# Rachel Carson

# Pen Against Poison

*Then a strange blight crept over the area and everything began to change. ... There was a strange stillness. ... The few birds seen anywhere were moribund; they trembled violently and could not fly. It was a spring without voices. On the mornings that had once throbbed with the dawn chorus of scores of bird voices there was now no sound; only silence lay over the fields and woods and marsh.*

Rachel Carson, *Silent Spring*

Table of Contents


A Quiet Woman Whose Book Spoke Loudly 1
By Phyllis McIntosh

A Book That Changed a Nation 5
By Michael Jay Friedman

A Persistent Controversy, a Still Valid Warning 8
By May Berenbaum

Rachel Carson's Legacy 11
A photo essay

Bibliography 14
Additional readings and Web pages


Cover photo: Rachel Carson at her microscope, 1951. Above: Baby wrens call for their supper.

# A Quiet Woman Whose Book Spoke Loudly

By Phyllis McIntosh

A shy, unassuming scientist and former civil servant, Rachel Carson seemed an unlikely candidate to become one of the most influential women in modern America. But Carson had two lifelong passions–a love of nature and a love of writing–that compelled her in 1962 to publish *Silent Spring*, the book that awakened environmental consciousness in the American public and led to an unprecedented national effort to safeguard the natural world from chemical destruction.

As a trained scientist, Carson meticulously documented her conclusions about the long-term dangers of pesticides; as a skilled writer, she communicated those dangers in language the average reader could understand.

*Renowned author Rachel Carson at her home near Washington, D.C, March 1963.*

## A Born Naturalist

Rachel Carson was born 100 years ago in a small town in western Pennsylvania. Even though she grew up far from the seacoast, she recalled that even as a child she felt "absolute fascination for every thing related to the ocean." She also was determined that one day she would be a writer.

As a student at Pennsylvania College for Women, she majored in English until her junior year, when she switched to biology–a bold move at a time when few women entered the sciences. She went on to graduate cum laude from Johns Hopkins University with a master's degree in marine biology in 1932. While teaching zoology at the University of Maryland, Carson spent summers studying at the Woods Hole Marine Biological Laboratory in Massachusetts, where she saw her beloved sea for the first time.

She began her civil service career writing science radio scripts for the U.S. Bureau of Fisheries and in 1936 was offered a job as an aquatic biologist, only the second women ever hired by the agency in a professional position. Carson spent 15 years in the federal government writing educational materials about conservation and natural resources and editing scientific articles. By the time she retired in 1952, she had risen to editor-in chief of publications for the U.S. Fish and Wildlife Service.

*Clockwise from upper left: Rachel Carson as a young girl; sits on her mother's lap, circa 1910, next to sister Marian and brother Robert; works on her studies in Woods Hole, Massachusetts; one of Carson's many drawings of plants and animals.*

While with the government, Carson continued to write independently about her love of the sea. In 1941, she published her first book, *Under the Sea-Wind*, a naturalist's look at the struggle for life in the sea and along its shores. A second book, *The Sea Around Us*, which described the processes that formed the earth and the oceans, became a best-seller and won her worldwide acclaim.

The financial success of her books made it possible for Carson to retire from the government and build a cottage on the coast of Maine. Continuing her research on the sea, she once boarded a trawler and sailed to the rough waters of the Georges Banks fishing grounds off the Massachusetts coast. Her third book, *The Edge of the Sea*, a guide to marine life, was published in 1955.

*Above: Carson, shown here in 1950, was already starting to be known as an author of popular books about sea life. Below: An aircraft sprays DDT to prevent ticks on these sheep in Oregon in 1948; years later Carson wrote her most famous book about the misuse of DDT.*

## A Crusading Scientist

Although most of her writing focused on the sea, Carson had long been concerned about environmental damage from overuse of chemical pesticides and as early as 1945 had tried unsuccessfully to sell an article about pesticide testing to *Reader's Digest* magazine. In 1958, with evidence mounting about the hazards of DDT and other pesticides, Carson was moved by a letter she received from friends on Cape Cod, Massachusetts, describing how aerial spraying of DDT had killed numerous birds on their private land.

She resolved to alert the public to the dangers and, once again unable to sell a magazine article on the subject, set to work on *Silent Spring*. Over the next four years, she meticulously researched the book and, anticipating sharp criticism from chemical companies, compiled 55 pages of sources and an extensive list of experts who had reviewed her manuscript.

When the first installment of the book appeared in the *New Yorker* magazine in summer 1962, the chemical industry, as expected, decried her as a "hysterical woman." The book quickly found favor with the public, however, especially after a major television network aired a special about pesticides that featured an interview with a calm, reasoned Carson.

In addition to TV appearances and interviews, Carson testified before several congressional

*Carson testifies at a 1963 Senate hearing on pesticides, where she advocated creating a government regulatory agency for pesticides.*

committees and called for establishment of a "Pesticide Commission" or some type of regulatory agency to protect people and the environment from chemical hazards.

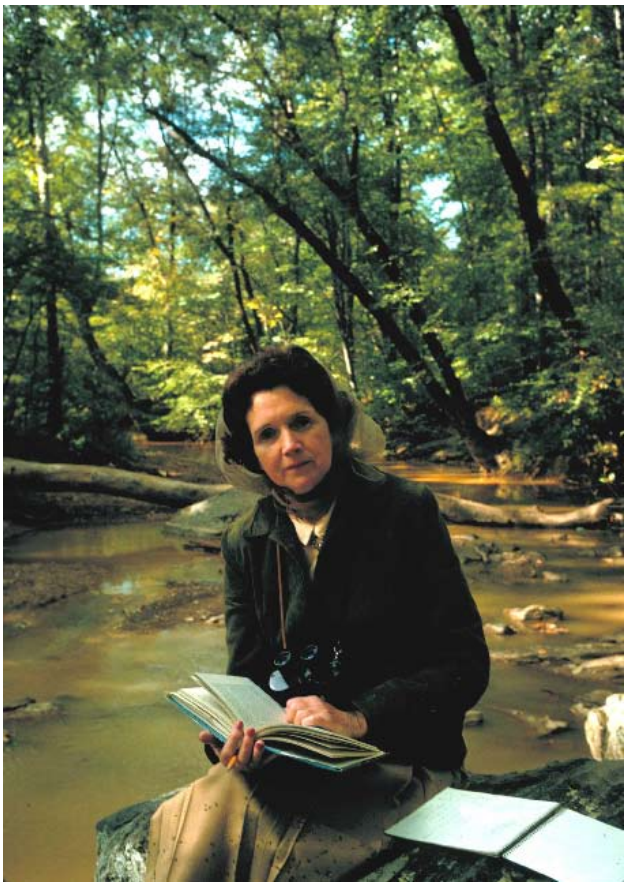
## Lasting Legacy

Seven years later, in 1970, Congress created the Environmental Protection Agency, a direct result of the environmental movement sparked by *Silent Spring*. In 1972, the government banned DDT, the pesticide that had helped push America's national symbol, the bald eagle, and other birds to the brink of extinction.

Few people knew at the time that while Rachel Carson was writing *Silent Spring* and enduring the controversy that followed its publication, she was waging a losing battle against breast cancer. In April 1964, at age 56, she died at her home in Silver Spring, Maryland, just outside Washington, D.C., never knowing of the landmark legislation that resulted from her work.

"Now I can believe that I have at least helped a little," she had written modestly to a friend in 1962. "It would be unrealistic to believe one book could bring a complete change." She could not have been more wrong. As Carson biographer Linda Lear has noted: "In the face of personal attack, and in spite of being gravely ill, Rachel Carson provided a compelling example of the power of the single individual to bring about change."

*Phyllis McIntosh, a former contributing editor of* National Wildlife *magazine, frequently writes about health issues.*



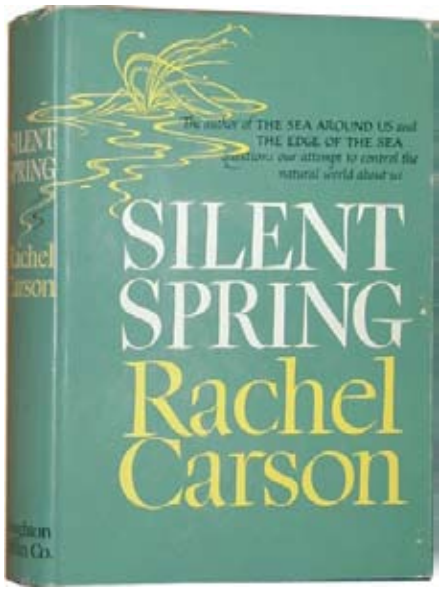
*Photographed in Maine a year before her 1964 death from breast cancer, Carson did not realize the extent of the movement her book started.*

# A Book That Changed a Nation

## By Michael Jay Friedman

In 1992, a panel of notable Americans offered their choices for the single book published during the previous half century that most profoundly influenced the thoughts and actions of humankind. More panelists cited Rachel Carson's *Silent Spring* than any other title.

*Silent Spring's* lasting power to inspire flows less from Carson's diligent research—even before publication, critics attacked some of her findings—but rather from its elegant prose, effective presentation, and fortuitous timing. *Silent Spring* focused the attention of millions, in America and then throughout the world, on an idea they were increasingly prepared to consider: that the indiscriminate use of pesticides threatened profoundly both the health of mankind and that of the world in which he lived.




*A first edition of* Silent Spring*, now valued at $500. Its famous "Fable for Tomorrow" is excerpted on a National Park Service Web page at* ***http://planning.nps.gov/wilderness/idea61.cfm****.*

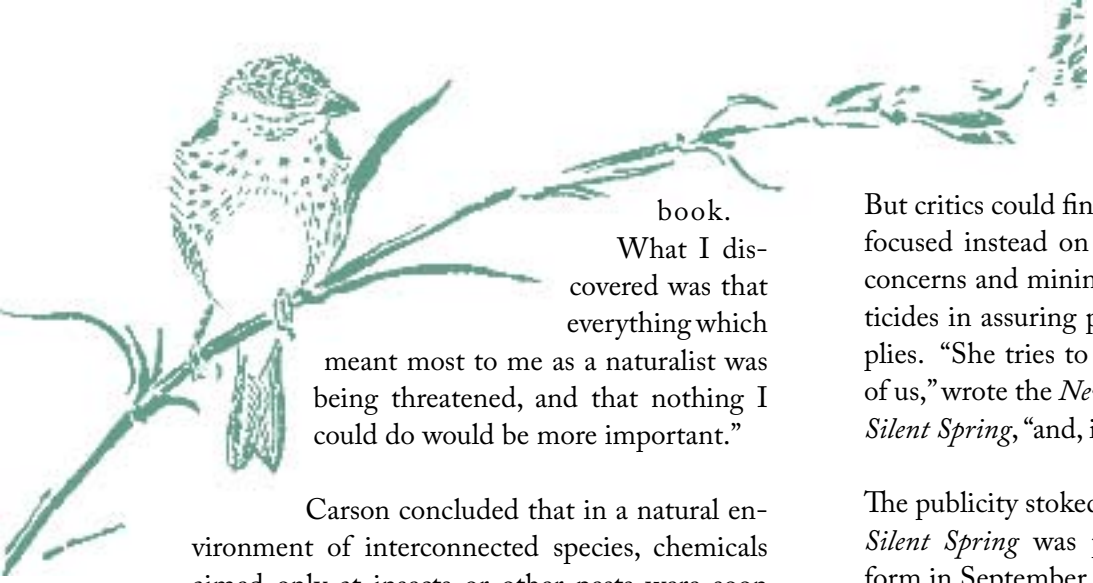
As Yale University historian Daniel J. Keveles has written: "Carson's book probably did more than any other single publication or event to set off the new environmental movement that emerged in the Sixties."

Only a few works have similarly catalyzed American public opinion as a force for change. Carson's impact compares with that of Thomas Paine, whose 1776 pamphlet *Common Sense* spurred popular support for American independence from Great Britain. American works of comparable influence might also include *Uncle Tom's Cabin* (1852) by Harriet Beecher Stowe, which energized the struggle against slavery, and *The Jungle* (1906) by Upton Sinclair, which described unhealthful meatpacking practices and sparked the passage of federal food inspection laws.

### Toxic Connections

Rachel Carson had long suspected that increasingly powerful chemical pesticides were being used carelessly, and she feared their impact on the environment. In 1958, Carson's friends Stuart and Olga Huckins propelled her investigations. The Huckinses owned a two-acre bird sanctuary near Duxbury, Massachusetts. After the government doused it with pesticides as part of a mosquito eradication program, many native songbirds perished, their nesting places, ponds, and birdbaths contaminated.

For the next four years, Carson consulted with scientific experts. "The more I learned about the use of pesticides, the more appalled I became," she later said. "I realized that here was the material for a



book. What I discovered was that everything which meant most to me as a naturalist was being threatened, and that nothing I could do would be more important."

Carson concluded that in a natural environment of interconnected species, chemicals aimed only at insects or other pests were soon ingested by other organisms and passed up the food chain. After the city of Detroit sprayed insecticide on local elm trees, Carson observed, it subsequently collected the dead bodies of DDT-contaminated robins. The birds had feasted on earthworms that had in turn ingested fallen leaves from the sprayed trees.

"As few as 11 large earthworms can transfer a lethal dose of DDT to a robin," Carson wrote. "And 11 worms form a small part of a day's rations to a bird that eats 10 to 12 earthworms in as many minutes."

About half of Carson's manuscript appeared in June 1962 over three consecutive issues of the *New Yorker* magazine. The excerpts ignited a national controversy. The U.S. Department of Agriculture received many letters expressing "horror and amazement" that DDT and other chemical "elixirs of death" were in common use.

Asked whether the U.S. government was investigating the use of DDT, President John F. Kennedy replied, "Yes ... particularly since Miss Carson's book."

Much of the chemical industry saw *Silent Spring* as a threat. "Our members are raising hell," one pesticide trade association divulged. The *New York Times* reported that "some chemical concerns have set their scientists to analyze Miss Carson's work line by line."

But critics could find little factual error. Criticism focused instead on how Carson dramatized her concerns and minimized the real benefits of pesticides in assuring plentiful, affordable food supplies. "She tries to scare the living daylights out of us," wrote the *New York Times* book reviewer of *Silent Spring*, "and, in large measure, succeeds."

The publicity stoked public demand for the book. *Silent Spring* was published in complete book form in September 1962, chosen as the Book-of-the-Month Club's October selection, and quickly emerged as a runaway bestseller. The CBS television network broadcast an hour-long documentary about the book.

## A Larger Truth

As Carson's critics understood, *Silent Spring* possessed an emotional power that overcame objections to specific bits of Carson's argument. Even as *Time* magazine argued that "many of the scary generalizations ... are patently unsound," most readers concluded that Carson understood and depicted accurately a larger truth: that mankind's growing reliance on deadly chemicals carried real and not fully understood costs.

Few readers could resist Carson's literary skill. "There was once a town in the heart of America where all life seemed to live in harmony with its surroundings," she wrote:

*Then a strange blight crept over the area and everything began to change. ... There was a strange stillness. ... The few birds seen anywhere were moribund; they trembled violently and could not fly. It was a spring without voices. On the mornings that had once throbbed with the dawn chorus of scores of bird voices there was now no sound; only silence lay over the fields and woods and marsh.*

In May 1963, President Kennedy's Science Advisory Committee released a 43-page report that called for limits on the use of pesticides. Kennedy immediately ordered implementation of

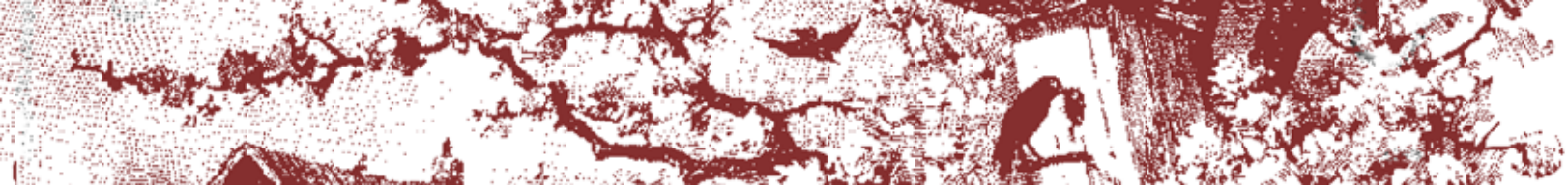
*This wetland marsh is part of the Rachel Carson National Wildlife Refuge, which comprises 10 parcels of land scattered across about 80 kilometers of Atlantic coastline near Carson's summer home in Maine.*

its recommendations, which included an end to some Department of Agriculture spraying programs and a Food and Drug Administration (FDA) review — "as rapidly as possible" — of tolerance levels for pesticide residue in the food supply. The report also acknowledged that "until publication of *Silent Spring* by Rachel Carson, people were generally unaware of the toxicity of pesticides."

*Silent Spring* proved a hugely significant catalyst for measures protecting the natural environment in the United States and beyond. In 1972, the FDA banned nearly all uses of DDT in the United States (many believe that, properly used, the chemical affords benefits in malaria-plagued nations), and new laws limited commercial pesticide use to properly trained "certified applicators."

Rachel Carson lived only one and a half years beyond *Silent Spring's* publication, not long enough to witness its full contribution to the rebirth of environmental consciousness, but enough to know she had made a difference. "I have felt bound by a solemn obligation to do what I could," she wrote a friend. "But now I can believe that I have at least helped a little."

*Michael Jay Friedman is a staff writer with the U.S. State Department's Bureau of International Information Programs.*



# A Persistent Controversy, a Still Valid Warning

## By May Berenbaum

Probably few people today remember the best-selling nonfiction book of 1962 despite the scandal that surrounded it. The book, a diet guide titled *Calories Don't Count,* sold more than two million copies. Its author, Herman Taller, was spectacularly convicted of mail fraud, drug violations, and conspiracy charges five years later over unsubstantiated claims regarding the efficacy of safflower-oil capsules in mitigating the effects of unfettered carbohydrate-free calorie intake.

Although it didn't sell nearly as well, another nonfiction book published that year has had a much more lasting impact; its title, *Silent Spring,* is recognizable today, and its author, already in 1962 a best-selling popular science writer, remains a household name 43 years after her death. Among the book's legacies are heightened public concern about the environmental consequences of pesticide abuse, including strengthened opposition to one pesticide in particular, the chlorinated hydrocarbon DDT, and more broadly a revitalized and empowered environmental movement.

*Decades ago DDT was used indiscriminately, including in aerosol cans for spraying against houseflies.*

The book's core message—that over-reliance on a particular pest-control strategy could have adverse environmental effects—was hardly novel. Indeed, it was well documented in the entomological journals of the time. But Carson, an inspired and gifted writer, explained this idea in terms the general public could comprehend and, more importantly, feel. Spraying to eliminate insects or other target species, she explained, also kills birds and other nontarget organisms, even as the target species evolves resistance to the chemicals. Although aimed at a crop pest, a pesticide can inadvertently contaminate earthworms, which in turn if eaten in sufficient quantity can kill robins. Without birdsong, a silent spring ensues.

The public took her words to heart. Less than a year after *Silent Spring* first appeared serialized in the *New Yorker* magazine, more than 40 bills aimed at controlling use of DDT and other synthetic organic insecticides had been introduced in state legislatures across the United States. In 1972, eight years after Carson's death, the newly established Environmental Protection Agency banned the domestic use of DDT.

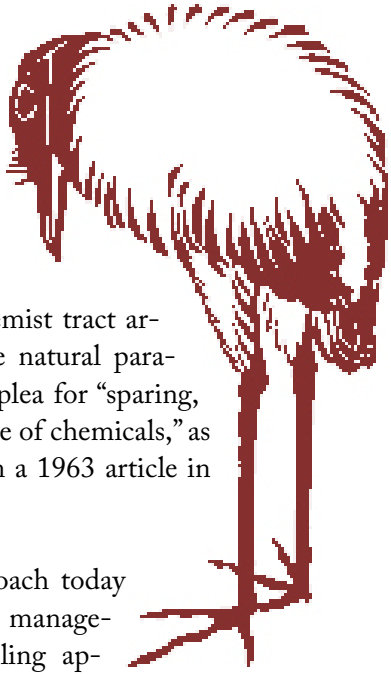
## Message Misunderstood

*Silent Spring* quickly proved a controversial book. The pesticide industry and other supporters of chemical controls of pests reacted swiftly and negatively to its publication. They branded Carson an irresponsible hysteric whose extremist views and selective presentation of scientific evidence threatened the health and welfare of the nation.

Even today Rachel Carson's name is a lightning rod for chemical pesticide supporters. Recent efforts to reintroduce DDT to control disease-carrying mosquitoes in malaria-ravaged parts of Africa have returned *Silent Spring* to center stage. The resulting often intemperate debate eerily mirrors the controversies of a half-century ago.

Oddly enough, many people on both sides of the debate still don't quite understand the central message of *Silent Spring*. Carson was no lover of mosquitoes, or of insects in general, and in fact never advocated abandoning chemical control methods. On page 12 of *Silent Spring* she unambiguously writes, "It is not my contention that chemical insecticides must never be used. I do contend that we have put poisonous and biologically potent chemicals indiscriminately into the hands of persons largely or wholly ignorant of their potential for harm."

Indeed, in the context of malaria control, she argued that DDT users should "spray as little as you possibly can" rather than "spray to the limit of your capacity."



*Silent Spring* was no extremist tract arguing for a chemical-free natural paradise; it was a compelling plea for "sparing, selective and intelligent use of chemicals," as she wrote less famously in a 1963 article in *Audubon* magazine.

This "informed use" approach today underlies "integrated pest management" (IPM), the prevailing approach for controlling pests of all descriptions. IPM, as the name suggests, integrates a number of useful strategies—chemical, cultural, and biological—into an ecologically sound, socially acceptable, and economically viable program.

*In recent times pesticides have been used with more discretion, as demonstrated by these Indonesian workers spraying mosquito repellent after the 2004 tsunami.*

Carson's message was one of moderation. It was hardly radical—indeed its origins date back to ancient Greece—but it should resonate today in any discussion of environmental technology. For that matter, it applies equally well to ongoing and still controversial discussions of calories and weight control.

## Research Continues

In the half-century since *Silent Spring* first appeared, knowledge of the toxicological and environmental effects of synthetic organic insecticides has grown, much of it acquired in studies inspired by Carson and those who embraced her message. DDT, the first and by far the most infamous of the chlorinated hydrocarbons, remains both newsworthy and controversial.

As it turns out, the causative links between DDT and cancer asserted by Carson have proved difficult to confirm, but cancers for which a causative factor has been definitively documented, such as lung cancer and smoking, remain the exception. As for ecosystem effects, epidemiological and animal studies have confirmed links between DDT exposure and reproductive disorders, although DDT is hardly alone in this attribute; new, more sophisticated analyses have revealed that many synthetic compounds and naturally occurring compounds disrupt human endocrine function.

*Today the informed use of insecticides allows them to be applied to kill or repel malaria-transmitting mosquitoes, as here in Zanzibar.*

Insect resistance to DDT, a major problem pointed out by Carson, and often forgotten in reexaminations of her central thesis, remains a problem a half-century later, even where DDT has not been used in years. This resistance can render DDT use ineffectual, as it already did in Carson's era for many different insect species. But then again, insects have evolved similar resistance against just about every other form of pest control, including crop rotation. And some new findings about DDT have even softened its image as the ultimate environmental pollutant; it degrades much more rapidly than expected, for example, in the warm, moist tropical environments where its use to combat malaria is most needed.

One thing about DDT that hasn't changed in the past half-century is its price; it remains one of the cheapest insecticides available. Its relatively low threat of acute toxicity to mammals and its affordability make DDT an appealing alternative for controlling insects that carry human diseases in desperately impoverished and disease-plagued regions of the world.

It's impossible to know what Rachel Carson would say today about the wisdom of re-deploying DDT in areas where other pest control measures have failed miserably, either due to cost, improper use, or resistance. It's likely, though, that whatever she advocated would be based on a careful examination of all of the evidence published since *Silent Spring*, consistent with her plea for "intelligent use of chemicals." Whatever her position, it likely would be presented in the same elegant, compelling prose that changed history.

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# The Legacy of Rachel Carson

## A Photo Album

*These bald eagle chicks, raised by volunteers, were hatched from eggs retrieved from wild nests on Santa Catalina Island off the California coast where DDT contamination still persists.*

Rachel Carson's legacy amounts to more than a few books and articles, more even than the U.S. ban on DDT. In the 100th anniversary year of Carson's birth in May 1907, her works are recognized as crucial building blocks for the environmental movement aimed at preserving the natural environment through sustainable use of the earth's resources, a movement that has achieved persistent public support and political clout.

*From top: The bald eagle is a species now recovered from the threat of extinction; Carson pages through her most famous book; people in Philadelphia celebrate the first Earth Day, 1970; President Nixon watches the swearing-in of William Ruckelshaus, first administrator of the Environmental Protection Administration, in 1970.*

*From top: A cedar waxwing catches fruit; inset photo, the heavily polluted Cuyahoga River in Cleveland caught on fire one day in 1969; now the river, shown in 2004, is cleaned up sufficiently for removal from the endangered rivers list; International Earth Day 2002 is observed in Katmandu, Nepal.*

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*In the 100th anniversary year of her birth, Rachel Carson is being honored online by the U.S. Fish and Wildlife Service, where she worked for 15 years. The main Web page,* Rachel Carson: A Conservation Legacy, *http://www.fws.gov/rachelcarson, links to a number of features:*

A short video at http://www.fws.gov/rachelcarson/Rachel Carson384K_Stream.wmv
Carson's *Conservation in Action* series of pamphlets
An online Rachel Carson book club http://rcbookclub.blogspot.com
Rachel Carson National Wildlife Refuge Web site http://www.fws.gov/northeast/rachelcarson
A discussion of DDT http://www.fws.gov/contaminants/Info/DDT.cfm
A Rachel Carson fact sheet http://www.fws.gov/rachelcarson/RC_Conservation_Legacy.pdf

## Web Sites


*Excerpts from Writings of Rachel Carson*
http://www.fws.gov/northeast/rachelcarson/excerpts.html

*Frontline: Fooling with Nature*
An essay about how Carson's book *Silent Spring* was instrumental in the United States' banning DDT.
http://www-c.pbs.org/wgbh/pages/frontline//////shows/nature/disrupt/sspring.html

*NASA Earth Observatory*
A short biography of Carson by Brian Payton.
http://earthobservatory.nasa.gov/Library/Giants/Carson/printall.php

*National Humanities Center*
Links to Web sites about Carson and *Silent Spring*.
http://www.nhc.rtp.nc.us/tserve/nattrans/ntwilderness/wildernesslinkscar.htm

*Natural Resources Defense Council "The Story of 'Silent Spring'"*
An article on the book and chemical companies' attacks on Rachel Carson.
http://.nrdc.org/health/pesticides/hcarson.asp

*Online Ethics Center for Engineering and Science*
An article describing Carson as a moral exemplar for raising public consciousness about the environment. Contains a description of her "campaign," a chronology, and supporting documents.
http://onlineethics.org/moral/carson/index.html

*Rachel Carson and the Awakening of Environmental Consciousness*
An essay by biographer Linda Lear with teaching materials and links to additional resources.
http://www.nhc.rtp.nc.us/tserve/nattrans/ntwilderness/essays/carson.htm

*RachelCarson.org*
A Web site devoted to Carson's life and legacy, maintained by biographer Linda Lear. Contains a biography, links, and many resources for information about Carson.
http://www.rachelcarson.org

*The TIME 100*
"Before there was an environmental movement, there was one brave woman and her very brave book."
http://www.time.com/time/time100/scientist/profile/carson.html

*Yale University Beinecke Rare Book and Manuscript Library*
(type "Rachel Carson" into the Dialog box)
Access to photos from Rachel Carson's personal papers.
http://beinecke.library.yale.edu/dl_crosscollex/default.htm

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# Legacy

**Nature and Environmental Writers – College and University Educators**
A non-profit, environmental education organization founded to assist writers and educators enhance public awareness of environmental issues.
http://www.new-cue.org

**North Carolina National Estuarine Research Reserve**
A wildlife reserve named for Carson.
http://www.ncnerr.org/pubsiteinfo/siteinfo/rachelcarson/rachel_carson.html

**Rachel Carson Conservation Park**
A Montgomery County, Maryland, park named for Carson.
http://www.mcparkandplanning.org/parks/park_of_the_day/may/parkday_may12.shtm

**Rachel Carson Council, Inc.**
A clearinghouse and library with information on pesticide-related issues.
http://members.aol.com/rccouncil/ourpage

**Rachel Carson Homestead**
Birthplace and historic site.
http://www.rachelcarsonhomestead.org/

**Rachel Carson Institute, Chatham College**
From Rachel Carson's alma mater, a Web site with a commemoration page describing the Rachel Carson leadership award, a bibliography, and a page of resource links.
http://www.chatham.edu/RCI/

**Rachel Carson National Wildlife Refuge**
Refuge dedicated by the U.S. Fish and Wildlife Service to the memory of Rachel Carson that preserves key points along migration routes of waterfowl and other migratory birds, from Kittery to Cape Elizabeth, Maine.
http://www.fws.gov/northeast/rachelcarson/

**Rachel Carson Trails Conservancy**
A nonprofit organization that promotes nature trails in Western Pennsylvania, where Carson was born.
http://www.rachelcarsontrails.org/about

**Silent Spring Institute**
A nonprofit scientific research organization dedicated to identifying the links between the environment and women's health, especially breast cancer.
http://www.silentspring.org

*The U.S. Department of State assumes no responsibility for the content and availability of the resources from other agencies and organizations listed above. All Internet links were active as of spring 2007.*

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*This bridge in Pittsburgh, Pennsylvania, was renamed in honor of Rachel Carson on Earth Day, April 22, 2006. Carson grew up in the nearby town of Springdale.*

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