

Paul B. Sears: The Generalist as Teacher

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ABSTRACT. Paul B. Sears' early ecological interests continued to expand over 70 years into such areas as vegetation mapping, paleoecology, climate change and conservation. Few ecologists saw and understood the interactions of the earth's biosphere in space and time as broadly as he did. He wrote that the laws of human society and those of nature often are not in harmony, and something must be done to ensure that the biosphere remains sustainable. His teaching started with his children; continued in the classroom and in one-to-one sessions with graduate students; and extended to his colleagues and the general public through his work in organizations, his lectures and his writing. Sears set an example for ecologists to act as citizens and teachers, as well as investigators.

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INTRODUCTION

The natural world of plants, animals, people and Paul B. Sears became inextricably enmeshed during his boyhood summers on his family's farm in Ohio. With a few administrative interruptions, this ecological relationship continued throughout his long and productive life.

After graduating from Ohio Wesleyan University, he began his graduate and research career with consecutive degrees at the University of Nebraska and the University of Chicago, the two bastions of ecology in the United States in that part of the 20th Century. At both places, his research was concerned with the cytological characteristics of the dandelion (*Taraxacum*). Despite his early work in cytology, the ecological ambience at these two universities must have influenced him greatly, because in the early 1920s, he left his degree granting discipline and dedicated the remainder of his life to ecology in the broadest sense.

The history and chronology of his ecological research have been covered in the papers in this volume. I shall not repeat those observations here. My focus will be Sears' tremendous breadth of interests in science, particularly ecology, and how they were reflected in his teaching.

EXPANDING ECOLOGICAL INTERESTS

His varied interests in the outdoors that developed concurrently with Sears' cytological research predicted the change from cytology to ecology to some extent. These continued to expand in a broad continuum throughout the next 70 years of his life from vegetation mapping, to paleoecology, to conservation and to climatic change.

In the 1920s and 1930s, when Sears was beginning to reach his most productive research period, ecology was still qualitative and amorphous, as we groped toward quantitative methods to measure structure and function of communities and ecosystems. For many of today's ecologists, methods of that time may seem primitive. However, ecologists must remember that the cumbersome, electric calculating machine had not yet been invented. The small hand-held calculator was far in the future, as was the massive vacuum-tube computer and the modern desktop computer on which this paper was typed, was unimaginable.

For my own doctoral dissertation, I spent months doing multiple correlations on a hand-cranked calculating machine that could not even derive square roots. Each answer was recorded carefully on a big piece of brown paper that was my spreadsheet on the office

floor. Sears had even fewer quantitative tools. However, ecology was new, and we all spent much of our time trying to see the "big picture." Sears did that very well indeed.

Few ecologists saw and understood the interactions in space and time of the earth's biosphere as broadly as Sears. His publications tended toward review articles, essays, editorials and books on regional and biospheric problems. These culminated, in a scientific sense, with his landmark *Deserts on the March* (1935), which, for more than 50 years, dominated the study of the effects of drought cycles on vegetation and agriculture. It was revised in its fourth edition as recently as 1980. One could say that Sears was a "thinking" ecologist, ahead of his time, during the period from the 1930s through the 1970s. He lived long enough after that to see the scientific consensus about the biosphere catch up with him.

In 1964, Sears wrote an incisive editorial, *Ecology - A subversive subject*, in which he argued that the "laws" of human societies [and nations?] and those of nature often are not in harmony and that something should be done to ensure that the biosphere remains sustainable (Sears 1964). We have now come to that point in time where doing something is long overdue (e.g., the inconclusive 1993 Earth Summit in Rio de Janeiro and the equally lackluster follow-up in Copenhagen in 2009). Woodwell (1992) noted that "Paul Sears, always fresh in thought, once referred to ecology as 'subversive' in an editorial in *BioScience* published in 1964. The editorial is as pertinent today as it was more than thirty-five years ago." He also wrote, "... reconciliation [between the laws of governments and the laws of nature] will require substantial revisions of government that some might consider downright revolutionary."

TEACHING ON MANY LEVELS

It is Sears' "teaching" in the broadest sense that I wish to emphasize here. This skill began with his children when they were young, as described so well by his daughters in their biographical essays in this volume. His traditional classroom teaching as a professional botanist and ecologist was competent at the very least. On a one-to-one graduate student level, it was undoubtedly superb, as Loren Potter describes in this volume. However, his teaching went far beyond the college and university to the public, as well as to his colleagues, through his roles as a lecturer, in person on the radio and as a writer.

His outgoing and friendly demeanor greatly influenced scientists and nonscientists alike. As members of the first ecology review panel of the National Science Foundation in the 1950s, Sears and I became friends and compatriots. He was a key member of this group and extremely helpful to us all. He had a certain "mixability" in crowds

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as well as in small groups. In the last year of his life (1990), Sears was named a Living Treasure of Taos by his adopted hometown in New Mexico, where he knew everyone and in which he continued to give violin lessons to children. He still retained his interest in ecology and the native mountain vegetation and communicated this enthusiasm and knowledge to townspeople and visitors.

Sears wrote in 1971,

The best hope, as I see it, is for those of us who are ecologically aware to remember that we are citizens and teachers as well as investigators. Continuing patiently in this triple role, we can be comforted by the fact that the race is not always to the swift. The times are with us ... Without knowledge of the realities of environmental imperatives and human behavior, we are at long last in a position to start transforming Utopian dreams from literary curiosities into sound working designs for the future of mankind.

We may ask, "Would Sears' optimism be justified today?" Maybe. One thing is certain though, he would have invited us to lunch at the faculty club and convinced us in a lively discussion that together we could do it!

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