Rachel Carson and *Silent Spring*

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October, 2012, marked the 50th anniversary of Rachel Carson's *Silent Spring*, published in 1962, just a year and a half before her untimely death from breast cancer and other illnesses at age 56. We in the sustainability movement today, owe a lot to Rachel Carson – to her intellectual brilliance, to her beautiful writing, to her courage and to her perseverance. And to her insistence on the people's right to know.

Rachel Carson (1907–1964) was a zoologist and marine biologist who worked for many years for the U.S. Fish and Wildlife Service. She is considered one of the finest science writers ever, producing a series of books and articles including *Under the Sea Wind* (1941), *The Sea Around Us* (1951), and *The Edge of the Sea* (1955) as well as several technical reports for the Fish and Wildlife Service.

Rachel Carson's masterpiece, *Silent Spring* is widely recognized as one of the most influential books of the twentieth century. Thousands of citations to the book have appeared in scientific journal articles and popular publications over the decades. The book has been published in France, Germany, Italy, Denmark, Sweden, Norway, Finland, Holland, Spain, Brazil, Japan, Iceland, Portugal and Israel and has influenced environmental legislation in all those countries.

The DDT Debate, the Chemical Industry and Right Wing Attacks

Questions about the possible harmful effects of DDT make up a substantial portion of *Silent Spring* and for many readers Carson's warnings about the health consequences of pesticides constitute the essence of the book. A particular concern has been the possibility that pesticides cause cancer and birth defects. Recent evidence now also implicates DDT and other POPs (Persistent Organic Polluters) in endocrine disruption – interfering with the operation of human

hormones. Endocrine disruption threatens a wide range of possible human harm.

In chapter 3 of *Silent Spring* Carson wrote the first scientific account of the mechanisms by which pesticides interfere with life processes in language that can be understood by non specialists. Carson explicitly disavowed the total cessation of pesticide spraying. She argued instead for careful and limited usage.

Silent Spring ignited a fierce public debate over the safety of synthetic pesticides created by humans that had never existed in nature. Carson was attacked by representatives of the chemical industry. The lawyer for the Velsicol Chemical Corporation attempted to prevent publication of the book by threatening a lawsuit just before it went to the printer. Corporate and right-wing commentators have continued to attack Carson and *Silent Spring* up to the present. Most recently she has been accused of facilitating the deaths of hundreds of millions of Africans from malaria. Go to http://rachelwaswrong.org and read the charges against her. An extensive and detailed refutation of the right-wing charges appears in Naomi Oreskes and Erik M. Conway in their 2010 book *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco to Global Warming*, pages 216−239. An online summary of their defense of *Silent Spring* can be accessed at: http://www.huffingtonpost.com/naomi-oreskes/emshadow-eliteem-merchant_b_615504.html.

And check out http://www.silentspring.org/ and http://www.rachelcarson.org/ to see some of the ongoing work on human health Carson's work has generated.

In 1963 *Silent Spring* led in part, to the appointment by President Kennedy of a President's Science Advisory Commission. This was followed by congressional hearings that most observers believe vindicated Carson's warnings that some pesticides and spraying campaigns were threatening to cause environmental and health disasters.

Silent Spring was the impetus for the founding in 1967 of the Environmental Defense Fund which later led the battle to ban DDT – a ban that took effect in

the U.S. in 1972. Today Rachel Carson continues to inspire people around the world who want to know what chemicals are being added to our environment, whether they have been properly tested and whether they fit into the web of life she defended in *Silent Spring*. Watch for Part 2: Rachel Carson and Sustainability.

Silent Spring and Sustainability

Rachel Carson might never have used the word "sustainability." But *Silent Spring* rang a warning bell that uncontrolled and careless over spraying of chemical pesticides could damage the web of life. Indeed, the very title of her book refers to the first chapter in which she describes a fictitious town in which a spring arrived but no birds sang.

Silent Spring is one of the first popularized scientific statements of the idea that we humans are part of nature, not its conquerors and that we should use science and technology to maintain or strengthen rather than to weaken or break the strands of the web of life:

- "It took hundreds of millions of years to produce the life that now inhabits the earth – eons of time in which that developing and evolving and diversifying life reached a state of adjustment and balance with its surroundings;"
- "The balance of nature is not a *status quo*; it is fluid, ever shifting, in a constant state of adjustment;"
- "Water must be thought of in terms of the chains of life it supports…""
- "The 'control of nature' is a phrase conceived in arrogance…;"
- "Future generations are unlikely to condone our lack of prudent concern for the integrity of the natural world that supports all life."

Carson was one of the first to publicize the accumulation effect: very small amounts of DDT sprayed over large areas eventually led to amounts sometimes hundreds of times larger in animals higher up the food chain as larger units consumed smaller ones and the DDT became stored in the fat.

Carson also realized that natural biological processes of mutation make it possible for insects to develop resistance to human attempts to wipe them out with chemicals. This results in turn in more massive sprayings, leading to more resistance and/or the introduction of ever more poisonous chemicals leading only to further resistance. Carson suggested that insects – because of their short life spans – were likely to mutate more rapidly than humans can invent new chemical killers. Even in 1962 evidence indicated that as many as 140 insect species had become resistant to DDT.

Furthermore, even when successful, destruction of one pest might only result in expansion of another that had been its prey. One example is the spider mite that sucks chlorophyll out of evergreen needles. When the U. S. Forest Service sprayed 885,000 acres of western forests with DDT to control the spruce budworm, the forests turned brown, at first mystifying the Service. Then it was discovered that the DDT had also killed most of the ladybugs that are the natural predator of the spider mites in that area. Carson noted that

> By their very nature chemical controls are self-defeating, for they have been devised and applied without taking into account the complex biological systems against which they have been blindly hurled;
> …the chemical barrage [of pesticides] has been hurled against the fabric of life – a fabric on the one hand delicate and destructible, on the other miraculously tough and resilient, and capable of striking back in unexpected ways.

If we substitute "geology" for "biological systems" or "fabric of life," would Carson's warning apply to hydrofracking in the Finger Lakes of New York State? Will geology strike back by poisoning our drinking water as the price of a paltry few decades of natural gas extraction?

Rachel Carson's Other Road

The final chapter of *Silent Spring* offered some of Carson's alternatives, broadly lumped into the category of biological controls. These included male sterilization of undesirable insects, use of natural repellants, lures, ultrasonic

sounds to repel certain insects, species-specific bacteria or viruses, importation of natural enemies and restoration of the populations of predators including birds, bats, spiders and some small mammals that all engage in effective insect control. Some of Carson's alternatives amount to human interference with naturally evolved systems. Aware of this, she explained that any alternatives should be "based on understanding of the living organisms they seek to control, and of the whole fabric of life to which these organisms belong." Today we might say that Carson understood the need to maintain biodiversity. But it was not just species biodiversity: it was biodiversity of the elements and the networks and systems of the web of life that she recognized as crucial to the existence and quality of human life. Organic farmers today make use of many of the ideas Carson advocated. Her emphasis on connections among the elements of the web of life also makes Carson one of the first science writers to present to the public a systems view of nature and of our place in it.

Rachel Carson is both ancestor and heroine for all of us today who are struggling to create and leave behind for our children and grandchildren a world of sustenance and beauty.