

FOREWORD

The idea for this book arose during a small dinner party held following a visiting scholar seminar by Eugene P. (Gene) Odum entitled "Balance of Nature: Myth or Reality?" at my home institution on September 5, 1996. Along with my wife Jean and me, Marlene and Fred Benfield and Sandy and Jack Webster (both Fred and Jack have worked for years on the University of Georgia's Coweta project) were in attendance. During a lull in the conversation, Odum turned to me and said, "What people expect from you now is a book containing illustrative examples that mark important developmental stages in your career, each preceded by a brief discussion of why you made the shift and its importance to you and environmental problem solving in general." Odum pointed out that I had, throughout my career, published in a variety of journals, and colleagues would unlikely have followed my career path the way they could had I restricted my publications to a particular subdiscipline or to one or two journals. Neither Odum nor I can remember the precise wording, but the content of the message was clear.

Certain experiences in my life have had a profound effect upon my professional career, such as growing up in a mill town, the US Great Depression, admission to Swarthmore College, and obtaining a professional position with Dr. Ruth Patrick. Connections to these defining moments appear in a variety of chapters in this book. I believe these connections are more important than the inevitable redundancies that result from some repetition, which I hope does not adversely affect the flow of the entire book.

During the Great Depression in the United States, most people were focused on short-term survival, i.e., in many cases, day-by-day living. However, even then, ordinary citizens valued an education because they understood the long-term benefits. Scientists and teachers were respected, regardless of their income. In those days, before television and high consumption of material goods ("one or more automobiles in every garage"), social interaction was at a much higher level. Radio was important because listening to "The Lone Ranger," "The Shadow," and so on required a vivid imagination. However, my listening was limited to one hour after dinner, and the rest of the time was spent studying and reading. By today's standards, Conshohocken, Pennsylvania, was a small community. I could walk anywhere in town in 10 or 15 minutes. Most homes did not have telephones (cell phones had not been developed), so conversations were "face to face."

At that time, I saw no major problems in how close in proximity naturalistic areas were to industries. A trout stream (Wissahicken Creek) was within the Philadelphia city limits. Potts Quarry, where I fished almost daily all summer, was only 10 minutes by bicycle from my home. The Schuylkill River, on one edge of town, was polluted and contained only carp and catfish. At that time, I had no appreciation for what the river could have been. While a teenager, I was able to fish in Yellowstone Park (my aunt and uncle, Dr. and Mrs. Walter Latshaw, lived in Salt Lake City, Utah). That experience was my first indication of what truly natural systems were like. For two weeks each summer, I also was able to fish in salt water at Somer's Point, New Jersey. Fishing pressure on nearby salt water systems was comparatively low, and the waters were relatively unpolluted.

In retrospect, I believe I had a sense of place that included both natural systems and humanized environments. In my youth, my sense of place was small geographically and limited ecologically. I still try to find a humanized environment in close proximity to a naturalistic environment. (I define a naturalistic environment as one in which human artifacts are minimal or, preferably, seldom visible. The environments I find are not truly wild systems. A humanized environment is one in which human artifacts are designed so that other life forms are treated with respect.)

I met Jean at Grange Women's Dormitory in 1941. I can still vividly visualize meeting Jean 64 years later. Our courtship was long by today's standards – nearly three years. We did

not engage in long discussions, which now are labeled communication; we just did things together. Of course, we discussed what hikes we would take the next weekend, but being together was our form of communication. Neither of us placed a high value on material possessions. I remember going to Penn State with a large suitcase and a winter overcoat over my arm. The US Postal Service had a special rate that permitted laundry to be shipped home for washing and ironing. When I see students arriving at Virginia Tech, usually with a rental van and the entire family carrying possessions into the dormitories, I marvel at how things have changed in 60 years. Although our material possessions increased as our family grew and we become more affluent, they never came close to those of our peer group. Living simply became a blessing when we spent summers at field stations where a simple life with few material possessions was the norm. Another lasting impact of the Great Depression was thrift. Our frugality paid off in a variety of ways, most notably when Jean had to enter a nursing home in June 2001 and remained there until she died on 21 February 2005.

Fortunately, Jean and I shared the same value system. The retirement community where I now live, Warm Hearth Village, has over 50% of the land in forests and one is less than 200 feet from all the windows of my Showalter assisted-living apartment. When Jean was in the nursing home there, the view from her bedroom window was of a forest. On my thrice daily visits to see Jean, I saw forests on both sides of the road that connects the two facilities. Many paths, both paved and unpaved within the property, offer space for communing with nature.

Jean and I spent 33 summers at the Rocky Mountain Biological Laboratory in Colorado and the University of Michigan Biological Station near the junction of Great Lakes Michigan and Huron. Both of us enjoyed a sense of place in these ecologically quite different ecosystems. I have spent 37 of my 57-year professional career in Blacksburg, Virginia, where our home was surrounded by 8.5 acres of woods. Jean and I could leave the back door of our home, walk for miles, and only see a power line and some distant houses from the end of our two favorite trails. Two national parks are nearby, as is the Appalachian Trail (a 2,050-mile trail that goes from Georgia to Maine). If I did not have significant daily contact with naturalistic systems, I would feel deprived. I am indeed fortunate that, at 82 years of age, some of this contact is still possible.

As undergraduates, Jean was always on dean's list or close to it. On the other hand, my grades were modest. Jean knew of my less than stellar grades, but she never mentioned them. When we married during World War II, Jean had her degree in biochemistry and I had not even graduated. After I was discharged from the Navy, I enrolled at Swarthmore College and improved my grades. With a wife and daughter dependent upon my performance, I simply could not return to marginal academic performance. While getting my grades to a level that would give me a chance to attend graduate school, I found great enjoyment in the academic life and never left it. Without Jean's faith in me, I suspect this turnaround would not have happened. A relatively recent happening that relates to this period of my life warmed my heart and brought tears to my eyes. I was scheduled to graduate from Penn State in biochemistry in 1944. Also, I was scheduled to be, but never was, inducted into my fraternity Alpha Zeta (Morrill Chapter – both honorary and social [with a fraternity house]). Instead, I served in the Navy and graduated from Swarthmore College in 1947. A group of present Alpha Zetas from Penn State combined with Virginia Tech's Alpha Zetas to induct me as a member 58 years later (in 2002).

The early 1940s were turbulent, and my recollection of dates, friends, and colleagues decreases every year. I have no trouble remembering the sequence of events, but the precise dates of events over half a century ago in my personal life are often not easy to determine. The situation is quite different for my professional life since I have always maintained a detailed and frequently updated *curriculum vita*. Even though some of the details are waning, the defining moments of both my professional and personal life remain clear, even vivid. Looking into the past has brought both moments of joy and distress – the latter when I am embarrassingly reminded that I could have done much better than I did.

I graduated from high school in 1940 and worked that summer in a paper mill. Even then, I could maintain my association with natural systems. In fall 1940, I entered Pennsylvania State University, then a small institution surrounded by natural systems. The following summer, I worked for the US Department of Agriculture Laboratory in Wyndmoor, Pennsylvania, as a sub-professional 6 (the lowest rank). This work was my first opportunity to observe research; it fascinated me, although it seemed far beyond my grasp at that time. Moreover, I never dreamed that one day I would view these quite different activities just described as part of a larger system.

During my professional career, I have benefited enormously from Odum's suggestions about what I should do next, although such comments have been exceedingly rare. As soon as I heard his suggestion, about the autobiography, I knew the project had to be done! I cannot hope to reach the elegance of E. O. Wilson's *Naturalist* or the series of Aldo Leopold's essays and seminars titled *The Mother of the River of God* (published after Leopold's death by his colleagues Flader and Callicott, 1991). Odum's difficulties in getting ecology accepted as a bona fide field are well known to those of us who witnessed the field's astonishing development, but these difficulties tend to be forgotten by new students and faculty who take the existence of ecology for granted.

I can easily select the major transitional periods in my career even though the changes occurred incrementally. Even though I could list and document the origin and development of each new area of interest, most scientists are remembered for recent work or vignettes of what colleagues remember from earlier work.

In her book *Composing a Life*, Mary Catherine Bateson (1989) states: "We take advantage of slim opportunities, swerve ever so slightly to avoid obstacles, and the next thing we know we are on a new life course." This statement describes my own career path perfectly. However, I have known a number of systematic and orderly people who envisioned their entire professional career while still a teenager (or before), and actually followed through and succeeded, some brilliantly. My own career was academically unsatisfactory until after World War II, which interrupted my college education for some years. After the war, my focus and motivation had increased and my career continued to change dramatically at fairly frequent intervals, partly because of my poor judgment at times, but mostly because of opportunities that seemed too good to ignore. Obstacles were aplenty, ranging from a department-level administrator (who felt that environmental science was a fad) to purchasing agents (who felt that "going by the books," even if it involved a delay of months, was more important than dealing with a spill of toxic chemicals). Most people were extremely helpful, and I am grateful for both their help and the psychological boost their interest provided.

Since 1948, when I began writing my MS thesis, writing has been the integrating theme for me professionally. Since writing for scientific journals requires substantive knowledge of the field, research and writing have been the foundation for my teaching. Writing for professional journals is often, but not always, based on hard data that is gathered at some considerable sacrifice to one's personal life. The November 1977 issue of the journal *Environmental Health Perspectives* contains my 1,300th publication. I had gathered no "hard" data for that commentary ("Defining Goals and Conditions for a Sustainable World"). I felt no joy in reaching that particular number of publications and, in fact, have only once celebrated a numerical threshold (the appearance of my 1,000th publication) with a few colleagues. However, I did feel joy in the article itself, not because it was perfect but because it represented an incremental advance for me personally in trying to understand the possibility of sustainable use of the planet with, of course, the recognition that nothing goes on forever.

Writing this autobiography has caused me to revisit the past far more frequently than I normally do. Recalling events would have been a worthwhile experience even if the book were never published because I have realized indebtedness to others more vividly than I did at the time the indebtedness occurred. The joy of writing for me, and I suspect for most others so engaged, is what Peter Drucker termed "future facing" or "solving the future" (Beatty, 1998). In

my present writing, I am preoccupied with how human society can balance the development and utilization of technological systems so as not to impair the health of the planet's biospheric life support system. My earlier writings were based on pollution assessment, with the goal of managing societal waste better in the future; ecotoxicology, with the goal of predicting the effects of potential toxicants before they were released into ecosystems; and ecological restoration, with the goal of determining how to repair ecosystems for future benefits after they had been damaged by societal activities. All my writings have been based on the hope that human society will develop a more harmonious relationship with natural systems and will leave a habitable planet for future generations. In short, humankind will learn to use natural systems without abusing them.

At age 82, I realize that the future becomes the present with alarming rapidity, and time spans of 10 or 15 years, which once appeared substantial, are now shrinking with enormous speed. However, time is often the healer of damaged ecosystems. Nature has survived major episodic extinctions before in history, and probably can again. I have less faith, however, in the ability of human society to survive a major cataclysm, including one induced by ecological destruction. The present is indeed an exciting time because society is witnessing an epic struggle to use its biospheric life support system in a sustainable manner, but may fail to do so.

This concern about future events does not diminish my joy in research! When an article appears in print, I experience a certain sense of satisfaction for having moved incrementally along a continuum toward what I hope is enlightenment. To view any publication as completion is entirely fallacious. If the article receives attention, invariably some responses will be favorable, some unfavorable; some communications in the latter category will call attention to omissions in the literature citations, and some will mention yet unpublished relevant research. Some of my publications may initially be ignored entirely, or what appears to be entirely. I have received letters as long as 20 years after the publication date that request some details not given in the article.

I also have moments of pleasure when I find, as I did early in December 1997, that a former honors undergraduate (Andrew Heaton, then a graduate student at the University of Georgia), who worked in my laboratory for several years, was given, along with all other new graduate students, a copy of my 1989 paper "Speaking at Length" from *BioScience*. To learn that a publication, nearly a decade old, is still useful is very gratifying! When this recognition is coupled with the pleasure of receiving a substantial letter from a former student, it is doubly gratifying.

As a member of a number of editorial boards of professional journals, I am often asked to solicit manuscripts for the journals from distinguished scholars. When I do so, I always request an article on something that interests the potential contributor at present. Almost certainly, the resultant article will involve some recently perceived issue, likely to be critical in the future. Moreover, the issue is one on which the invitee is intensely focused, and, therefore, the contribution is quite likely to be exceptional. Furthermore, as Luciano Pavarotti said in an interview with David Frost on Public Television, "I am famous because I take risks." World-class scholars are risk takers and usually produce notable writings as a consequence.

I began my professional career as a freshwater protozoologist working on a field team, which required long hours of sitting on a chair bent over a microscope and studying highly perishable samples. In January 1995, I suffered serious blood clots in the deep veins of my right calf and was cautioned by my physician to avoid sitting for long periods of time on planes, in committee meetings, and the like. Furthermore, my eyes can no longer take the 12 or 14 hours/day of microscope work that they once endured. If I viewed myself as only a freshwater protozoologist, my career would have been over at least a decade ago, if not before. Since I viewed myself as a person who determined how ecosystems are stressed and how to restore stressed ecosystems to some semblance of predisturbance condition as a step toward sustainable use of the planet, my career opportunities were not eliminated by medical problems—they were merely

redirected. Early and frequent experience with the need for redirection in one's career is surely one of the key components of continuing professional productivity.

References

Bateson, M. C. 1989. *Composing a Life*. Atlantic Monthly Press, New York.

Beatty, J. 1998. *The World According to Peter Drucker*. The Free Press, Simon & Schuster, Inc., New York.

Flader, S. L. and J. B. Callicott, 1991. *The River of the Mother of God and Other Essays by Aldo Leopold*. The University of Wisconsin Press, Madison.