepared to take the next step in her career, a Ph.D, disaster struck! The economic collapse of the Great Depression had a great impact on funding for scientific research. Jobs were scarce, especially for women. No one wants to hire a woman biologist!

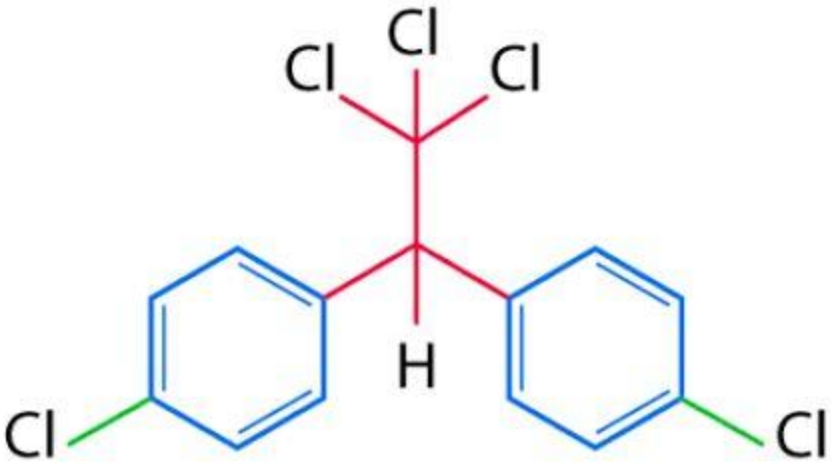
When her father died in 1935, Rachel was desperate for money to support her family. She set aside her ambition for a doctorate and looked for a job. Miss Skinker, her former biology teacher, encouraged her to take the government scientist test. She took the exam in 1936 and outscored all other applicants, but still had no job offers. One day in 1937, the chief of the Bureau of Fisheries (now called U.S. Fish and Wildlife Service) interviewed Rachel. He told her that there were no biologist jobs available but perhaps she may be interested in trying to fix dull radio scripts about sea life. Every other writer tried and failed! Rachel's unique talents began to shine. Her supervisors realized that she has a talent not just for data but communication. She wrote a series of educational radio scripts about the ocean and aquatic life. She wrote about the sea with vivid imagery which left the listeners captivated! They could imagine themselves beneath the waves exploring coral reefs, or swimming with a school of fish. The scripts were a success!

The Bureau of Fisheries then offered her a full-time job as a junior aquatic biologist, one of only two professional women in the staff. When she was assigned to write about the sea for a radio broadcast, her boss was so impressed that he suggested that she send the article to *The Atlantic Monthly* magazine. The magazine printed the article with the title "Undersea". When a book editor read the article, he asked Rachel if she would be interested to write a book about the sea for ordinary readers, not scientists. Thus began Rachel's writing career! In 1941, Rachel published her first book, *Under the Sea Wind: A Naturalist's Picture of Ocean Life.* Unfortunately, the book was published during the time when Pearl Harbor in Hawaii was bombed; so, it was mostly unnoticed.

Rachel kept researching and writing. As a biologist for 15 years, she did work few women have done. She counted deep-sea fish in the dangerous currents south of Nova Scotia, observed reef animals in a special suit with an 84-lb diving helmet off the coast of Florida, tracked alligators atop a rumbling "glades buggy" in the swamps of the Everglades. She worked on her writing in the evening or at weekends. She started to think about various factors which affect the ocean. She wondered what would happen to sea creatures if more and more garbage were dumped in the ocean. What would happen to these creatures if the temperature of the ocean kept rising? In 1951, she published her second book, *The Sea Around Us.* It was very successful and stayed on top of the bestseller list for 86 weeks, a great achievement for a book about science. It was translated into 28 languages around the world. *The Sea Around Us* won the National Book Award for Nonfiction and the John Burroughs Medal. Rachel received two honorary doctorates. Because of the success of *The Sea Around Us*, her first book *Under the Sea Wind* was republished. It also became a bestseller.

A year later she quit her job at the Bureau of Fisheries to write full-time. She published her third book, *The Edge of the Sea,* in 1955. She became famous and people demanded her autograph everywhere she went: elevators, beauty parlors, taxicabs, and restaurants.

In the 1950s, America was riding a wave of prosperity and technological triumph. Cars, televisions, plastics, and pesticides were supposed to improve the lives of all Americans. DDT was credited with saving the lives of countless soldiers during the war by stopping the spread of malaria and typhoid. After the war, DDT was used by civilians for killing all kinds of pests. Planes flew over fields to kill pests that destroy crops. Trucks rolled through suburban neighborhoods with DDT sprays. DDT was seen as a sign of progress, with families enjoying pest-free picnics, farmers harvesting bountiful crops, mothers protecting their children from disease-carrying insects.



Dichlorodiphenyltrichloroethane

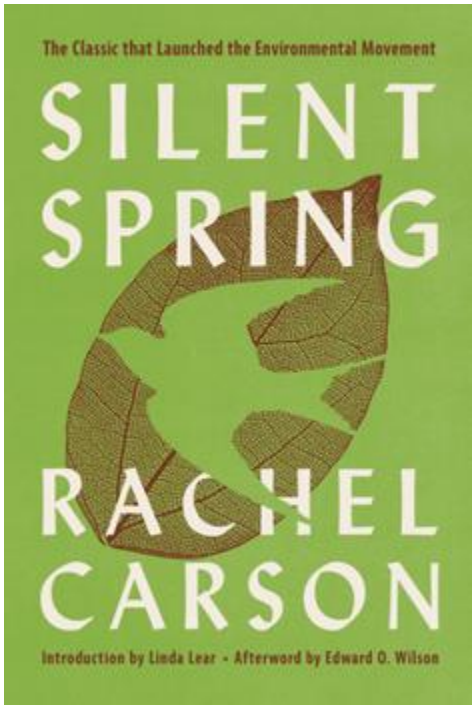
Rachel had so many readers writing to her! One of these readers, a friend from Massachusetts, told her about a routine spraying of DDT in her neighborhood to kill mosquitoes. Days later, the neighborhood was silent. Robins were found dead on the lawns. Fish floated belly-up in ponds.

Another letter from a wildlife refuge worker in the Midwest wrote that after crop-dusting in nearby fields, entire colonies of songbirds disappeared. Rachel took note. But as a scientist she needed real proof that DDT was causing all these problems. Then came the government reports. They documented fish kills, contamination of waterways and strange patterns of illness among farm workers. Industry officials insisted that pesticides were safe when “properly used”. Rachel saw a different story! DDT was not only killing pests, but it was also infiltrating entire ecosystems. Unlike older, natural pesticides that broke down quickly, DDT lingered in the environment for years. It accumulated in animal tissue, moving up the food chain in increasing concentration, a process called biomagnification. What began as a light mist on a crop duster could end in the breast milk of a human mother or in the eggshells of a bald eagle.

Rachel began gathering information quietly. She traveled to wildlife refuges, interviewed scientists and read all government reports accessible to her. Her notebooks filled with observations: dates, locations, species affected, spraying schedules. It was slow, painstaking work which she did mostly in secret. At this time, she was also diagnosed with breast cancer. Treatment left her exhausted and in pain all the time. But she persisted! She understood that she would be taking on the chemical industry with its millions of dollars and legions of lobbyists.

By the late 1950s Rachel's house in Silver Spring, Maryland has become a combination library and detective office. Rachel approached the research with the precision of a scientist and the determination of an investigative journalist. She studied bird population records, tracing the declines to nearby pesticide spraying campaigns. She read medical reports linking chemical exposures to cancer clusters among farm workers and families. She read laboratory studies showing how DDT and related compounds accumulated in fat tissues and thinning the eggshells of predators like the bald eagle.

Even before the manuscript was finished, word of Rachel's new book began to spread. The pesticides manufacturers began attacking the book. Some of Rachel's friends told her to be careful. She was up against companies with enormous wealth and with scientists in their payroll. Their advertising budget would be big enough to sway public opinion.



The June,1962 issue of *The New Yorker* magazine carried the first excerpt from Rachel's new book *Silent Spring.* The first chapter described an imaginary town where spring had come without birdsongs, where flowers bloomed but no bees visited and where streams ran lifeless and silent. This jolted readers all over the country! By September 1962 the book was published; within days it was on the top of the bestseller list. The public's responses were varied. Some readers were grateful that Rachel was giving voice to their private fears, and others were angry at the government for negligence. The chemical industry called Rachel "hysterical" and "unqualified". They said that her degrees in biology and zoology did not give her the right educational background to say that DDT is harmful. One chemical company executive even suggested that the book was part of a communist plot to undermine American agriculture. Pamphlets proclaiming that pesticides are safe were distributed all over the nation. They claimed that Rachel has twisted the facts

to scare the public. Scientists who worked for the chemical industry wrote rebuttals casting doubts on her research. Some of the attacks became personal. They called her an “emotional spinster”. They said that because she did not have a husband or children, she was incapable of understanding real-world needs. Some even said that her breast cancer (only few people know about it at that time) made her irrational. Rachel knew there would be resistance from the industry, but she could not have predicted the ferocity of that resistance. Despite this resistance, Rachel remained calm and measured. In interviews, she would calmly ask the reporters to look at the evidence. She became the only voice of reason against powerful corporations.

Rachel’s illness worsened and she died on April 4, 1964. She did not live to see her legacy. In the months after her death, policymakers moved forward with legislation. Several states introduced new regulations limiting pesticide spraying. The federal government launched broader investigations into chemical safety.

Conservation organizations saw unprecedented growth in membership and funding. For the first time, many Americans saw environmental protection as a moral and civic duty. On December 2,1970, President Richard Nixon signed an Executive Order creating the Environmental Protection Agency (EPA). That same year, on April 22nd, millions of Americans participated on the first Earth Day, a nationwide celebration and protest that drew attention to environmental issues. The environmental movement had been awakened! On June 14, 1972, DDT was banned in the United States.

Rachels' influence went global! *Silent Spring* was translated into dozens of languages and environmental movements blossomed worldwide! Countries began reassessing the use of pesticides. International organizations like the United Nations did research on chemical pollution and biodiversity loss. Schools named after Rachel Carson appeared in multiple countries. Her critics still maintain that Rachel had overstated the dangers of pesticides. Some claim that restrictions on DDT contributed to malaria deaths in developing countries- a charge fiercely debated by scientists and public health officials.

In the 1980s and 1990s, the results of Rachel's influence were clearly visible. The bald eagle, once on the brink of extinction, began to recover as pesticide levels dropped. Eagles returned to nesting grounds that have been empty for decades. Other bird species also rebounded, their songs filling the air again in the spring.

HER LEGACY

Rachel wrote many books about the sea and the environment. These books are still as relevant as ever as we fight pollution, global warming, and rise in sea levels.

The publication of her book *Silent Spring* led to the ban of DDT in the US.

Her influence helped create the EPA and environmental movements all over the world.

In March 1963, she was named Conservationist of the Year by the National Wildlife Federation.

In 1963, she also received the Isaak Walton League of America (IWLA) conservation award for her groundbreaking work in environmental conservation.

The National Audubon Society awarded her the Audubon Medal, the group's highest award for conservation achievements. Rachel was the first woman to receive this award.

She also received the prestigious Cullum Geographical Medal from the American Geographical Society for her profound impact on environmental awareness through *Silent Spring,* a rare honor for a woman at that time.

In 1963, she was one of only four women elected to the American Academy of Arts and Letters.

A number of conservation areas have been named for Rachel as well. Between 1964 and 1990, 650 acres (263 ha) near Brookeville in Montgomery County, Maryland were acquired and set aside as the Rachel Carson Conservation Park. In 1969, the Coastal Maine National Wildlife Refuge became the Rachel Carson National Wildlife Refuge.

In 1973, she was inducted in the National Women's Hall of Fame.

In 1975, Rachel's birthplace and childhood home in Springdale, Pennsylvania, became the Rachel Carson Homestead and was included in the National Register of Historic Places. The Rachel Carson Homestead Association was also created that year to manage the Rachel Carson Homestead.

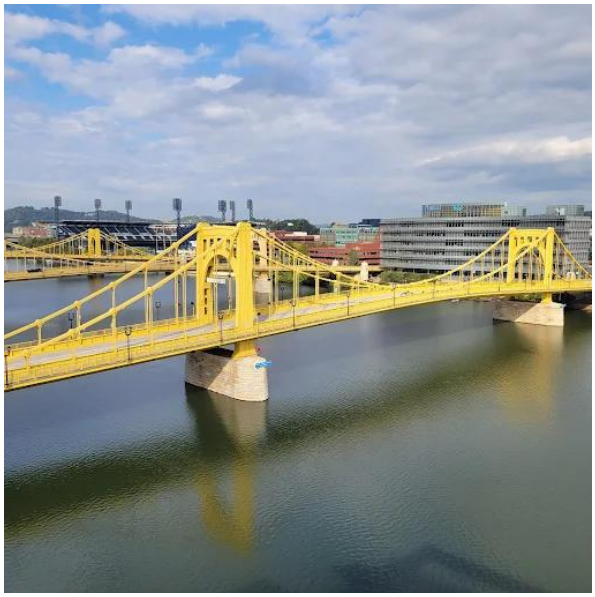
In the same year, the Rachel Carson Trail, a 46.1 miles (74 km) hiking trail near Pittsburgh was created and maintained by Rachel Carson Trails Conservnacy.

On June 9, 1980, President Jimmy Carter awarded Rachel posthumously the Presidential Medal of Freedom, the highest civilian honor in the United States.

In 1981, a stamp in her honor was issued by the United States Post Office as part of the Great Americans series postage stamps.

In 1991, her home in Colesville, Maryland where she wrote the book Silent Spring was named a National Historic Landmark.

Rachel is also a frequent namesake for prizes awarded by philanthropic, educational, and scholarly institutions. The Rachel Carson Prize, founded in Stavanger, Norway in 1991, is awarded to women who have contributed to the field of environmental protection.



On April 22,2006 the Ninth Street Bridge in Pittsburgh was renamed the Rachel Carson Bridge in her honor.

The Pennsylvania Department of Environmental Protection State Office Building in Harrisburg, Pennsylvania was named in honor of Rachel.

In 2009, the Rachel Carson Center for Environment and Society was founded in Munich, Germany. It is an international, interdisciplinary center for research and education in the environmental humanities and social sciences. It was established as a joint initiative of Munich's Ludwig-Maximilians Universität and the Deutches Museum with support from the German Federal Ministry of Education and Research.

Elementary schools in Gaithersburg, Maryland, Sammamish, Washington and San Jose, California were named in her honor. The same was done for the middle schools in Beaverton, Oregon, Queens, New York, and Herndon, Virginia. A high school in Brooklyn, New York was also named in her honor.

Two research vessels have sailed in the United States bearing the name R/V *Rachel Carson*. One is on the west coast, owned by Monterey Bay Aquarium Institute and

the other is on the east coast, operated by the University of Maryland Center for Environmental Science.

On July 14, 2013, the Rachel Carson sculpture was unveiled in Woods Hole, Massachusetts.

Google made a doodle for Rachel on her 107th birthday, May 27, 2014.

The centennial of Rachel's birth occurred in 2007. On Earth Day, (April 22), *Courage for the Earth: Writers, Scientists, and Activists Celebrate the Life and Writing of Rachel Carson* was released as "a centennial appreciation of Rachel Carson's brave life and transformative writing." It included 13 essays by environmental writers and scientists. The photo on the right shows the celebration of her centennial on May 7,2007 in Springdale, Pennsylvania.

In 2016, the University of California, Santa Cruz named one of its colleges Rachel Carson College. Before that the college was known as College Eight. Rachel Carson College is the first college at the university to have a woman's name.

It is dedicated to exploring the connections between environment and society through education, research and action. Following the legacy of Rachel Carson, the college prepares students to think critically, engage collaboratively, and help build a more sustainable and just world.

HER SCIENCE JOURNEY

1907 - Rachel Louise Carson was born on May 27, 1907, in Springdale, Pennsylvania

1918 - Rachel's first story "A Battle in the Clouds" was published in St. Nicholas Magazine

1929 - Rachel graduated magna cum laude at the Pennsylvania College for Women

1932 - Received her MS degree in Zoology from Johns Hopkins University

1935 - Rachel's father Robert Carson died

1936 - She took the government exam where she outscored all the other applicants

1937 - Started working at the Bureau of Fisheries

- Her article "Undersea" was published in the Atlantic Monthly magazine

1941 - Her first book *Under the Sea Wind* was published by Simon and Schuster

1951 - She wrote her second book *The Sea Around Us.* It was very successful and stayed on top of the bestseller list for 86 weeks, a great achievement for a book about science. It was translated into different languages around the world.

1952 - *The Sea Around Us* won the National Book Award for Nonfiction and the John Burroughs Medal.

- Received two honorary doctorate degrees
- Rachel quit her job at the Bureau of Fisheries to write full-time

1955 - Published her third book *The Edge of the Sea*

1958 - Rachel's mother Maria died.

1962 - Published Silent Spring

1963 - Was named Conservationist of the Year by the National Wildlife Foundation

- Received the Isaak Walton League of America (IWLA) conservation award for her groundbreaking work in environmental conservation

- Received the Audubon Medal

- Received the prestigious Cullum Geographical Medal from the American Geographical Society for her profound impact on environmental awareness

- She was one of only four women elected to the American Academy of Arts and Letters.

1964 - Rached died at the age of 56 years old.

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