

REPRESENTING NATURE, REORDERING SOCIETY:

EUGENE ODUM, ECOSYSTEM ECOLOGY, AND ENVIRONMENTAL POLITICS

by

LEVI VAN SANT

(Under the Direction of Paul Sutter)

ABSTRACT

This thesis examines the life of Eugene Pleasants Odum (1913-2002), who is widely known as “The Father of Modern Ecology.” In addition to his role as founder of the discipline of ecosystem ecology, Odum was also a prominent figure in modern American environmentalism. This work uses Odum's dual role as both respected scientist and popular political leader as a window into the relationship between the science of ecology and the budding environmental movement in post-World War II America. In contrast to most of the scholarly literature, this thesis argues that ecosystem ecologists were as much products of the environmental movement as they were its leaders.

INDEX WORDS: Eugene P. Odum, Howard W. Odum, Ecosystem Ecology, University of Georgia, Environmentalism, Agriculture, American South, Horse Shoe Bend, Sapelo Island

REPRESENTING NATURE, REORDERING SOCIETY:  
EUGENE ODUM, ECOSYSTEM ECOLOGY, AND ENVIRONMENTAL POLITICS

by

LEVI VAN SANT

B.A., University of Georgia, 2004

A Thesis Submitted to the Graduate Faculty of the University of Georgia in Partial Fulfillment  
of the Requirements for the Degree

MASTER OF ARTS

ATHENS, GEORGIA

2009

2009

Levi Van Sant

All Rights Reserved

REPRESENTING NATURE, REORDERING SOCIETY:  
EUGENE ODUM, ECOSYSTEM ECOLOGY, AND ENVIRONMENTAL POLITICS

by

LEVI VAN SANT

Major Professor: Paul Sutter

Committee: James Cobb  
Shane Hamilton

Electronic Version Approved:

Maureen Grasso  
Dean of the Graduate School  
The University of Georgia  
May 2009

## ACKNOWLEDGEMENTS

Anyone who chooses to take on a work of this nature would be very lucky indeed to have the support and guidance that I did. The University of Georgia has provided a challenging and rewarding environment. While an undergraduate student, Dr. Eve Troutt-Powell and Dr. Stephanie Lindquist gave me the push that eventually propelled me to graduate school. My time in the Odum School of Ecology was a real boon to this project. Dr. Gary Barrett was always excited to talk about Eugene Odum and Horse Shoe Bend. Laurie Fowler is an energetic activist and teacher who nevertheless always made time to work with me. The graduate faculty of the History Department have set an excellent example of scholarship. My first graduate seminar was with Dr. Jim Cobb, and my product for that class is the foundation of chapter one. His devotion to the study of the American South is an inspiration. Dr. Shane Hamilton has always made time to talk about my work, and his ideas about the political ecology of agriculture inform the pages that follow. Finally, it would be impossible to overstate the influence that my advisor Paul Sutter has had on my entire graduate school experience. He is somehow able to teach and learn simultaneously – the sign of a true scholar. Paul's tireless devotion to my success and this project have been indispensable, and his personal and professional example will continue to guide me long after this thesis is finished.

There is a growing contingency of aspiring environmental historians at UGA, and they have been a great group to get to know: Chris Manganiello, Drew Swanson, Hayden Smith, Lesley-Anne Reed, and Tom Okie – Tim Johnson and Tore Olsson are hereby granted honorary status. Special thanks to Bert Way, senior among us all, for setting a great example. Thanks to

Blake Scott for the many hours of editing and friendship; may there be many more. Also among my peers at UGA, I owe a debt of thanks to those I have gotten to know while working with local agriculture: Josh Egenolf, Tad Brown, Jason Mann, Jeff Stoike and Catarina Passidomo. I have been lucky to share with them both interdisciplinary scholarship and interdepartmental happy-hours.

The staff of the UGA Hargrett Library have been especially helpful throughout this process, especially Chuck Barber, Steven Brown, and Toby Graham. They truly strive to make the archival experience as enjoyable and productive as possible.

My entire family has always been a source of great strength and knowledge. However, my sister, Jami, and my parents, Vic and Brenda, deserve special mention. Perhaps they even planted the seed of this project in my mind when, back in the early 1990s, we took a family trip to view the bust of Eugene Odum in the UGA Ecology building. Their love and support are the foundation for everything that I will achieve in my life.

## TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS.....	iv
INTRODUCTION.....	1
CHAPTER	
1    “The Politics of Place: Ecosystem Ecology and the American South”.....	16
2    “Searching for the <i>Fundamentals of Ecology</i> : Eugene Odum, Ecosystem Ecology and Environmental Politics”.....	40
3    “Backlashes, both Environmental and Social: Agriculture and Environmentalism in the Age of Ecology”.....	63
CONCLUSION.....	82
APPENDIX.....	91

## Introduction

For many Americans today, the terms “ecology” and “environmentalism” have nearly identical meanings. Anecdotally, the thesaurus of the word processing program on which I am typing this links the two together as synonyms. This ubiquitous association stems from what many have assumed to be a close relationship between the science and the political movement in the decades following World War II. Indeed, scholars cannot write about the modern American environmental movement without pondering the role of ecology. Much of the resulting work depicts the science and its practitioners as leaders of the environmental movement, in the sense that they both generated invaluable insight and defined the movement's direction.<sup>1</sup> While this interpretation seems intuitive, it fails to capture the complexity of the relationship and results in a narrative that too cleanly separates scientists from their social context. My study will start with the assumption that the relationship between ecology and environmentalism was in fact a reciprocal one, for ecologists and the knowledge they produced sprang from the same soils as did the grassroots of environmentalism. Indeed, ecologists were just as influenced by the growing environmental consciousness of the times as we assume environmentalists to have been by the science.

The prominence of ecology and the political power of environmentalism are both post-World War II phenomena that have shaped the material and social landscape of modern America. In addition to transforming modern America, these developments have also attained a

---

<sup>1</sup> Donald Worster, *Nature's Economy: A History of Ecological Ideas*, (New York: Cambridge University Press, 1994), 340-341; Betty Jean Craige, *Eugene Odum: Ecosystem Ecologist and Environmentalist*, (Athens: UGA Press, 2001), 104-130; Joel Hagen, *An Entangled Bank: The Origins of Ecosystem Ecology*, (New Brunswick: Rutgers Univ. Press, 1992).



position of immense cultural importance as well. Historian Sharon Kingsland claims that ecology is the “natural theology” of our times, for it is how we understand the world and our place in nature; in rebuttal, Hal Rothman places environmentalism in the pulpit as postwar America’s “secular religion.”<sup>2</sup> This debate aside, it is clear that they are knit together in our historical memory as transformative forces in modern America. My task is to untangle this knot in order that we may better understand some of the defining trends of postwar America.

This brief introduction suggests a set of questions to guide my thesis: In what ways did ecologists define their social role? When did they begin to identify themselves as environmentalists? How did their ideas about the environment and the political implications of their research change over time? When did citizens concerned about environmental damage begin to look to the discipline of ecology and why? How were its principles absorbed and transformed by the popular audience? How did specific political issues become incorporated into the mainstream environmental agenda?

I will approach these questions by focusing on Eugene Odum, the oldest son of influential sociologist Howard Washington Odum. Known as the “father of modern ecology,” Eugene was one of the most recognized figures in the history of American ecology. This story is not merely one of a scientist and his ideas, however, for he was also a prominent figure in the environmental movement during the “Age of Ecology.” As momentum peaked leading to the first Earth Day in 1970, Odum received national media coverage. *Newsweek* ran a story on him, and on February 2, 1970 *Time* covered Odum and “a tiny band of ecologists that has achieved sudden prominence.” The *Time* article, titled “Fighting to Save the Earth from Man,” touted ecology as the “emerging science of survival.”<sup>3</sup> While Odum was only one piece of the larger

---

<sup>2</sup> Sharon Kingsland, “Essay Review: The History of Ecology,” *Journal of the History of Biology* vol. 27, no. 2, (Summer 1994), 353. Hal Rothman, *The Greening of a Nation: Environmentalism in the United States Since 1945*, (Fort Worth: Harcourt Brace, 1998), xi.

<sup>3</sup> “Fighting to Save the Earth from Man,” *Time*, February 2, 1970.

relationship between ecology and environmentalism, he represents a very significant piece. From the early 1950s until his death in 2002, Eugene Odum was consistently engaged in and identified with both ecological science and environmental politics. Studying his dual role as both respected ecologist and popular figure in the environmental movement can shed light on the relationship between the two phenomena.

The historiographies of ecology and environmentalism are both vigorous and contentious. There are often points where the two intersect, yet there is no study that focuses explicitly on the above questions. The studies that address these questions do so only in passing or tangentially. As Kevin Dann and Gregg Mitman suggest, “the interaction of both past and present ecologists’ scientific practice with their roles as spokespeople for the environment” is largely unexplored terrain by both environmental historians and historians of ecology.<sup>4</sup> This project aims to address that oversight.

The major works in the history of ecology often analyze the science as a product of its social context. However, this approach has yet to be applied with critical rigor to my topic. The scholarly literature on the post-World War II environmental movement is expanding rapidly.<sup>5</sup> This body of work largely focuses on tracing the myriad of intellectual threads that come together loosely to form the agenda of the movement. The coalescence of modern environmentalism is understood as a postwar phenomenon; yet recent work challenges scholars to think about why it came to full fruition in the 1960s and ‘70s and what such a broad social

---

<sup>4</sup> Kevin Dann and Gregg Mitman, “Essay Review: Exploring the Borders of Environmental History and the History of Ecology,” *Journal of the History of Biology* 30: 1997, pg. 299.

<sup>5</sup> Samuel Hays, *Beauty, Health and Permanence: Environmental Politics in the United States, 1955-1985*, (New York: 1987); Adam Rome, *Bulldozer in the Countryside: Suburban Sprawl and the Rise of American Environmentalism*, (Cambridge: Cambridge Univ. Press), 2001; Robert Gottlieb, *Forcing the Spring: The Transformation of the American Environmental Movement*, (Washington: Island Press), 2005; Hal Rothman, *The Greening of a Nation?*; Work on the American wilderness movement is sophisticated and also important to this discussion: Roderick Nash, *Wilderness and the American Mind*; William Cronon, “The Trouble with Wilderness, or, Getting Back to the Wrong Nature”; Mark W.T. Harvey, *A Symbol of Wilderness*; Paul Sutter, *Driven Wild: How the Fight Against Automobiles Launched the Modern Wilderness Movement*.

movement can tell us about those decades.<sup>6</sup> My project will speak directly to this literature by arguing that popular ecologists should also be understood as products of the environmental movement, rather than detached leaders of it.

Useful concepts for thinking about my proposed research questions spring from the recent dialogue between the history of ecology and environmental history. Work in environmental history reminds us that the material reality of place is a critical component of historical inquiry. For example, Donald Worster's sweeping narrative of ecological ideas, *Nature's Economy*, analyzes the historical dynamics of particular landscapes to explain associated conceptions of nature.<sup>7</sup> In "Nature's Agents or Agents of Empire?" Paul Sutter shows how, for some scientists, the material environment of the Panama Canal Zone challenged the belief that "Americans had conquered unalloyed tropical nature."<sup>8</sup> My investigation of Eugene Odum's ecological thought thus operates with an awareness that physical environments often influence intellectual conceptions.

Place is more than just a geographic or political region; historian of science David Livingstone proffers a useful conceptualization of place that makes a distinction between place as "site" and place as "region." The site of work is the type of location where research is done: laboratory, field, museum, zoo, and even the human body. The region, then, is the geographic or political location: state, nation, landmass, or body of water, for example.<sup>9</sup> Daniel Schneider proceeds along this line of inquiry in his study of Stephen Forbes' early ecological work on the Illinois River floodplain. Schneider shows how the local knowledge and politics of fishermen on

---

<sup>6</sup> Adam Rome, "Give Earth a Chance: The Environmental Movement and the Sixties," *The Journal of American History*, September 2003, pp. 525-554.

<sup>7</sup> Worster, *Nature's Economy*, 17, 208-253. While this is not Worster's main analytical approach, he employs it occasionally with provocative result.

<sup>8</sup> Paul Sutter, "Nature's Agents or Agents of Empire?: Entomological Workers and Environmental Change during the Construction of the Panama Canal," *Isis*, 2007, 98: 724-754. On this matter, Sutter builds on work by the historian of science Robert Kohler, *Lords of the Fly: Drosophila Genetics and the Experimental Life and Landscapes and Labs*.

<sup>9</sup> David Livingstone, *Putting Science in its Place: Geographies of Scientific Knowledge*, (Chicago: Univ. of Chicago Press), 2003.

the river shaped Forbes' understanding of both the role of scientists and the workings of nature. Eugene Odum was influenced by both the political culture of the New Deal-era American South as well as the dramatic material transformations of the region in the years following World War II. Thus, my project will work to tease apart the intricacies of place and their substantial influence on Eugene Odum. This tack not only helps explain why Odum thought the way that he did, but understanding the ways in which place can act on people's conceptions also informs the larger thesis of this work: the public and scientists lived in and were exposed to similar places, and through a dynamic dialogue they constructed both “popular” and “scientific” knowledge about nature and humans' place therein. Never was there a clean separation between these two environmental inquiries, or a clear leader in this exchange.

Odum formulated and practiced ecosystem ecology with a new mixture of lab and field techniques. In his influential study of the biological sciences, *Landscapes and Labscales*, Robert Kohler shows how over the course of the 20<sup>th</sup> century field biologists struggled to create a new kind of science that combined the rigor and precision of the lab with the real-world context of field studies. He argues that specific places of field study – “sites” in Livingstone's lexicon – were critical to this process. Kohler also suggests that ecosystem ecology was the “most puritanically lab-like” of the border biologies, a claim that has some merit if thinking solely about their methodologies, yet if taken too far can obscure the very real role that the nature of field sites played for Eugene Odum and his disciplinary cohorts.

Another important concept in this line of thought comes from environmental historian Richard White's argument that labor is a valid and under-appreciated path to “knowing nature.”<sup>10</sup> He challenges both the general public and scholars to revisit how humans can come to know

---

<sup>10</sup> Richard White, “Are You an Environmentalist, or Do You Work for a Living?” in William Cronon, ed., *Uncommon Ground: Toward Reinventing Nature*, (New York: W.W. Norton, 1995). While White's main jab seems to be in the direction of privileged classes that consume nature as recreation and cast a disparaging eye towards working-class Americans that labor in nature, I think his point is applicable to those few middle and upper-class Americans that also work outdoors.

nature through labor. While White's critique seems to be largely aimed at studying how working-class people formulate their understandings of the environment, it seems equally applicable to those few modern professionals who labor outdoors as well. The site of ecological research is often in the field, and the cultural authority granted to ecologists is predicated on their scientific understanding of nature. Therefore, ecological *fieldwork* is perhaps the most important way that some of America's most authoritative environmental voices come to understand nature. Odum's science came at a time in American history when working in the field – as opposed to the lab – began to carry more public authority. By employing a contextualist approach I will emphasize the ways in which changing American attitudes about work in the field – or, “big nature,” for Eugene Odum – reshaped the practice of biological science.<sup>11</sup>

Several issues that emerge from the history of ecology will be important ones for this study. One of these is a concern with the socio-political role of scientists. Gregg Mitman's *The State of Nature* illustrates how this theme can provide us with insight into the relationship between science and society at any point in time. Mitman studied the early 20<sup>th</sup> century school of ecologists at the University of Chicago and found that their work was inscribed with their own beliefs about the nature of human society and political prescriptions for social relations. This mode of analysis is critical to understanding how postwar ecologists saw themselves and how their work reflected and/or influenced the concerns of their contemporary society: What were Odum's preconceived notions about social life? Are these assumptions clearly manifest in his thoughts about non-human relations? Did he naturalize his ecological observations as political prescriptions?

---

<sup>11</sup> Robert Kohler, *Landscapes and Labscapes: The Lab-Field Border in Biology*, (Chicago: University of Chicago Press, 2002). Kohler also uses Odum's “big nature” quote on pg. 292 of *Landscapes and Labscapes*.

Another common theme of the literature is the increased privilege of science in post-WWII America. Worster argues in *Nature's Economy* that science, largely physics, helped save democracy during wartime and that the government then looked to ecology to help understand the impact of nuclear technology.<sup>12</sup> To him, this interaction signaled the birth of the “Age of Ecology.”<sup>13</sup> The influence and funding largesse bestowed upon postwar ecology by the federal government then contributed to its acceptance by the public as an authoritative discipline. In contrast to Worster's top-down vision, Peter J. Taylor locates the authority of science in postwar society's “technocratic optimism.” This belief in the ability of technical science to address social issues “in a value-free manner” facilitated postwar ecologists' efforts to transform themselves into socio-environmental engineers.<sup>14</sup> My research examines the reasons that environmentalists looked to ecological science in the postwar years and, in the process, contributes to our understanding of the popular authority granted science at this time.

Ecosystem ecology was the dominant ecological paradigm in the post-WWII years and the one most intimately linked with the origins of the environmental movement in America. The field deployed the ecosystem concept as its foundation, and conceived of environmental interactions as energy and nutrient transfers to be analyzed with methodologies drawn from the physical sciences. As the ecological approach that dominated during the postwar years, it is the one of most concern to my research. Scholarship that centers on ecosystem ecology largely employs an internalist approach to the historical development of the field.<sup>15</sup> When the works do address the relationship of the science to the environmental movement, their assessment is

---

<sup>12</sup> For a broad history of physics in America, see Daniel Kevles, *The Physicists: The history of a scientific community in modern America*, (Cambridge: Cambridge University Press, 1987).

<sup>13</sup> Donald Worster, *Nature's Economy: The Roots of Ecology*, (San Francisco: Sierra Club Books, 1977), viii.

<sup>14</sup> Peter J. Taylor, “Technocratic Optimism, H. T. Odum, and the Partial Transformation of the Ecological Metaphor after World War II,” *Journal of the History of Biology*, vol. 21, no. 2, (Summer 1988) pp. 213-215.

<sup>15</sup> See Craige, *Eugene Odum*, Hagen, *An Entangled Bank*, and Golley, *A History of the Ecosystem Concept*.

general and follows the dominant narrative of scientific leadership.<sup>16</sup> By employing a contextualist approach, my research will launch a more sensitive analysis of the historical association between ecological science and modern American society.

In its search for the conceptual roots of ecosystem ecology, Joel Hagen's history emphasizes continuity and overlooks the ways in which science changes to reflect dynamic social concerns. For example, he does not consistently develop the ways in which Eugene Odum's understanding of the ecosystem concept in the 1950s differed from Arthur Tansley's original conception in 1935. Similarly, Hagen's discussion of how Odum's textbook *Fundamentals of Ecology* influenced environmentalists lacks attention to change over time. Hagen's insensitivity to this variation suggests that we can learn more about how ecology and environmentalism interacted by paying close attention to the development of ecosystem ecology.<sup>17</sup>

Perhaps due to the internalist approach, much of the literature focuses on the *concept* of the ecosystem and often concludes that it was the driving force behind new ways of thinking in both science and society.<sup>18</sup> Betty Jean Craige's biography of Eugene Odum reflects the extremes of this tendency in the scholarly literature: "The ecosystem concept really did change the world . . . It became an instrument to curb the actions of capitalists. . . And it became a vision of interconnectedness that today motivates global environmentalism and influences the politics of nations."<sup>19</sup> While ideas are powerful, and the ecosystem concept is indeed a powerful idea, this interpretation is problematic for several reasons. First, by (over-)emphasizing the influence of a

---

<sup>16</sup> See Hagen, *An Entangled Bank*, pp. 193-194; Craige, "Ecosystem Environmentalism" in *Eugene Odum*; and Worster, *Nature's Economy*, pp. 340-387.

<sup>17</sup> Hagen, *An Entangled Bank*, 193.

<sup>18</sup> Frank Golley, *A History of the Ecosystem Concept in Ecology: More than the Sum of Its Parts*, (New Haven; Yale University Press). See also Betty Jean Craige, *Eugene Odum*. As Robert V. O'Neill points out, the concept itself is currently defined in multiple ways. O'Neill, "Is it Time to Bury the Ecosystem Concept? (With Full Military Honors, Of Course!)", *Ecology*, 82(12), 2001, pp. 3276. I would add that it has also shifted significantly over time.

<sup>19</sup> Craige, *Eugene Odum*, xviii.

concept, it obscures the very real impact that people had in promoting its use or acceptance. Also, by minimizing the role of people, this interpretation suggests that the genesis of the ecosystem concept and its effects were inevitable. Finally, this kind of conceptual determinism begins with the assumption that there was a uniform and monolithic understanding of the concept, both among individuals and across time. This project will show that none of these were the case. While the idea of the ecosystem has often proven powerful, it has never been inevitable, politically-neutral, or monolithic.

Some recent scholarship emphasizes the institutional context of scientific knowledge. Stephen Bocking's *Ecologists and Environmental Politics* is one of these, and it is also one of the few works that aims to flesh out the relationship between ecological science and environmental politics. He takes a comparative institutional approach, characterizing scientific institutions as "mediators" between scientists and the broader society. He shows how these institutions can shape science and also insulate scientists from public politics. This study serves as an important reminder that the institutional complex influences the work of scientists. Bocking's approach, however, separates scientists from the public. My study will avoid such a clean separation in order to understand how ecosystem ecology was affected by broader sociopolitical trends.

Studies of American environmentalism are currently most concerned with defining the movement and tracing its roots. As the phenomenon is such a complex and politically charged area of study, there is much disagreement on some of these basic questions. Different "official births" abound: the Echo Park Dam controversy, the publication of Rachel Carson's *Silent Spring*, the first Earth Day – 22 April, 1970. Robert Gottlieb even argues that we should label Progressive Era urban reformers as environmentalists.<sup>20</sup> While periodization of the movement is

<sup>20</sup> The first argument is Hal Rothman's, *The Greening of a Nation*. The publication of *Silent Spring* and Earth Day 1970 are the most commonly cited dates. Gottlieb's *Forcing the Spring* conceptualizes environmentalism much more broadly and loosely than anyone else.



not my main concern, I do highlight competing strands of environmental politics and the ways in which they change over time.

While the “official birth” debate is in some ways a trivial one, these starting points shape how we understand the movement. Gottlieb argues that if we privilege Progressive Era conservation and 20<sup>th</sup> century Wilderness movements – both attempts to manage and protect exurban resources – as the roots of environmentalism, we cannot truly understand “the rise of new social movements focused on quality-of-life issues.”<sup>21</sup> This argument illustrates the contemporary political implications of how we define environmentalism; Gottlieb is voicing a concern that if social justice issues are not considered a part of the birth of environmentalism, then the movement will continue to slight urban-industrial concerns. While my work will not attempt to draw a line around environmentalism, it will explore the permeable boundary between those clearly within the mainstream movement and those on the periphery. To avoid letting my own politics shape the story, I will focus on how those involved understood the environmental movement.

As is the case with the historiography of ecology, most of the literature on environmentalism addresses the relationship between science and the social movement superficially. Similar conclusions are made by these scholars about the influence of ecology on the development of environmentalism.<sup>22</sup> Again, there is no work that focuses explicitly on this exchange in an effort to tease out the particularities.

An example of this tendency to address the relationship – but not really question the historiography – is Paul Milazzo’s *Unlikely Environmentalists*, a political history of post-WWII water pollution legislation that emphasizes the leadership of U.S. congressmen. In addition, he offers an interesting interpretation of postwar environmental policy and the role of ecosystem

<sup>21</sup> Gottlieb, *Forcing the Spring*, 36.

<sup>22</sup> Rothman, *The Greening of a Nation*; Stoll, *U.S. Environmentalism since 1945*; Samuel Hays, *Beauty, Health, and Permanence*; Gottlieb, *Forcing the Spring*.

ecology. Milazzo characterizes the discipline as at once “holistic and technocratic.” For him, ecosystem ecology emerged from a “military-industrial ethos” and, thus, was useful to legislators because it was compatible with “traditional institutions and ways of thinking.” He then asserts that environmentalists latched onto the science for its holistic principles. I would suggest that the science’s political authority was more important to the environmental movement’s embrace of ecosystem ecology. Instead of Milazzo’s narrative of scientific leadership, it is then possible to see ecosystem ecology as a technocratic science that adopted holistic thinking just as many environmentalists did, and for similar reasons – to combat rising social and environmental fragmentation.

Much of the work on the environmental movement comes from within the traditions of environmental history, a field that itself has a complicated relationship with ecological science. Many of the early works in environmental history have been charged with uncritically employing ecological science as authoritative, objective knowledge of past environments.<sup>23</sup> The first generation of environmental historians were also “first-generation” environmentalists, and like many others of their time they came to see the science of ecology as a powerful ally in environmental debates. It seemed to provide the scientific evidence and political authority they needed to combat environmental problems. This fact may explain the tendency in the literature to interpret ecology as a guiding force and to overlook the impact of growing environmental awareness on ecologists’ understanding of the human place in nature.

It is always important to define terms precisely. This rule is especially true with this research project, as part of the confusion over the matter results from the multiple meanings of, and permeable boundaries between, “ecology” and “environmentalism.” For one, “environmentalism” did not appear in print with its current meaning until 1972, yet this project

---

<sup>23</sup> David Demeritt, “Ecology, objectivity and critique in writings on nature and human societies,” *Journal of Historical Geography*, Vol. 20, Issue 1, January 1994, pp. 22-37.

and many others that study the phenomenon discuss the decades prior to this usage.<sup>24</sup> The movement is also notoriously amorphous. There was no single concern or even a uniform set of ideologies that united environmentalists. Determining what issues should be deemed “environmental” is contentious and problematic. Those in the mainstream of the movement – defined here as the environmental lobby – often wanted to distance themselves from more radical or countercultural elements in an effort to avoid being labeled as dangerous or dismissed as irrelevant.<sup>25</sup> Hence, thinking critically about how we conceptualize the environmental movement and who we define as environmentalists is critical to this project. As a broad definition of American environmentalism, I suggest that one must consider it a both a set of ideologies about nature and an associated social movement that coalesced in the decades following World War II. For the most part, I am concerned with environmental politics – specific ideologies and positions – rather than environmentalism – the social movement.

“Ecology” is also defined in multiple ways. Some use the term to suggest a common, albeit vague, popularized notion of holism: “ecologically, one-worldish.”<sup>26</sup> In other uses – take the frequent “Ecology Movement,” for example – it is not quite clear what is meant, other than some uncertain set of environmental politics and cultural values. Oftentimes, people refer to “the ecology” of a place or a set of organisms, as in: “The introduction of exotic species upsets *the ecology* of previously healthy ecosystems.” This usage is very common but is also especially problematic because it naturalizes a specific environment and its “ideal” relationships from what

---

<sup>24</sup> Steven Stoll, *U.S. Environmentalism since 1945*, (Boston: Bedford/St. Martin’s), 2007, pg. 4. Here, Stoll defines the term as “a concern with the preservation of the environment and the politics or policies associated with that concern.”

<sup>25</sup> By “environmental lobby” I mean the group of powerful environmental organizations and their constituents which have largely shaped the agenda and legislation – for better and worse – in post-World War II America. I suggest that this is only a subset of a larger group of citizens concerned with related issues, however, most Americans – whatever their position – understand “environmentalists” to mean the environmental lobby. This conflation is so oversimplified that it could be called an unfortunate case of mistaken identity, and is in fact a source of much opposition to environmentalist platforms and discussions.

<sup>26</sup> Warren Belasco, *Appetite for Change: How the Counterculture Took on the Food Industry*, (Ithaca: Cornell Univ. Press), 1993, 45.

is in fact a shifting *historical* landscape. This conception is often then used as the foundation upon which normative arguments about nature are made.<sup>27</sup> Many in the alternative agriculture movement refer to their work as “ecological agriculture,” even though most of their production methods are simply small-scale, labor-intensive techniques that predate the science of ecology by centuries. Although problematic, these competing definitions can be useful analytically. By interpreting the multiple uses and their political implications, one can come to a more subtle reading of how people understood the term and its role in their ideologies. It is my contention that these conflicting definitions reflect the modern scientific bias which has led many people to assume that the science of ecology is the *source* of holistic ideas, when in actuality ecologists appropriated these notions from the same sources and for similar reasons as did many of their contemporaries outside of academia. I suggest that the most precise and analytically correct definition of “ecology” must specify it as the discrete work of a scientific discipline. In order to be as clear as possible, I will distinguish between ecology – the particular work of a science – and popularized ecological notions – the public's contested and dynamic mixture of environmental values and appropriated scientific proclamations.

To study these complex relationships I have chosen a somewhat untraditional narrative and analytical approach. Chapter One situates Odum in the context of the American South, where he was born and spent almost his entire life. There are two main reasons for this. As Richard Lewontin highlights, “Scientists do not begin life as scientists . . . but as social beings immersed in a family, a state, a productive structure, and they view nature through a lens that has been molded by their social experience.”<sup>28</sup> Odum was the son of a profoundly “regional”

---

<sup>27</sup> In an example from American popular culture, the full title of Marvin Gaye's 1971 hit single is “Mercy Mercy Me (*The Ecology*).” That the song is a protest against environmental pollution might also be surprising to some, but is a good example here of the many ways that the term “ecology” has been used through time.

<sup>28</sup> Richard C. Lewontin, *Biology as Ideology: The Doctrine of DNA* (Toronto: Anansi Press, 1991), 3.

thinker, Howard Washington Odum. Exposed to his father's mode of thinking from an early age and embedded in the liberal reformist culture of his father's circle, Eugene absorbed much of this Southern experience. Second, I am concerned here largely with Eugene Odum's ideas about nature and the lessons he drew from them. While Lewontin's argument about social context is critical, I argue that it only reveals a part of the story. Scientists also "view nature through a lens that has been molded by their" *environmental* experiences. Therefore, I hope to understand how the changing environment in the region influenced Odum's understanding of nature. While the American South was not and never will be an entirely uniform landscape, there are significant regional histories that, I believe, influenced his thinking. This initial chapter argues that Eugene Odum's place, both social and environmental, set the stage for his entry into larger ecological and environmental discussions.

In Chapter Two, I zoom out to the national scale to examine the ways in which Odum and his science interacted with the development of postwar environmental politics. To do this, I focus on the first three editions of his textbook, *Fundamentals of Ecology* (1953, 1959, and 1971), which is often heralded as the most important work in modern American ecology. Too often, however, *Fundamentals* is understood as a static text when in fact each edition was significantly different from its predecessor. Tracking the changes in these editions reveals that Odum was constantly reformulating his science in relation to the broader debates over the direction of environmental politics. This approach highlights change in the science of ecosystem ecology – a much-overlooked topic – as well as shifts in Odum's political rhetoric. Examining these trends in parallel with the burgeoning environmental movement results in a more subtle understanding of the relationship between science and politics in postwar America.

In Chapter Three, the narrative pares down environmental politics to examine a single issue: agriculture. World War II marked a severe break in not only the ways that American

farmers grew crops, but also in the way that Americans thought about agriculture and rural life more broadly. After an interwar period during which a broad swath of American society questioned the efficacy of their nation's food production, the years immediately following World War II witnessed sweeping optimism about the state of American agriculture.<sup>29</sup> It would be decades before agriculture re-entered the broader discourse of environmental politics. Eugene Odum formulated a scientific critique of industrial agriculture that meshed with other critiques in the 1970s and marks the renewal of audible discussions about agricultural reform in postwar America. However, there were significant pockets of Americans who objected to industrial agriculture prior to this revival that I argue were marginalized in mainstream politics because they lacked “scientific” credibility. It was only when Odum and other prominent scientists spoke out that the mainstream added agriculture to the agenda. This history suggests that ecologists contributed cultural authority to the environmental movement, not unilateral leadership. Isolating agriculture as an element within broader environmental issues thus allows for more fine-grained analysis of how ecosystem ecology and politics interacted in postwar America.

This story traces two of the most influential forces during the dynamic and formative decades following World War II in America: ecological science and environmental politics. Returning to the earlier claims of scholars Sharon Kingsland and Hal Rothman – who characterize, respectively, ecology and environmentalism as America's religion in the late 20<sup>th</sup> century – I argue that scholars must re-examine claims based on such a clean bifurcation. As the life and works of Eugene Odum show, the two are so intimately tied together during this period that they must be considered in tandem. With this awareness in the foreground, we can better understand not only these powerful forces but also the ways that they interacted to shape the natural and cultural landscapes of modern America.

---

<sup>29</sup> Sarah Phillips, *This Land, This Nation*, introduction.

## The Politics of Place:

### Ecosystem Ecology and the American South

*“Such a social backlash . . . is especially likely when the shift from small farms to large, industrialized farms takes place too quickly and without compensatory adjustment in social and political systems. As farming becomes mechanized, small farmers and agricultural workers are driven off the land into the city where there is no work or housing for them.”*

*- Eugene Pleasants Odum, 1971<sup>30</sup>*

In May of 1979 – as the environmental decade gave way to the decade of greed – Eugene Odum continued to carry the banner of activism. “The things that people prize highly in the South – Southern graciousness and friendliness and open space, lots of nature, hunting and fishing, and so on – all of this is disappearing,” Odum reminded readers, “in the rush for big business, industry, automobiles, and all this.”<sup>31</sup> It is not surprising that Odum continued to voice environmental concern in 1979. Scholars have detailed his public promotion of environmental protection, which he maintained for the remainder of his life.<sup>32</sup> What would surprise many today about Odum's admonition, however, is that he framed the issue as a Southern one.

Unfortunately, most scholars have overlooked the role of place when assessing Odum's part in American history. As this chapter will show, to do so is to neglect not only a central part of Odum's self-identity, but also the material basis of his environmental knowledge.

<sup>30</sup> Eugene Odum, *Fundamentals of Ecology*, Third edition, (Philadelphia: Saunders, 1971), pg. 412.

<sup>31</sup> Tom Patterson, “Eugene Odum on Georgia and the Future,” *Brown's Guide to Georgia*, May 1979, pg. 39.

<sup>32</sup> Joel Hagen, *An Entangled Bank: The Origins of Ecosystem Ecology*, (Rutgers Univ. Press: New Brunswick, 1992); Mark Madison, “Potatoes Made of Oil” *Environment and History* 3 (1997): 209-238; Betty Jean Craige *Eugene Odum: Ecosystem Ecologist and Environmentalist*, (Univ of GA Press: Athens, 2001).

Historians of science have situated Odum and ecosystem ecology within the context of post-World War II American society. The intellectual influence of his father, noted sociologist and founder of Southern Regionalism Howard Washington Odum, on Eugene's own philosophy is recognized by many, but not fully developed.<sup>33</sup> The role of the Southern environment in shaping Eugene Odum's scientific and public message has been entirely neglected. Therefore, this chapter will situate Odum in both the culture and nature of the American South, as these experiences formed the foundation upon which he built his environmental science and politics.<sup>34</sup>

It is hard to exaggerate the degree to which Odum's time and place influenced his thinking. Though born in New Hampshire in 1913 (his parents were residents of Georgia at the time), Odum spent the formative years of his youth in Chapel Hill, North Carolina after his father took a position as professor of sociology at the University of North Carolina in 1920. Howard Odum focused his scholarship on the social, racial and economic inequalities of the South. In *Southern Regions of the United States*, he developed the concept of regionalism, which was a liberal alternative to the philosophy of sectionalism. He argued that the South was unique and had its own strengths and weaknesses, but in marked contrast to the divisiveness of the sectionalists, that it was nevertheless interdependent with the other regions of the United States.<sup>35</sup> When Eugene was a child, the Odum house in Chapel Hill was a meeting place for local liberal intellectuals bent on reforming the worst aspects of the American South, as well as visitors that were friends of this circle. Eugene grew up immersed in this culture of healing and reform.

Howard Odum was not only a scholar but also a prominent activist and political figure. He would likely argue that this was not merely an extra-academic interest, but was in fact the

---

<sup>33</sup> Madison "Potatoes Made of Oil" and Betty Jean Craige *Eugene Odum: Ecosystem Ecologist and Environmentalist*, (Univ. of GA Press: Athens, 2001) address H.W. Odum's intellectual influence on his children.

<sup>34</sup> Golley, *Ecosystem Concept*, Hagen, *An Entangled Bank* and Donald Worster, *Nature's Economy: The Roots of Ecology*, (Sierra Club: San Francisco, 1977) offer the most thorough examinations of post-war culture on Odum's thought.

<sup>35</sup> Craige, *Eugene Odum*, 5; Howard Washington Odum, *Southern Regions of the United States*, (Chapel Hill: UNC Press, 1936).



proper role for social scientists.<sup>36</sup> As with many of his American peers trained in the Progressive era, he understood his education in social theory to be a tool for enlightened reform. In one of Howard Odum's many public roles, he served as a New Deal administrator for the state of North Carolina. His research institution at Chapel Hill also received significant funding to study the effectiveness of New Deal programs. If we accept Sarah Phillips' characterization of New Deal politics, Howard Odum seems to fit into the category of industrializing and modernizing liberal.<sup>37</sup> Indeed, to address the problems of rural America, he championed education and urban manufacturing infrastructure instead of the politics of agrarian reform which characterized earlier New Deal efforts.

Howard Odum's understanding of the South, and his influence on Southern intellectual trends is hotly debated. His social theories, however, are critical to understanding Eugene's intellectual path. Howard figures prominently in Glenda Gilmore's *Defying Dixie*, a study of the decades leading up to the Civil Rights movement in the American South. She is mainly concerned with his stance on racial segregation, and concludes that he was an unfortunately hesitant gradualist. Gilmore understands his resistance to radical change as a product of his regional frame of analysis and his insistence on the near immutability of folkways. For Odum, the special regional character of segregation meant that it was a problem for Southerners to solve internally, and his understanding of folkways suggested that only glacial generational change could alter race relations. With these as his working assumptions, he argued that outside agitation and legislation were inappropriate, ineffective, and would likely lead to violent white backlash. In the broadest terms, Gilmore critiques Odum's understanding as patently ahistorical in that it denied agency to anyone but “the folk” while also minimizing the role of contingency.

---

<sup>36</sup> See quote by C. Vann Woodward in James C. Cobb, *Away Down South: A History of Southern Identity*, (Oxford: Oxford University Press, 2005), 124.

<sup>37</sup>Sarah Phillips, *This Land, This Nation: Conservation, Rural America, and the New Deal*, (Cambridge: Cambridge University Press, 2007).

She concludes that Odum “looked at the present, mistook it for the past, and predicted it to be the future.”<sup>38</sup>

Other scholars have shown that Howard Odum indeed understood the importance of history. James Cobb argues in his history of Southern identity, *Away Down South*, that one of Odum's contributions to debates at this time was his incorporation of historical understanding. However, Cobb also recognizes that this mode of thinking was not fully developed in Odum's work. While at first it may seem that these positions are irreconcilable, I argue that there is some useful middle-ground: Odum was sensitive to the role of history; however, some of his main sociological concepts suggested a teleological and linear story. While Gilmore overemphasizes Odum's lack of historical perspective, her conclusion that his conception of folkways limited historical possibility remains plausible.<sup>39</sup>

The question of the elder Odum's influence on his son Eugene is a difficult one. There are numerous parallels on the surface. In the academic realm both turned their disciplines in a new direction, wrote foundational textbooks, established research centers, successfully secured funding, and trained generations of graduate students. Howard encouraged Eugene to pursue many of these directions, often introducing him to important and influential people to speed him along this path. As Eugene finished his Ph.D., his father informed key contacts at Southern universities (including the president of UGA) that his son was looking to return to the region, and that ecology was a field poised to make “distinctive contributions in the South.”<sup>40</sup> Howard also encouraged Eugene early and continuously to work on a general ecology textbook (which

---

<sup>38</sup>Glenda Gilmore, *Defying Dixie: The Radical Roots of Civil Rights, 1919-1950*, (New York: W. W. Norton, 2007), 228.

<sup>39</sup>Glenda Gilmore, *Defying Dixie: The Radical Roots of Civil Rights, 1919-1950*, (New York: W. W. Norton, 2007), 228. James Cobb, *Away Down South: A History of Southern Identity*, (Oxford: Oxford University Press, 2005), 121-122.

<sup>40</sup>Letter from H. W. Odum, 1940, UGA Hargrett Library, Manuscript Collection, Box “Letters from H. W. Odum”.

eventually became *Fundamentals of Ecology*) and mentioned the project, apparently without Eugene's prompting, to several academic publishers.<sup>41</sup>

On a more substantive level, both father and son had faith in the primacy of scientific expertise, which led them to argue vigorously for an activist social role for scientists. In addition, Joel Hagen argues that Eugene continued to proffer a politics that was strongly informed by New Deal reformers like his father long after it had fallen out of fashion. Hagen sees this most clearly in Odum's "claims for a cooperative society and an activist government."<sup>42</sup> Eugene's public message, like his father's, was one of hope and reconciliation that sprang from a desire to create harmony where it did not exist. Finally, the preferred political strategy of each was to search for the middle-ground in order to unite opposing forces.<sup>43</sup> However, the insensitivity to history which Glenda Gilmore sees in the father is occasionally evident in his son Eugene as well. Specifically in his use of the ecosystem concept to analyze succession – or, in his words, "ecosystem development" – Eugene reduced history to the orderly march of biotic communities along a linear scale. He then took the problematic logical leap of applying this "law" of natural communities to the human community. Thus, Odum's understanding of American history reads like a typical New Deal conservation critique dressed up in modern scientific jargon: in the pioneer stage of society, humans used resources rapidly and inefficiently in order to expand quickly, but then – like biotic communities – they must develop negative feedback loops (self-regulate) in order to transition to a state of stability, or else suffer a dramatic

---

<sup>41</sup> See letters in UGA Hargrett Library, Manuscript collection, Odum, box A9.

<sup>42</sup> Joel Hagen, "Teaching Ecology During the Environmental Age, 1965-1980," *Environmental History*, October 2008, 713.

<sup>43</sup> For a clear example of this tendency, see the 1988 letter exchange between UGA ecologists and Newt Gingrich on environmental politics. Odum's letter applauds Gingrich's past environmental efforts and implores that he continue on this path. Odum closes with a postscript arguing that if Gingrich were to do so, he would increase the Republican parties image as a friend of the environment. Odum even went so far as to suggest that Gingrich speak at a UGA seminar on the role of government in environmental management. In contrast, UGA ecologist Bernard Patten refused to sign on to Odum's letter and drafted one of his own to Gingrich which expressed his disappointment with what he saw as the politician's superficial and self-serving interest in environmental protection. UGA Hargrett Library, Manuscript collection, "Letters to Gingrich" folder, 1988.

bust.<sup>44</sup> As these examples show, both father and son applied a rigid functionalist approach to the study of complex socio-environmental problems that perhaps led them to comprehend only a fraction of the possible paths towards an improved future.

In the early 1990s Eugene launched a personal exploration into his family's history and especially his father's legacy. He collected newspaper clippings and read academic articles published on Howard Odum's scholarship and activism. Eugene requested that family members mail him photos and record personal recollections of his father's life. While much of this was aimed at collecting and recording his family's past, one also senses that it was largely underpinned by a desire to secure a favorable legacy for his father. The archives reveal that Eugene hardly ever wrote or marked on materials that he read; however, likely in response to portrayals of his father as a gradualist on the issue of segregation, on a copy of Howard's 1949 publication, "This is Worth Our Best," Eugene highlighted all the passages that stressed the need for interracial cooperation and parity. In 1993, Eugene wrote to John Shelton Reed – a sociologist at UNC who, like his predecessor Howard Odum, focused on the American South – in an effort to bolster his father's public memory: "You are certainly correct that regionalism has left the field of sociology, but you are apparently unaware that the offspring of H.W. Odum's regionalism is alive and well in ecology and geography. We call it 'landscape ecology' . . . I believe you underestimate the effect his regionalism has had on other disciplines and on public policies that have enabled the south to snap out of its isolationist doldrums."<sup>45</sup> In the 1950s,

Eugene and his father had brainstormed about synthesizing sociological and ecological studies of

---

<sup>44</sup> Eugene Odum consistently argued that this was the lesson drawn from his ecological research that was most important for humans. He develops it first in an academic publication, "The Strategy of Ecosystem Development," *Science*, 1969, vol. 164, pp. 262-270; it is the central argument in his popular publications as well, including *Ecological Vignettes: Ecological Approaches to Dealing with Human Predicaments*, (Amsterdam: Harwood Academic Publishers, 1998). Odum was also prone to historically-insensitive statements like: "During the Industrial Age, our confidence in the omnipotence of science and technology has led us increasingly to divert from the path that would have been dictated by the common sense embodied in our traditional culture . . ." from Odum, *Ecological Vignettes*, pg 241. (emphasis added)

<sup>45</sup> All of this material drawn from a collection in transition: UGA Hargrett Library, Eugene Odum Manuscript Collection (uncatalogued), Box "H.W. Odum's Legacy"; Letter to John Reed, September 7, 1993.

the American South.<sup>46</sup> For the rest of his career, Eugene understood his work as furthering the intellectual and regional traditions laid by his father.<sup>47</sup> While it is not clear that regionalism had a significant intellectual impact on landscape ecology, it is clear that Howard Odum left inspiring tracks for Eugene to follow.

The first tracks Eugene followed as a child, however, were likely not his father's but those of birds. He was a precocious child and spent much time exploring the wild places around rural Chapel Hill. While in high school, he published his own magazine about birding in the area. He soon became friends with Coit Coker, the son of a UNC botanist and fellow amateur birder. Coit and Eugene walked the surrounding streams from source to outlet and made maps while observing birds.<sup>48</sup> As a child, Odum also read the works of Ernest Thompson Seton, founder of the Woodcraft movement, which taught basic natural history, wilderness survival skills, and “Indian lore”.<sup>49</sup> Odum kept these in his personal library the rest of his life. This early interest in his wild surroundings is perhaps not surprising for a man who would spend the rest of his life studying natural systems. His observations from this period show a remarkable attentiveness to detail and he remained forever fascinated with birds.

Odum received a B.A. in 1934 and an M.A. in 1936, both from UNC, and at the suggestion of his father he left the American South for his Ph.D. In 1939, Odum completed his dissertation on the heart rates of small birds under the direction of Charles Kendeigh at the University of Illinois. After expressing interest in returning to the South, Odum accepted a position as instructor of biology at the University of Georgia. As historian Jack Temple Kirby describes it: “An Odum had returned to the old sod.” The four years between his master’s degree

---

<sup>46</sup> Letter from H. W. Odum, 1952, UGA Hargrett Library, Manuscript Collection, Box “Letters from H. W. Odum”.

<sup>47</sup> Eugene P. Odum, “The Emergence of Ecology as an Integrative Discipline,” *Science*, March 1977, vol. 195, no. 4284.

<sup>48</sup> Betty Jean Craig, *Eugene Odum*, 13.

<sup>49</sup> UGA Hargrett Library, Manuscript Collection (uncatalogued), Box “Childhood Books”.

and his first teaching position would be the only ones that Odum lived outside of the American South.<sup>50</sup>

When Odum was hired at UGA in 1940, ecology was merely a sub-discipline of biology. This may seem strange to those who have witnessed what is now called the “Age of Ecology.” Indeed, since the Second World War, ecology has not only become an independent scientific discipline but has also become the most visible one in American popular culture. This meteoric rise in status is intimately connected to the simultaneous growth of the American environmental movement, and through the lens of Eugene Odum we can better understand the intricacies of this relationship.

As already stated, Odum became an international figure in the environmental movement, but this history did not take off until the late 1960s. When he first came to Athens, Odum was just a junior professor of zoology. His primary concerns were personal and professional. The university had yet to earn a respectable scholarly reputation and in his first couple of years Odum questioned whether he could stay in a place that was not more academically stimulating or socially progressive. On top of those concerns, Odum also battled what he considered to be the dominant misconception within biology departments that ecologists were merely glorified bird-watchers, not rigorous scientists. During World War II, much of his time and energy was directed away from ecological research and towards instructing doctors and nurses for the war effort. In 1944, Odum was already receiving inquiries about a general ecology textbook from publishers, as his father had pushed the project for years, but he responded to suitors with hesitation. For one, he noted that there were other ecologists who were better prepared to tackle this task. However, as they were apparently reluctant to do so, and he had exposure to several different schools of ecological training, he was interested in writing a textbook that would

---

<sup>50</sup> *ibid*, 31; Kirby, *Mockingbird's Song*, 251.

connect animal and plant ecology. But this would all have to wait, he explained in a letter to J.B. Bennett of MacMillan Company:

With present wartime medical training and other demands on my time, I don't know whether I can do this job now, or even if it is feasible at this time. I do believe, however, that after the war there will be a great revival of interest in ecology and in applied fields which spring from it such as conservation, forestry and wildlife management, etc. With all the distruction [*sic*] now going on, it will be practically essential for us to give more thought to our shrinking environment in more ways than one!<sup>51</sup>

While Odum's predicted “revival of interest” seems prescient, he could have never anticipated what in a few decades would become the “Age of Ecology”.<sup>52</sup>

As others have ably demonstrated, the decades following World War II were critical ones for American ecologists. Eugene Odum was at the center of this story.<sup>53</sup> He secured funding 1951 from the Atomic Energy Commission (AEC) to work on ecological research at the Savannah River Plant that eventually turned into a unique long-term research arrangement. In the early 1950s Eugene and his brother H. T. completed a research project, also funded by the AEC, on Eniwetok Atoll in the Pacific Ocean that later won the Ecological Society of America's Mercer Award for best research paper. In 1961, Odum helped found the Institute of Radiation Ecology at UGA, which provided a campus home for the study and teaching of ecology. In 1966, “radiation” was dropped from the title and over the course of the decade Odum authored successful grant proposals to a variety of sources that expanded the Institute's faculty and breadth of programs.

---

<sup>51</sup> Letter to J.B. Bennett, Feb. 7, 1944, UGA Hargrett Library, Manuscript Collection, Box A9.

<sup>52</sup> I suggest that we be careful in granting this prediction too much political insight as well. In keeping with my analysis in Chapter 2, it is important to recognize that at this point Odum defined applied ecology in relatively limited terms – as important to traditional conservation fields and objectives. He had not formulated a new environmental critique that was necessarily based on *ecological* knowledge (this is a central argument to my thesis: when scientists voice a critique, we should not assume that it is necessarily based on purely scientific knowledge, for they are just as influenced by their social context as any other critic). In addition, Odum is predicting that ecologists will be the ones to address the “shrinking environment”, not that a popular social movement (informed by science) must organize to tackle this challenge.

<sup>53</sup> Hagen, *An Entangled Bank*; Worster, *Nature's Economy*; Golley, *A History of the Ecosystem Concept*.

While accomplishing these institutional and research goals, Eugene was also hard at work synthesizing a new disciplinary approach. Building on a long intellectual and scientific tradition (combined with new sources of funding and methodologies), he and a few cohorts constructed what would come to be known as ecosystem ecology. The textbook that Eugene's father had encouraged since World War II was first published in 1953 as *Fundamentals of Ecology* and served as the lynch-pin that held the new discipline together.<sup>54</sup>

Although absorbed in the tasks detailed above, Eugene did not shed his early-cultivated interest in the American South. Throughout the 1940s, he and his younger brother, who was studying in the chilly climes of New Haven, Connecticut, corresponded frequently about their home region. And as H.T. finished his Ph.D. and prepared to enter the job market they discussed the possibility of him moving back south again in order to “cooperate on southern ecology.”<sup>55</sup> In the summer of 1949, after extensive brain-storming with his father, Eugene took a month-long trip along the Gulf coast of the Southern states in order to “ecologically define” the region. He concluded rather vaguely that the amount and type of water available was the determining factor in landscape variation.<sup>56</sup> This self-conscious interest in the nature of his home region continued to inform Odum's scientific and political values.

As Eugene, often accompanied by his brother, was working in the late 1940s and early 1950s to change the contours of American ecology, the environment around him was changing too. In fact, the decades following World War II were ones of *monumental* change in the South. In *Rural Worlds Lost*, Jack Temple Kirby details the region's transformation into the “New South,” a term that for Kirby means economic modernization, not necessarily racial or political. Only in the former sense was the South leaving “the primitive worlds of the village, farm, and plantation behind.” Indeed, “progress” in the form of growing industry and cities did come to

<sup>54</sup> I give more detailed coverage of the history of ecology leading up to this point in Chapter 2.

<sup>55</sup> Letter from H. T. Odum, Hargrett Collection, Folder “H.W. Odum correspondence.”

<sup>56</sup> UGA Hargrett Library, Manuscript Collection, Folder “Field Trips.”



the South in the years following the Civil War. Yet, the region retained its distinctly rural character well into the 20<sup>th</sup> century. Farmers outnumbered industrial workers into the 1940s and a majority of the South's residents lived in rural areas until the 1950s; therefore, the urbanized and industrialized South did not become a reality until after World War II.<sup>57</sup>

Much of this change can be located in the years between 1920 and 1960. The 1920 census was the first to show that the nation was now urban – meaning that a majority of its population lived in cities of at least 2,500 residents. Yet, not one Southern state fell in this category. The Great Depression and its associated farm relief programs, as well as the “demographic chaos” of World War II combined in the 1930s and ‘40s to stimulate the most punctuated changes in Southern society and landscape. The mechanization of farming that swept the South during this period pushed many tenants and laborers into the cities to look for jobs in the expanding industrial sector. By 1960, the character of the region had fundamentally changed; it was now majority urban and industrial – a new South.<sup>58</sup>

When the Odum family moved to Chapel Hill in 1920, they had moved into a distinctly rural landscape. As already noted, Eugene was intimately familiar with this environment and had no doubt been exposed to his father's talk of the defining features of the region. Even in 1940, when Odum began his career in Athens, the region retained much of its rural character. The growth of urban centers and farm mechanization was under way, but Athens was still a small town with few paved roads and only one trolley car. Many black residents of the area left during the Depression, but fields of cotton and corn still surrounded the town – most of them owned by whites and tended by blacks.<sup>59</sup>

---

<sup>57</sup> Kirby, *Rural Worlds Lost*, pp. xiii, xiv.

<sup>58</sup> In broad terms, this is the argument Kirby makes for the period of most dramatic demographic transition in *Rural Worlds Lost*.

<sup>59</sup> See Craig, *Eugene Odum*, pp.12-13 for a discussion of his familiarity with the rural areas around Chapel Hill; Eugene consistently reflected upon and referenced his father's scholarship on the South. For examples of this see: Eugene Odum, “The Attitude Lag” *BioScience*, May 1969, vol. 19, no. 5, pg. 403; Eugene Odum, “Input Management of Production Systems,” *Science*, January, 1989, vol. 243, pg. 181; Eugene Odum, “The Emergence of

By the time Odum published *Fundamentals of Ecology*, the South was no longer the decidedly rural one of his youth. This is not to say that the region was no longer an agricultural one; it remained so, but the nature of farming in the South had changed dramatically. As farm owners mechanized to keep up with competition from those in other parts of the US, the region's small farms that had relied on sharecropping and the mule were either abandoned or absorbed by the next generation farm, which was much larger and typically planted from fence line to fence line. The 1960s witnessed approximately a 60 percent increase in the number of large farms in the South, and large farmers' share of sales jumped from 47.2 percent to 72.1 percent. As Southern populations shifted from rural to urban, Southern agriculture moved from being labor to capital and input intensive.<sup>60</sup>

This demographic transition had dramatic consequences for the Southern landscape. Many abandoned fields and houselots simply went into old field succession. Others were actively reforested – overwhelmingly with loblolly or slash pine. And still others were incorporated into the “modern” farms. In short, the countryside was less patchy and various, more ordered and homogeneous.

The trend over this period was one of increasing farm size. The number of farms dropped drastically, and the total number of acres farmed also declined. At the same time, as testament to the increased productivity of the new agriculture, yields rose dramatically. In 1985, Odum and his colleagues completed a 50-year retrospective analysis of the Georgia landscape. It revealed that the 1950s were the most dramatic years in terms of both decrease in area farmed and increase in yield.<sup>61</sup>

---

Ecology as a new Integrative Discipline,” *Science*, March 1977, vol. 195, pg. 1291; For a description of the Athens countryside see Craige, *Eugene Odum*, 32.

<sup>60</sup> Kirby, *Rural Worlds Lost*, 348.

<sup>61</sup> Eugene Odum, “Input Management,” pg. 180, Fig. 4, graph A.

Saddled with its own economic, social, and environmental problems, the region in the post-World War II years was not exactly a hotbed of scholarly thought – certain programs at UNC being the obvious exception. When Odum began his academic career at UGA in 1940, there were no prominent ecologists working at Southern institutions. In fact, five years earlier his father had argued in *Southern Regions* that the exodus of educated Southerners – the “brain drain” – was one of the most serious impediments to Southern development. However, the abused and eroded soils of the South proved to be fertile ones for the seeds of ecosystem ecology.

These seeds were first planted in places very different from the American South. The concept of the ecosystem was suggested by an Englishman in 1935, and the first attempt to apply it in the field was Raymond Lindeman’s study of Cedar Bog Lake in Minnesota; however, the synthesis and popularization of a distinct discipline built around the ecosystem concept was largely the result of work in the American South. The Horseshoe Bend ecological research site is a useful lens through which to examine the influence of the dynamic Southern landscape on Odum and his colleagues at UGA. Contextualizing the research done at Horseshoe Bend also suggests answers to the question of why the ecosystem concept flourished in the region.

By 1965 Odum had acquired two areas for long-term ecological study in Georgia: the Savannah River Ecology Laboratory and the Marine Institute on Sapelo Island. However, these areas were both far from the Athens campus and both were also in the coastal plain. He was eager to add another location that would be closer to campus and allow for research in the piedmont region of the state.<sup>62</sup> In 1965 he learned that the UGA College of Agriculture was abandoning its dairy operation at the 35-acre Horseshoe Bend site, and Odum quickly secured use of the area for the Institute of Ecology. In what must seem to many faculty at today’s large

---

<sup>62</sup> Barrett and Barrett, eds., *Holistic Science*,

universities like an era worth mourning, this transaction was a simple and informal agreement, and the title was not officially transferred to the Institute of Ecology until 1984.<sup>63</sup>

Horseshoe Bend was appropriately named, for it sat in a near-180 degree bend in the river. The tract is thirty-five acres surrounded on three sides by the North Oconee River, the unbounded side rising gently into upland forest. After the College of Agriculture removed their dairy cows from Horseshoe Bend, the fields began to resemble those of much of the region – they went into secondary succession. Gary Barrett, the first ecology graduate student to work at Horseshoe Bend, built a concrete building to store equipment and research data. Two adjacent one-acre plots in the floodplain were partially enclosed with metal sheeting; one was the experimental enclosure, the other the control.<sup>64</sup>

The mission of Odum and other ecosystem ecologists was to understand the structure and function of natural systems, but they believed that this knowledge was almost worthless if it was not used to help minimize disturbance and maintain stability. Odum laid out the role of ecosystem ecologists in an article titled “The New Ecology”:

If biologists do not rise to the challenge, who will advise on the management of man’s environment – the technicians who have great skill but no understanding, or the politicians who have neither?<sup>65</sup>

The projects at Horseshoe Bend were designed to assess the landscape-level consequences of human perturbation of their environment, and they reflect a specific intent to address the problems that resulted from the South’s recent demographic and environmental transformations. They also reflect a burgeoning politicization in both Odum and “modern ecology”.<sup>66</sup>

---

<sup>63</sup> *Ibid.*, pp. 164-165; Blesh and Williams, *HorseShoe Bend: A Center for Ecological Teaching, Research and Service at the University of Georgia*, pg. 6.

<sup>64</sup> Ecologists label regrowth “secondary succession” when it follows a disturbance that mainly affects the plants in an area. Primary succession refers to the process of soil creation and regeneration that follows dramatic disturbances.

<sup>65</sup> Eugene Odum, “The New Ecology,” *BioScience*, vol. 14, no. 7, Ecology (Jul., 1964), pp. 16.

<sup>66</sup> Odum is commonly referred to as “The Father of Modern Ecology,” a moniker some suggest was given to him by another famous Georgian: Jimmy Carter.

The two major phases of research at Horseshoe Bend were old-field succession studies (1965-1975) and agroecosystem studies (1978-2000). Although both phases indicate Odum's interest in studying landscape change, and he always understood his science as applied, the old-field studies lean more to the theoretical side, while the second phase is more obviously applied and motivated by a proactive agenda. Both were designed as long-term studies that employed what Odum, somewhat ambiguously, called the “mesocosm” approach. Essentially, a mesocosm is an intermediate size system that offers a greater degree of realism than a laboratory, yet is small enough to control for variables and to observe easily. The mesocosm approach allowed ecologists to study the reality of the dynamic environment and also extrapolate from the experimental setup to real-world problems.

The old-field studies were mainly concerned with perturbation theory – understanding how natural systems respond to disturbance.<sup>67</sup> As with Savannah River, Horseshoe Bend was an ideal experimental site for ecologists to study succession – a process characteristic of their broader *place*. The first old-field study was Gary Barrett’s doctoral research, completed under Odum's direction. Barrett's choice of “disturbing agent” is telling. Initiated in the wake of the USDA’s aggressive fire ant and malaria eradication programs in the South and the publication of *Silent Spring*, Barrett’s research attempted to study the non-target effects of insecticides on the environment. Barrett sprayed the experimental enclosure with Sevin, a supposedly short-lived pesticide, then tracked changes in small mammal populations, plant-herbivore relationships and litter decomposition rates. He argued that “only by considering the whole ecosystem . . . will man be able to better predict the long range results of environmental contamination.” The UGA ecologists saw a fundamental problem with research that did not explicitly address real-world questions. An Institute of Ecology report describes the motivation for the old-field studies:

---

<sup>67</sup> Barrett and Barrett, *Holistic Science*, 164; Eugene Odum, “The Mesocosm,” *BioScience*, Vol. 34, No. 9, (Oct., 1984), pg. 558.

Much of man's difficulty with pollutants stems from the fact that pesticides are tested at one level (that of individual organisms) and then used at another level (that of the ecosystem) without sufficient understanding of the deleterious "side effects" that can develop.

The study indicated "longer-term side effects on small mammal populations, plant herbivore relationships and rates of litter decomposition" – in sum, non-target effects of even a mild insecticide. In addition to studying "natural" disturbances like floods, later perturbation experiments also studied the effects of a controlled burn, pesticides and fertilizers.<sup>68</sup>

In the Spring of 1978 Odum initiated a new phase of research at Horseshoe Bend that was less tied to ecological theory, and was noticeably more concerned with solving human-environmental problems. Odum, D.A. Crossley, Jr., and R.L. Todd began a series of agroecological experiments that compared conventional and no-till farming practices. The ecologists further subdivided the enclosed plots and randomly assigned the new divisions a tillage scheme. The plots were then regularly observed in an effort to determine how the different tillage practices affected soil characteristics and the biotic community. A major premise of the group's argument in their funding proposal to the National Science Federation (NSF) was that the project would yield workable solutions to the problems of industrial agriculture:

Ultimately, agricultural systems are seen as ecosystems in which the artificial barriers between basic and applied ecology can be dissolved, a framework for the integration of man's systems with "natural" systems.

---

<sup>68</sup> Gary Barrett, "HSB insecticide dissertation," pg. 91, box A76, Odum collection Hargrett rare book and manuscript collection, UGA; *Ibid*, pp. 165-169; "Institute major programs" Odum collection, Hargrett rare book and manuscript collection, UGA, Manuscript 01-019, box 2, Folder 17, page 5; Barrett and Barrett, *Holistic Science*, pg. 165; "Natural" events like floods are often-times largely exacerbated by human actions, like deforestation and the construction of impermeable surfaces.

Whereas the old-field studies aimed to *understand* landscape change, the no-till studies were designed to *inspire* landscape change. It was a more active and politicized ecosystem ecology. Odum and his colleagues made sure to include theoretical justification in their grant proposals, but one can sense that they were more immediately concerned with how “better agroecosystem management may be gained.”<sup>69</sup>

The ecosystem-level problems that the UGA scientists hoped to address were common to much of the nation by 1978, but their appearance was most recent in the American South. When Odum assessed modern agriculture using the ecoenergetics model, two troubling conclusions were apparent: the new agriculture was much more dependent on auxiliary energy inputs in the form of “fertilizers, pesticides, and fuel-powered machinery,” and species diversity was low. Both of these problems reflected the industrial nature of the farm operation – using new labor-saving machinery and monocropping to achieve maximum yield.<sup>70</sup>

Odum and his cohort warned that not only was this type of homogenized and heavily-stressed system much less stable than others, but it also resulted in soil erosion, nutrient depletion and pollution in the form of fertilizer and pesticide runoff. Arguing that the status quo externalized many costs, they warned that the “‘economies of scale’ that accrue from large-scale industrialized farming” might eventually result in environmental problems with their own “diseconomies of scale.”<sup>71</sup>

Odum and his colleagues hoped that their comparison of no-till and conventional till practices would lead to “more harmonious” farming methods. In a no-till system, the crop

---

<sup>69</sup> Odum, Crossley, and Todd, “NSF Proposal: Analysis of Agricultural Ecosystems: No-till and Conventional Cultivation Practices,” 11/1/78, pg. 2-3. UGA Odum collection, Hargrett rare book and manuscript collection, box A151.

<sup>70</sup> *Ibid*, 3.

<sup>71</sup> *Ibid*.

residue is left on the soil surface, resulting in a layer of mulch buildup. They found that no-till management had several benefits. For one, it reduced surface runoff and erosion. No-till practices also improved soil moisture retention and resulted in slower leaching that preserved more nutrients near the surface.<sup>72</sup>

In a 1989 publication, Odum placed the results of their agroecological research at Horseshoe Bend in the context of 20<sup>th</sup> century Southern agricultural history. He detailed the transition from a “patchy” to uniform landscape, noted the abandonment of farmland and simultaneous increase in productivity per acre, and emphasized the region's urbanization. Odum suggested that the region had recovered some of its productivity since sociologist Gerald Johnson's 1930s portrayal of “the South's 'wasted land.’” He also revived his father's quest to close the region's “chasm between the potentialities and actualities.” To this goal of maximum productivity, the younger Odum added environmental protection and suggested that “a major change, an about-face, in the approach to management of agriculture” was necessary.<sup>73</sup>

Like most Institute of Ecology work, the research at Horseshoe Bend was designed as a long-term project. Looking back on his work, Odum noted that the purpose of long-term field studies was to determine the effect of environmental change. The several decades before ecological research began at Horseshoe Bend were indeed ones of dramatic transformation in the Southern landscape. The scientists who worked there responded to environmental dynamism by formulating projects that assessed its effects and offered practical management solutions.<sup>74</sup>

---

<sup>72</sup> *Ibid*; Hendrix et. al., “Detritus Food Webs in Conventional and No-tillage Agroecosystems,” *BioScience*, June 1986, Vol. 36, No. 6, pg. 374.

<sup>73</sup> Eugene P. Odum, “Input Management of Production Systems,” *Science*, January 1989, vol. 243, pp. 177-181.

<sup>74</sup> “Retro-Analysis Final Report”, UGA Odum collection, Hargrett rare book and manuscript collection, box A122.



That the South in the years following World War II was not a place of equilibrium is evident. In addition to the national experience of social and demographic disruption following the Great Depression, the Dust Bowl, and World War II, the South also experienced urbanization, industrialization, and nothing short of an agricultural revolution.

The convergence of national and regional disruption in the post-war South lent a special character to the development and popularization of the ecosystem concept. In the hands of Odum and early ecosystem ecologists, the concept was a reaction to industrial cities and farms and a frame that allowed ecologists to study human action as a component of natural systems.

The tumult in the postwar American South had a similar effect as did the agricultural and industrial revolution in late eighteenth century Britain. The rural lands of both were enclosed and depopulated, and their cities expanded rapidly. Just as the nature essayists of industrializing Britain looked to the natural world for order and respite, so too did Eugene Odum. Odum's holism was a more modern one, to be sure. His was a scientific, materialist holism – much less idealist than the British nature essayists. Whatever its specific incarnation, Donald Worster notes that holism has been proffered “by those who have an intense distaste for the fragmentation of the industrial culture and its isolation from the natural world.”<sup>75</sup> Eugene Odum fits this characterization.

The social and environmental problems of industrialization are a consistent theme in Odum's writing. As early as 1955, Odum argued that industrialization in Georgia made basic studies of stream ecology “one of the most important fields in the state.” In a 1989 article, Odum continued to insist that these were “large-scale ecosystem-level” problems that required a complete reassessment of “management of agriculture, power plants and

---

<sup>75</sup> Kirby, *Rural Worlds Lost*, xv; Worster, *Nature's Economy*, 13; *Ibid.*, pg. 16; Worster, *Nature's Economy*, 21.

industries.” Throughout his career at UGA, Odum used the ecosystem as a frame to examine the impact of industrialization on society and the environment.<sup>76</sup>

It is important to note that the ecosystem was not just a lens for environmental analysis. Odum believed that it could also be used to study and manage social issues.

Agriculture was the critical juncture:

Maximizing for yield without regard to other consequences is producing very serious *backlashes, both environmental and social* . . . man does not differ from rats or monkeys in his need for an environment that permits a stabilized social behavior.

Odum drove the connection home with photos in his textbooks as well. The caption beneath an aerial photo of a ramshackle house surrounded by nearly lifeless fields and gullies reads: “Farmland in Mississippi ruined by soil erosion. Such abuses leave abandoned houses and poor people.” As with many other popular scientists of the postwar decades, Odum's analysis of social and political questions was often crudely biological.<sup>77</sup> The implications of this for the direction of the growing environmental movement were significant and will be discussed in more detail later.

Odum's study of both human society and the non-human environment had important implications for the refining of ecosystem theory and the development of an ecology internally different from previous paradigms. Prior to Odum and ecosystem ecology, Frederick Clements' theory of plant succession and climax dominated ecological thought. Clements' approach was also holistic. He studied what he conceptualized as coherent groups of interacting plant populations and posited that these communities were actually superorganisms – as these populations interacted and matured they functioned as a single

<sup>76</sup> Eugene Odum, “Notes on Info for Alumni Committee,” 1955, UGA Odum collection, Hargrett rare book and manuscript collection, Manuscript no. 01-019, Box no. 1, Folder no. 2, pg. 2; Eugene Odum, “Input Management,” *Science*, pg. 1.

<sup>77</sup> Eugene Odum, *Fundamentals of Ecology*, pp. 412-413; *Ibid*, 25

organismal unit. Donald Worster has suggested that Clements' pioneer experience on the Great Plains taught him that humans were decidedly extraneous to natural communities. For Clements, as humans moved into an area, nature receded.<sup>78</sup>

This was not how Odum conceptualized the study of ecology. For Odum, and many others familiar with the Southern landscape, the presence of humans did not mean the absence of nature. The two were often intimately connected. Humans have profoundly and visibly shaped much of even the most rural countryside in the region. Throughout the 19<sup>th</sup> and early 20<sup>th</sup> century, farmers across the South were forced to shift fields when the soil refused to respond to their coaxing. If you have a keen eye, you can still read parts of this story in the land. Terraces plowed into cotton fields to slow erosion still snake through cattle pastures and lowland hardwood stands. Erosion gulleys still slice through the land, too. One such gully in Georgia is so gaping and dramatic that it has been preserved as a state park: Providence Canyon. Across the South, places that might at first seem undisturbed actually reveal the long history of extensive, shifting agriculture.<sup>79</sup> Unlike Clements' framework, Odum's ecosystem approach – crafted in the Southern landscape – encouraged the analysis of human action.

This conception is also evident in many others familiar with Southern histories and landscapes. One of the most consistent themes in the 20<sup>th</sup> century literature of the region is the mutual reliance of nature and culture. The tie – an often tenuous one – between humans and their environment is a central one to these authors. William Faulkner, and Janisse Ray have both written about the connections between landscape, society and identity in the

---

<sup>78</sup> For a good overview of Clements' theory, see Hagen, *An Entangled Bank*, pp. 20-24.

<sup>79</sup> Mart Stewart, "If John Muir had been an Agrarian: American Environmental History West and South," *Environment and History*, 11 (2005): pg. 139-162; For more on Providence Canyon see Paul Sutter, "On Georgia's Little Grand Canyon," *Environmental History* 11: 830-834. Sutter points out that much of the conserved land in the South is in the public domain because, like Providence Canyon, it had been abused and was of little use to farmers.

South. In Faulkner's "The Bear," wild nature is not portrayed in the same transcendental/religious light that it often is in the American West; it is simply a "not farm," "unaxed." The bear is not the master of non-human nature, but in fact an animal who has tied himself to humans; he has made his living off of corn cribs and farm animals. The setting of Janisse Ray's memoir, *Ecology of a Cracker Childhood*, is emblematic of the long-standing, albeit often contested, marriage between Southerners and their environment. Ray was born into her beloved piney woods of rural south Georgia "from people who were born from people who were born from people who were born here." Her woods are not stately "pristine" pines, but are interspersed with farms and even more obvious signs of man's presence: a junkyard of outmoded farm equipment, broken appliances, and leaking automobiles. In Ray's understanding of the South, "Our culture is tied to the longleaf pine forest that produced us, that has sheltered us, *that we occupy*." There were indeed wild places in the 20<sup>th</sup> century South, but long-settled agricultural terrain had so defined the region that one could not remove humans from nature. Southern literary figures explored this theme; Odum – and ecosystem ecology – reflected this understanding.<sup>80</sup>

Eugene Odum saw himself as heir to his father's role as advocate for Southern reform and healing. In retirement, he undertook a project that he was fond of calling *Southern Regions Revisited*, a self-conscious attempt to continue the mission and legacy exemplified by his father's classic study of the region.<sup>81</sup> Updated with the authority and technical mastery of a modern science, he envisioned the philosophy of regionalism as more

---

<sup>80</sup> My interpretation of Faulkner is drawn from Stewart, "John Muir," 148; Janisse Ray, *Ecology of a Cracker Childhood*, (Milkweed: Minneapolis, 1999), pg. 271 (emphasis added).

<sup>81</sup> Unfortunately, this project was never finished, however he alluded to it frequently and the archives reveal that he had actually "put pen to paper," so to speak. UGA Hargrett Library, Manuscript Collection, Box "Popular Works – Manuscripts/Reprints".

useful than ever, but he understood that the new torch-bearers faced different challenges than did his father's generation. For Eugene, the solutions that development-minded New Dealers like his father had suggested were largely successful in curing the contemporary “ills of the South.” But as he wrote in 1989, this appeared a Pyrrhic victory, for “Georgia and many other southern states are well on their way to becoming 'developed,' with all the different problems that come with that status.”<sup>82</sup>

Odum's drive to solve these new problems was so strong that when his attempts to do so were at risk, he often tried to *will* change. When questioned on his belief in the balance of nature, Odum responded simply that nature *must* be purposeful and regenerative. If you believe otherwise, he claimed, “then there's no order, and why bother about conservation? You can't possibly take that viewpoint and try to do something about our problems.”<sup>83</sup> It is clear that Odum's science was consistent with his values, and that he used this science to urge others to accept his values. In the language of ecosystem ecology, there was a powerful “positive feedback loop” between Odum's science and politics. This is not an inherently problematic situation, as science – and academic work in general – should be balanced with moral, ethical and political reflection. Yet Odum often posited his most far-reaching and speculative ideas about the state of nature as principles or laws, not hypotheses. He accepted and entered the dichotomized debate of a uniform, ordered nature versus a neo-Darwinian, chaotic one. The acceptance of an undifferentiated “nature” – which neither side of the debate questioned – not only polarized these discussions, but also prevented Odum from formulating a scientific vision that was more attune to subtlety and competing interpretations. The tragic irony is that his scientific innovations produced a new

---

<sup>82</sup> For Odum on his ecology as regionalism see Eugene Odum, “The Emergence of Ecology as a New Integrative Discipline,” *Science*, March 1977, Vol. 195, Number 4284, pg. 1291; Eugene Odum, “Input Management,” pg. 181.

<sup>83</sup> Tom Chaffin, “Whole-earth mentor: A conversation with Eugene P. Odum,” *Natural History*, October 1998. Accessed online 1/16/09, 2:57 p.m.

way of understanding the environment, yet the intellectual atmosphere in which it was produced prevented him from doing so.<sup>84</sup> Perhaps one of the greatest lessons we can learn from this is the importance of subjecting our own assumptions to the same – if not a higher – level of scrutiny as we reserve for those of others.

While many of Odum's assumptions may be legitimately challenged, his intentions were clearly admirable. Jack Temple Kirby has correctly characterized Eugene Odum as a reformer with a “self-consciously Southern mission” to better the region through science.<sup>85</sup> Not only was his goal to awaken others to the balance of nature’s system, but also to create equilibrium where it did not exist. Odum's early exposure to the Southern liberalism of Chapel Hill coupled with his aversion to the region's postwar landscape changes to inspire a platform for change rooted in a sense of place. In his role as synthesizer and popularizer of ecosystem ecology, Odum fashioned the course for a generation of ecologists out of the shifting cultural and physical landscapes of the American South.

---

<sup>84</sup> One could speculate that the framework of these debates are evidence of the polarizing effect that the conformist culture of cold war America had on topics well outside of foreign affairs.

<sup>85</sup> Kirby, *Mockingbird Song*, xix.

## Searching for the *Fundamentals of Ecology*:

### Eugene Odum, Ecosystem Ecology, and Environmental Politics

In early March of 1970, as momentum accelerated towards the first Earth Day, Eugene Odum wrote to David Hicks, a colleague and former student, of the immense influence that the growing environmental movement was exerting on the science of ecology:

The public has redefined “ecology” for us! It is no longer an obscure division of biology, but the science of environment (or “Environmental housekeeping” as the word means literally). Thus, on every campus, large and small, everybody and everything is focused on whoever announces that he is an “ecologist”.<sup>86</sup>

Odum was referring to both the rapid popularization and politicization of ecosystem ecology, a field that he helped define in the 1950s. Into the early 1960s, Odum and others focused on refining the theories and methodologies that differentiated ecosystem ecology from earlier approaches. Foremost in this process of differentiation was a concern with countering the notion that ecologists were merely glorified bird-watchers – that they were not “true” scientists. This task was largely complete by the early 1960s; Odum and his cohort enjoyed academic respect and massive government support.<sup>87</sup> During this same period, Odum had also portrayed ecology as a field applicable to conservation. As public environmental concern and an associated popular interest in ecology grew in the 1960s, the social role of ecologists was thrown into question.<sup>88</sup> In the

---

<sup>86</sup> Letter to David Hicks, March 9, 1970, UGA Hargrett Library, Correspondence.

<sup>87</sup> Golley, *A History of the Ecosystem Concept*, 1993.

<sup>88</sup> Dorothy Nelkin, “Scientists and Professional Responsibility: The Experience of American Ecologists,” *Social Studies of Science*, Vol. 7 (1977), pp. 75-95.

dynamic times surrounding Earth Day 1970, Odum was perplexed by this new situation. Doors that led to popular authority were thrown open, but he feared that taking this route would put at risk the hard-won academic integrity of his field. Hoping to prevent this damage, Odum continued in his letter to Hicks, “Be sure to exert leadership because I’m afraid the coming years will see a lot of pseudo-science and a flood of bad books on this subject!”<sup>89</sup>

What is revealing about Odum’s reflection on this situation is not only the contests over ecological authority, but also his awareness of the degree to which popular environmental politics affected ecological science. While his understanding of this relationship is limited, it is significant that he recognized it as an important one. I argue that historians have too often overlooked the interaction between ecological science and environmental politics; when this relationship has been addressed, it is often assumed that the knowledge flowed unilaterally from the science to public politics.<sup>90</sup> As a result, scholars have understood this relationship as one where ecologists led the budding environmental movement, in the sense that the scientists provided invaluable insight and defined direction. In contrast, by examining the life and works of Eugene Odum, this exploration will emphasize the ways in which changing ideas about environmental relations and ethics in postwar America influenced the science of ecology.

To do this I will focus on another oversight, the historical development of ecosystem ecology. Joel Hagen’s history of the field, *An Entangled Bank*, is largely a study of the internal workings of the science – its concepts, techniques, and institutions.

---

<sup>89</sup> *Ibid.*

<sup>90</sup> Perhaps much of this emphasis on ecology’s influence can be traced to Donald Worster’s landmark history of the science, *Nature’s Economy*. Worster is concerned with “how this science shapes man’s view of his place in nature” because “ecology has deeply affected the conservation movement.” He concludes that “after 1945, conservation became much more amenable to a preservation policy based on ecology.” Worster, *Nature’s Economy*, 1977, pg. 256. While Worster’s analysis of the science’s influence is illuminating, there has been too little emphasis of the ways in which the science developed in response to the same impulses that shaped popular environmental concerns.



This approach misses the ways in which ecosystem ecology developed in response to broader social trends. When Hagen does address the interaction between the science and popular politics he suggests that it is a static one, where ecosystem ecology directs “social responsibility and environmentalism.”<sup>91</sup> However, when one examines ecosystem ecology as a part of its broader context, it is clear that the science was often *responding to* dynamic social ethics and concerns.

Frank Golley's *A History of the Ecosystem Concept in Ecology* pays more attention to the evolution of the field. Golley, an accomplished ecologist and colleague of Eugene Odum's, posits that the field developed in three discrete stages: an early stage that developed simultaneously with community ecology in the early 20<sup>th</sup> century; an active stage of institution-building and theory-testing from the 1950s through the '70s; and, a mature phase in which workable ecosystem experiments gained a foothold.<sup>92</sup> As an active participant throughout much of this time, Golley was acutely aware of change in the field. However, he attributes most of the internal conflicts to differing philosophical positions – reductionism versus holism, for instance – thus minimizing, and sometimes obscuring, the role of politics. Golley points out that both environmentalists and industry leaders latched onto the ecosystem concept for self-serving (and opposing) reasons, and argues that ecosystem ecologists “passively accepted the buzzing activity.”<sup>93</sup> This exploration aims to pay attention to both the change of the field over time and the ways that *ecologists actively engaged in the political contests* of the postwar decades.

---

<sup>91</sup> Joel Hagen, *An Entangled Bank*, pg. 212; In his classic essay “Transformation of the Earth: Toward an Agro-Ecological Perspective of History,” *Journal of American History*, vol. 76, no. 4, (March 1990), 1087-1106, Worster also assumes that the 1971 edition of *Fundamentals* represents *the* picture of ecosystem ecology, as he cites it as the definitive vocalization of the ecosystem concept when in fact Odum's definition shifts in important ways.

<sup>92</sup> Frank Golley, *A History of the Ecosystem Concept in Ecology: More Than the Sum of It's Parts*, (New Haven; Yale University Press, 1993). It is interesting to note that the developmental pattern which Golley proffers for the field of ecosystem ecology is similar to the way that many ecosystem ecologists viewed ecological succession. E. P. Odum frequently suggested that this “sigmoid pattern” fit many human and non-human development trends.

<sup>93</sup> *Ibid*, 3.

As detailed in Chapter One, Odum's environmental values were early informed by the liberalism of the New Deal South as well as the rapid industrialization and urbanization of the region following World War II. This chapter advances the story by surveying the ways that Odum's early environmental politics were then transformed in the late 1960s and early 1970s by his exposure to the growth of the broader environmental movement. Just as with many other Americans, Odum ratcheted up his environmental politics in the punctuated years of 1969 and 1970. This trend can be seen anecdotally in the meetings and symposia that he chose to attend. Up through 1968, Odum had concentrated almost exclusively on academic and professional gatherings, but from 1969 to 1971 he turned his attention dramatically towards gatherings more engaged with public environmental politics: the Georgia Conservancy Conference, Fontana Conservation Roundup, Southeastern Water Lab – Freshwater Biology and Pollution Course, and many others.<sup>94</sup> In a 1969 *BioScience* editorial, Odum urged his fellow scientists to communicate to the public the need for a new attitude towards the environment. He closed by highlighting the efforts of Georgia citizens, who, combined with politicians and scientists, were taking significant steps towards protecting the Georgia coast.<sup>95</sup> In the months leading up to the first Earth Day, Odum received national media attention for his role in ushering in the “Age of Ecology.”<sup>96</sup>

Energized by the growing environmental movement, Odum was not content to separate his science and politics. Instead, he attempted to politicize ecosystem ecology. Student evaluations from his Fall 1972 “Principles of Ecology” course applauded his method of using “current ecology [environmental] dilemmas” to teach the science. Odum's students also stressed that after his class they recognized the need to act with sound ecological knowledge, for as one typical respondent put it, “without it, we are doomed.”<sup>97</sup> As these students' accounts from 1972

---

<sup>94</sup> UGA Hargrett Library, University Collection 97-045, Boxes 1-6.

<sup>95</sup> Eugene Odum, “The Attitude Lag,” *BioScience*, vol. 19, no. 5, (May 1969), pg. 403.

<sup>96</sup> Betty Jean Craige, *Eugene Odum*, xii.

<sup>97</sup> UGA Hargrett Library, Manuscript Collection, box “Class Material,” folder “Zool 450/854 *Principles of Ecology* Fall Quarter 1972.”

illustrate, Odum's principles of ecology rested on engaging public concerns. The budding of modern environmentalism not only affected Odum's personal politics, but also the science of ecosystem ecology.

His textbook, *Fundamentals of Ecology*, provides a useful window through which to view this exchange. First published in 1953, Odum's textbook soon became the standard text in ecology classes and earned him a leadership position in the field.<sup>98</sup> Several things set *Fundamentals* apart from its predecessors. It opened with a discussion of general principles, most famously the ecosystem concept, which unified the previously separate fields of plant and animal ecology. The next section surveyed the habitat approach to ecology, whether freshwater, marine, terrestrial, or estuarine environments. And the final section attempted to show how applied ecology could be useful to land managers and policy makers.

The synthesis of two preexisting ideas was central to Odum's formulation of ecosystem ecology. First was the concept of the ecosystem, which under Odum was a malleable landscape unit of living and non-living entities that interacted in an intimate manner. The ecosystem was defined by the scientist relative to their specific research interests. Sir Arthur Tansley coined the term “ecosystem” in the 1930s, but until Odum locked onto it in the 1950s, it was merely a theoretical abstraction for ecologists. Odum's creative contribution was in recognizing that the brilliant biogeochemical work of G. Evelyn Hutchinson and his student Raymond Lindeman could add experimental rigor to the ecosystem concept. Hutchinson and Lindeman's work focused on how nutrients cycled through the environment; through birth and assimilation, death and transformation, they traced the path of specific elements. The biogeochemical approach emphasized the interaction between living and non-living elements of the environment, for the weathering action on a rock was just as central to the scientists as the death of a bird. Odum

<sup>98</sup> In his book, prominent ecologist Frank Golley argues that it was Odum's 1953 textbook that gave ecosystem ecology the conceptual and methodological basis that it needed to coalesce. Golley, *A History of the Ecosystem Concept*, pg. 1.

used this methodology drawn from the physical sciences as a way to quantitatively describe the *structure* and *function* of an ecosystem. This emphasis on structure and function became an integral part of ecosystem ecologists' efforts to push their work beyond the descriptive work of scientific natural history. In the first edition of *Fundamentals*, Odum offered this synthesis as the foundation for a new approach to the science of ecology – an approach entirely dependent upon highly-technical analysis of energy flows and nutrient exchange rates. After the first edition of *Fundamentals*, federal nuclear agencies provided Odum and his cohort with the resources – both in terms of infrastructure and finances – to further perfect the new quantitative techniques.<sup>99</sup> These methodological innovations mark the most significant changes between the first and second edition of Odum's *Fundamentals of Ecology*.

Now in its fifth edition, Odum's textbook is widely viewed as the definitive statement of ecosystem ecology. In a 2001 survey of biologists, *Fundamentals of Ecology* received the most votes for the book that “made the greatest impact on their career training”; the classic works by Rachel Carson, Charles Darwin and Aldo Leopold followed Odum's textbook.<sup>100</sup> Too often commentators assume that the textbook is static, when in fact it changed significantly over time. The first three editions – 1953, 1959, and 1971 – correspond to distinct periods in American environmental thought, and thus provide a useful chronological framework for my analysis. At first, this seemed only a happy coincidence. Yet, upon further examination it became clear that the timing of these three editions is in fact critical to understanding how and why ecosystem ecology developed the way that it did.

Each edition, whether prompted by internal or external factors, reflects the evolving attitudes towards nature and environmental management in postwar America. The 1953 edition

---

<sup>99</sup> Scott Kirsch, “Ecologists and the Experimental Landscape: The Nature of Science at the US Department of Energy's Savannah River Site,” *Cultural Geographies*, 14, 2007, 485-511.

<sup>100</sup> Gary Barrett, Karen E. Mabry, and Vassiliki Betty Smocovitis, “Twentieth Century Classic Books and Benchmark Publications in Biology,” *BioScience*, vol. 52, no. 3, (March, 2002), pp. 282-286.

is firmly rooted in traditional American conservation, emphasizing rational management of important natural resources. By 1959, *Fundamentals of Ecology* reflects an ambivalent concern with the new Atomic Age and the ability of humans to “destroy” nature. However, these realizations and anxieties did not prompt much of a political swing in the tone of the book. The first two editions are focused on internal methodological and conceptual problems. The most dramatic shift comes in the third edition. Energized by his work with citizens to protect Georgia's marshlands and inspired by the atmosphere of the first Earth Day, Odum drafted the third edition in a new tone. As Odum revised the text in 1969 and 1970, he collected stacks of newspaper clippings about environmental issues and coverage of specific disasters.<sup>101</sup> He eventually included these in his text as evidence of the need for “ecology.” Feeling the urgency of the times – and equally concerned about risking his field's recently-won status within the biological sciences – he attempted to imbue the field with an activist political agenda. Odum adopted the emerging popular jeremiad. The fear that humankind is “faced with ultimate rather than local limitations” rings throughout its pages. Public response to this new ecology was amazing: annual sales of the textbook increased nearly 700 percent between the years 1969 and 1971.<sup>102</sup> The shifting environmental politics of these critical decades forced Odum to continually rework the fundamentals of ecosystem ecology. Read in this way, the first editions of Odum’s classic text reveal a much more reciprocal relationship between science and society than many today envision.

In addition to the shifting environmental concerns mirrored in *Fundamentals of Ecology*, there are more subtle changes that also suggest the extent to which popular politics influenced the young scientific field. One of these is Odum’s rhetoric. As others have noted, the tone of environmental critique sharpened in the late 1960s, at least in part due to the confrontational

---

<sup>101</sup> UGA Hargrett Library, Manuscript Collection, Box A72.

<sup>102</sup> Betty Jean Craige, *Eugene Odum*, pg. 175, n. 2.

tactics of the youth movement.<sup>103</sup> *Fundamentals of Ecology* parallels this trend. These visible and influential youth, largely students, had more political power than in previous decades. This encouraged Odum to focus less energy on his academic peers and more on communicating with enthusiastic youth. Odum also reworked his definition of conservation, broadening it to more closely represent contemporary understandings. Finally, Odum rethought the relationship between health and ecological science. In the 1950s, he was hesitant to talk about health, either environmental or human. At this point, Odum gave minimal attention to public health, and he defined it as the increasingly manageable issue of infectious disease. Yet, by the third edition of *Fundamentals*, he wrote more openly about health. This text linked environmental and public health in interesting ways, and the latter he redefined as the product of a stressed environment. By tracing these overlapping themes through *Fundamentals*, we can see how Odum reformulated ecosystem ecology in the image of popular American politics.

As Joel Hagen has correctly noted, “Textbooks may be a pedestrian form of literature, but they play a critical role in the training of neophyte scientists.” Not only do they outline general concepts and theories, but they also expose students to the norms and goals of the discipline.<sup>104</sup> Focusing on different editions of the same text highlights the changing ways that Odum defined the discipline for peers and students. The introduction of each edition suggests the motivation for the revisions, and the manipulations within the text are significant because they represent a degree of intention that is much harder to infer when one is not comparing revised editions. In short, it is fair to assume that Odum made the changes which I trace here because he felt the previous meaning and language was inadequate or inappropriate for a new time. It is also important to foreground the audience for which Odum wrote. *Fundamentals of Ecology* is a

---

<sup>103</sup> Adam Rome, “‘Give Earth a Chance’: The Environmental Movement and the Sixties”, *Journal of American History*, September 2003, pg. 541-552.

<sup>104</sup> Joel B. Hagen, “Teaching Ecology During the Environmental Age, 1965-1980,” *Environmental History*, 13 (October 2008), pg. 704.

textbook. He and his editors expected, beginning with the first edition, that most of the biological science community and a large portion of American university students would pick up a copy.<sup>105</sup> Therefore, the changing tone of his writing represents intended and historically significant changes in rhetorical strategy.

The limitations of this approach are obvious. As important as *Fundamentals* was, and still is, to ecosystem ecology it does not represent the field in full. The way that Odum interacted with popular politics is by no means the definitive template for the exchange between post-war science and politics – a story much too large and complex to be told here. While these limitations temper the conclusions that follow, they do not render this story incidental. Odum was both an internationally-recognized environmentalist and a leader in the field of ecosystem ecology. Charting the way he married these two over-lapping agendas reveals a significant part of this larger story.

### **Rhetorical Shifts**

As Adam Rome has shown, the 1960s were a critical decade for the environmental movement. New constituencies joined the cause and added new concerns to the agenda. Of the three groups on which Rome focuses – middle-class women, liberal intellectuals, and the youth movement – the latter contributed the most dynamic energy to the movement. At the end of the 1960s, perhaps seen most clearly in the first Earth Day, youth directed the movement down a more skeptical and confrontational path. In addition to organizing and protesting, young activists published extensive underground writings. As Rome argues, this new tone inspired older authors to write with more audacity.<sup>106</sup>

---

<sup>105</sup>Hargrett Rare Book and Manuscript Collection, UGA Libraries, Odum manuscript collection, Boxes 67A and B.

<sup>106</sup> Ibid.

Odum was clearly one of those influenced by this new direction. In each revision of *Fundamentals of Ecology*, he described with a new tenor the status of human-environment relations and the role of ecologists. Odum believed early on that the ecosystem concept was instructive outside of the scientific arena. For example, in the first edition of *Fundamentals* he discussed the unintended environmental consequences of ore smelting near Copperhill, Tennessee and closed by pronouncing, “Everyone should visit Copperhill as part of his general education!” However, Odum merely used this story as an example of the ruination of the landscape, and did not go beyond this – as he would later – to make pointed political statements. Even these stories of caution appear infrequently and the general tone of this edition is formal.

It is clear that Odum’s primary purpose in writing the textbook was scientific: “to outline . . . the principles of ecology in such a way as to be readily understood by all those who desire an introduction to the subject.”<sup>107</sup> As Odum tells the story, he was inspired to synthesize *Fundamentals of Ecology* after being snubbed at a UGA biology department meeting for suggesting that ecology be a part of the core curriculum. His fellow biologists objected to this on the grounds that ecology was essentially a descriptive discipline with no unifying principles; it was “just organized natural history.”<sup>108</sup> Initially angered by this reaction, Odum later realized that the critique was a valid one and thus began the project of systematizing the field. So *Fundamentals* – and ultimately ecosystem ecology – was sparked by an internal academic clash, and only much later would it become a text that promoted “environmentalism and social responsibility.”<sup>109</sup> This is not to suggest that Odum’s early formulation of ecosystem ecology was not meant to be applied, or that he saw his role as a narrow academic one. Even in the first edition he voiced concern about modern society’s reckless use of resources and hubristic

---

<sup>107</sup> Eugene Odum, *Fundamentals of Ecology*, first edition, v.

<sup>108</sup> Eugene Odum, “Whole-earth Mentor: A Conversation with Eugene P. Odum,” interview by Tom Chaffin, *Natural History*, 1998, pg. 1.

<sup>109</sup> Hagen, *An Entangled Bank*



approach to environmental management, and each edition of the text devoted the final section to applied ecology. However, what is important here is the changing way in which he voiced these critiques and programs.

The applied ecology section of each edition illustrates how the changing politics of this formative era influenced the foundations of ecosystem ecology. In the first edition Odum introduced the topic in a detached and formal tone in less than one half page:

Ecology has many applications which contribute to the well-being of human society. . .the applied worker learns most of the needed details in the actual practice of his profession or from consulting books and papers dealing with the particular specialty. A detailed discussion of applications, therefore, is beyond the scope of this volume.<sup>110</sup>

He concluded the opening with a caution against over-specialization and suggested that the principles of ecology could serve to counter narrow, technical training.

In the 1959 edition, Odum simply added a new concluding paragraph to this discussion, albeit an important one. In it, he alludes to the fact that “the atomic age has made a dramatic appearance” and suggests that now ecology can provide “a valuable protective function in assembling data and principles which will prevent man from destroying his environment (and thus himself) in his enthusiasm for the use of new-found powers.”<sup>111</sup> This obviously marks a shift towards a more active role for ecology in the era of atomic fear and uncertainty, yet the tone of this edition is decidedly apolitical and academic relative to the 1971 textbook.

The sense of urgency in American environmental politics during the late 1960s and early 1970s clearly informed Odum’s revisions to the third edition. Fear of “ultimate rather than local limitations” reshaped his politics and rhetoric, and inspired by the tenor of the youth movement he took a much more bold and confrontational stance.<sup>112</sup> Odum acknowledged the influence of

<sup>110</sup> Odum, *Fundamentals of Ecology*, first edition, 1953, pg. 315.

<sup>111</sup> Odum, *Fundamentals of Ecology*, second edition, 1959, pg. 419.

<sup>112</sup> Odum, *Fundamentals of Ecology*, third edition, 1971, pg. 405.

the moment's "historic 'attitude revolution,'" and insisted that as a part of this new era, "there needs to be an administrative change in attitude so that communication with citizens and students will be considered equal in importance to communication with scholars!"<sup>113</sup> He stated in the preface to the 1971 edition that the revisions were necessary because of "the increasing importance of the subject in human affairs" – indicating that by 1971, one of the fundamentals of ecology, as he defined it, was to address popular environmental concerns.<sup>114</sup>

Odum entirely reworked the introduction to the applied ecology section of the third edition. Most obviously, one can see the "increasing importance" of applied ecology in the length of the introduction; it tripled compared to the previous edition. More substantively, it had the tone of a manifesto. Odum opened with a neo-Malthusian sense of crisis and then offered as panacea a synthesis of "the outpouring of rhetoric that marked the close of the 1960s":

*"Technology alone cannot solve the population and pollution dilemma; moral, economic, and legal constraints arising from full and complete public awareness that man and the landscape are a whole must also become effective."*<sup>115</sup> Odum's writing in this edition of his textbook is littered with italicized phrases and exclamation points. By 1971, Odum felt the same sense of urgency as many other Americans did, and he imbued ecosystem ecology with a proactive political program.

The introduction to applied ecology closed with a detailed guide for practical student activism. Odum encouraged students to select a major "in terms of its relevance to man-in-environment problems" and to enroll in an interdisciplinary degree program. If there was no such program, students should "organize one yourself by getting several professors in different departments to form an advisory committee that can help you plan, and cut departmental red

---

<sup>113</sup> Ibid; For the quote about extra-academic dialogue see Eugene Odum, "The Attitude Lag", *BioScience*, May 1969, vol. 19, no. 5, pg. 403.

<sup>114</sup> Odum, *Fundamentals of Ecology*, third edition, 1971, vii.

<sup>115</sup> Ibid, 405-406. Odum's emphasis.

tape.” Finally, one should “select an ecologically oriented thesis topic which not only excites you as a contribution to human welfare, but which also will provide further training in synthesis.”<sup>116</sup> Clearly Odum recognized that students were a critical part of the dialogue on environmental affairs.

The most striking example of the popular movement’s influence is the confrontational and even desperate tone that Odum employs frequently throughout the applied ecology section. In discussing pollution, the most popular target of both the youth movement and Odum, he warned that humans were close to “completely raping the earth’s resources,” which would ultimately lead to self-destruction. He concluded that the costs of pollution added up to “a terrible and increasingly intolerable burden for human society.”<sup>117</sup> Next to pollution, the exploding human population was the most apocalyptic trend. Odum predicted that the “population will *double in the next 30 to 50 years*,” leaving humans dangerously close to an overcrowded and impoverished existence as a mere “organic machine.”<sup>118</sup> In conclusion, Odum pleaded, “*Both human population control and better resource management that includes recycle [recycling-sic] are needed – NOW.*”<sup>119</sup> Odum reminded technological optimists that the human potential “for both good and evil [is] mind-boggling!” Intensive, large-scale projects (such as desalination and weather modification) had many supporters, and Odum cautioned that they also held very real potential for “horrendous ecological backlashes!”<sup>120</sup> When discussing agricultural conservation, Odum boldly attacked corporations and technocrats with explicit emphasis: “*Agroindustry is one of the chief causes of air and water pollution*”; “*the agricultural and the forestry specialist must now consider that ‘his’ crops and forests have outputs other than food and fiber in terms of man’s total ecosystem*”; “*The green revolution also sows very poisonous*

---

<sup>116</sup> Ibid, 406-407.

<sup>117</sup> Ibid, 432.

<sup>118</sup> Ibid, 431.

<sup>119</sup> Ibid, 411.

<sup>120</sup> Ibid, 420.

*seeds of social revolution. . .*<sup>121</sup> Odum used *Fundamentals* in 1971 as a forum to engage his audience with a new highly-politicized ecology. The most significant change in any of the first three editions of *Fundamentals* was the pervasive incorporation of activist language in 1971.

### **Rethinking Conservation**

There is no doubt that Odum intended ecosystem ecology to be an applied science from its inception, for the first edition of *Fundamentals* includes an entire section on how ecological principles can inform certain professions and management goals. It is also clear early on that he felt “conservation of natural resources” was “the most important practical application of ecology.”<sup>122</sup> Yet, in 1953 he defined conservation quite narrowly, and justified it solely on scientific, utilitarian grounds. Even his argument for “the setting aside of natural areas” is based on their value to humans as controls for ecological study. Recreation is a very distant second premise for the preservation of “natural areas.” There is no hint of the moral responsibility towards nature or the need for restraint of greed which creeps into the 1971 edition of *Fundamentals*. Odum did suggest as early as 1953 that conservation needed a broader, more holistic perspective that treated the environment as a whole, not on the basis of “isolated” projects.<sup>123</sup> However, he had trouble squaring this with his older notion of rational, scientific conservation.

In the first edition of *Fundamentals*, Odum outlined the goals of “good conservation” in such a way that one could reasonably imagine them coming directly from Gifford Pinchot: “to insure the continuous yield of *useful* plants, animals, and materials, by establishing a balanced cycle of harvest and renewal.”<sup>124</sup> He expanded on this by emphasizing that conservation was not

---

<sup>121</sup> Ibid, 411-413. Odum’s emphasis.

<sup>122</sup> Eugene Odum, *Fundamentals of Ecology*, 1953, pg. 12.

<sup>123</sup> Ibid, 318-319.

<sup>124</sup> Ibid, 317. Emphasis added.

necessarily “hoarding,” whereby one simply tries to ration a fixed supply. Instead, the complex and dynamic nature of ecosystem relations demanded a more flexible approach, illustrated by the principles of farm-pond management:

A ‘no fishing’ sign on a pond may not be as good conservation as a management plan which allows for removal of several hundred pounds of fish per acre year after year.

As one can surmise from Odum’s utilitarian definition of conservation, he felt that single-species conservation and broader habitat conservation approaches were equally sound strategies. The first strategy fit his utilitarian, managerial ethic. The second – protection of “natural areas” – he justified on purely scientific grounds as needed “controls” for comparative study of disturbed and undisturbed ecosystems.<sup>125</sup>

Although the dangers of the Atomic Age concerned Odum, they did not significantly affect his thoughts on environmental politics in general, or conservation policy more specifically. He made minor revisions to specific portions of the applied ecology section, but he did not change the general definition of conservation or his discussion of different approaches for the 1959 edition of *Fundamentals*.<sup>126</sup>

By the third edition, Odum proffered a definition more in-line with that of his young, liberal audience. According to the 1971 text, “good conservation” attempted to balance “esthetic and recreational” needs with the goal of a continuous yield of resources. “What the real conservationist is against,” Odum exhorted, “is *unplanned development that breaks ecological as well as human laws*.”<sup>127</sup> And in an extreme departure from the detached, scientific tone of the first two editions, he alluded to “the ‘green pastures’ of biblical psalms” and argued that they are “symbolic of the moral responsibility of man for his environment.”<sup>128</sup> Odum clearly recognized that it was necessary to incorporate other influences into his argument for conservation.

---

<sup>125</sup> Ibid, 317-318.

<sup>126</sup> Although it would be a mistake to understand *Fundamentals* as entirely representative of Odum's thought, it does track the general trends found in other sources. For another source that verifies this paragraph's main point, see Odum, “The New Ecology,” *BioScience*, vol. 14, no. 7, July, 1964, pp. 14-16.

<sup>127</sup> Eugene Odum, *Fundamentals of Ecology*, 1971, pg. 408.

<sup>128</sup> Ibid, 419.

His views on conservation strategy changed as well; in marked contrast to the first two editions, narrowly-defined management was no longer acceptable. “Good conservation,” Odum argued, must “shift from ‘special interest conservation’ to ‘total ecosystem conservation.’”<sup>129</sup> By this he meant that conservation could not simply focus on preserving a useful or obviously important species. Instead it must look to preserve ecological function, namely the ability of the environment to sustain human life. This awareness is an achievement that he often claimed for ecologists. However, it is obvious that many Americans had already widened their concern to include the general health of the land.<sup>130</sup>

Odum's earnest desire to find an appropriate ethic is evident in his critique of other land management professionals for “failing to move with the times.”<sup>131</sup> In the first two editions of *Fundamentals*, he upheld the Soil Conservation Service’s (SCS) watershed approach as an early model of “ecosystem thinking,” and he applauded their strategy of cooperation between public and private interests. In the third edition, though, Odum complained that the SCS had grown complacent and was not responding to the changing demands of popular concern. Instead, they were beholden to the goal of increased production. This failure, Odum suggested, was emblematic of land management science’s unfortunate delay in addressing newly recognized problems. “It is the deteriorating quality of the urban and suburban environment,” he reminded his fellow scientists, “rather than the eroding cotton fields that threaten the entire social and

---

<sup>129</sup> Ibid, 408.

<sup>130</sup> The general thrust of Earth Day 1970-era critique was that we needed to protect the Earth from ourselves, or else face the ultimate reality of death from an inhospitable environment.

<sup>131</sup> Ibid, 421.

economic system.”<sup>132</sup> Odum clearly recognized that a revised and broadened conservation ethic was needed for postwar America's new problems.

Odum’s increasing emphasis on pollution also indicates his attention to the public debate. He added an entire chapter titled “Pollution and Environmental Health,” which aimed to explain how ecosystem ecology could be applied to this growing concern. Not only did his environmental politics broaden to include popular social concerns, but his emphasis also explicitly shifted away from traditional conservation science approaches. In one telling passage, Odum argued that environmental law was the most important discipline for solving environmental problems, and also a “field that provides unlimited challenge for the motivated youth of today.”<sup>133</sup> Odum continued to emphasize the need for a new approach to conservation:

assimilation of environmental principles and concepts into environmental law is just now more urgent than research in oceanography insofar as the conservation of the sea is concerned. Or, urban planning along ecological lines . . . is much more urgent than is the application of principles of population ecology to game management.<sup>134</sup>

By 1971 many Americans were aware of the desperate need for a revised conservation ethic to guide them through the new problems of the postwar era. Odum was encouraged by this debate, and the third edition of *Fundamentals* represents his effort to contribute to the discussion.

### **The Environmental Politics of Health**

Recently scholars from a broad range of environmental and science studies have turned their attention towards health as a way to reconceptualize their fields. Most of this work

---

<sup>132</sup> Ibid. Adam Rome explores the ways in which urban and suburban growth influenced the trajectory of American environmentalism in *The Bulldozer in the Countryside: Suburban sprawl and the Rise of American Environmentalism*, (Cambridge: Cambridge University Press, 2001).

<sup>133</sup> Ibid, 444.

<sup>134</sup> Ibid, 406.

suggests that the study of health – as both a powerful and contested social idea and the result of biological agency – offers a window through which to study the interaction between material and cultural worlds. From the historical perspective, this work has largely focused on the 19<sup>th</sup> and early 20<sup>th</sup> centuries. However, both changing environmental conditions and notions of health were central to the birth of modern American environmentalism, and should thus encourage scholars to push their analysis further into the 20<sup>th</sup> century.<sup>135</sup> Historian Maril Hazlett broached this topic by suggesting that the central tension between traditional conservation and the evolving environmental politics of the 1960s largely centered on the incorporation of human health into the agenda.<sup>136</sup> By exploring the changing ways that Odum – both an esteemed scientist and popular environmentalist – understood health and its political role, we can begin to outline this complex interaction.

In the first edition of *Fundamentals*, Odum designated a short chapter to the role of ecological science in “Public Health and Welfare.”<sup>137</sup> He suggested in this three-page chapter that the study and prevention of human diseases was just as much an ecological question as a medical one. For instance, doctors may know that a certain species of mosquito is the vector for yellow fever, yet understanding the population dynamics and behavior of that species is a needed task for which the ecologist is especially well suited. Indeed, Odum suggested that a lack of attention to this kind of ecological knowledge usually resulted in unsuccessful eradication

---

<sup>135</sup> For a sampling of this literature, see Gregg Mitman, “In Search of Health: Landscape and Disease in American Environmental History,” *Environmental History*, vol. 10, no. 2, (April 2005), 184-210. Paul Sutter, “Nature’s Agents or Agents of Empire? Entomological Workers and Environmental Change during the Construction of the Panama Canal,” *Isis*, 98 (4), December, 2007, 724-754; Mitman, Gregg, Michelle Murphy, and Christopher Sellers, eds. *Landscapes of Exposure: Knowledge and Illness in Modern Environments*, *Osiris* 19 (2004): 1-304.

<sup>136</sup> Maril Hazlett, “Man vs. Woman vs. Bug: Gender and Popular Ecology in Early Reactions to *Silent Spring*,” *Environmental History*, vol. 9, no. 4, October 2004, 701-729; the increasing importance of human health to environmental politics is one of the most dominant arguments in the historiography of American environmentalism, see Samuel Hays’ *Beauty, Health, and Permanence*.

<sup>137</sup> Odum, *Fundamentals*, 1951, 339.



programs. Here, Odum defined public health as the field of inquiry concerned with water and animal-borne human diseases and “general sanitation.”<sup>138</sup>

In the 1959 edition, Odum added a page onto the end of the chapter. This addition stressed more emphatically the role that ecology should play in disease prevention. As evidence, he claimed that “where malaria control has been achieved it has always been through measures directed at the mosquito and not at the parasite in the human body.”<sup>139</sup> Odum also predicted that the greatest public health challenge of the future was not control of specific diseases, but control of pollution, “which can bring with it ill-health of all kinds.”<sup>140</sup> He mentioned smog as one of the developing threats, but concluded that radioactive waste was the most dangerous source of pollution. It seems that by 1971, Odum – always the ambiguous technocrat – had finally given up hope that humans could turn the proverbial sword of nuclear weapons technology into the plowshares of scientific tool and clean energy source.

In the 1971 edition, Odum removed the public health chapter and in its stead wrote a much larger one entitled “Pollution and Environmental Health.” This twenty-page chapter reflects the concern to which Odum briefly alluded in the 1959 edition: humans were the direct source of the greatest threat to their own health. In this chapter on *environmental* health, there is no discussion of biological diseases – Odum's older notion of *public* health. The most significant shift in this new mode of thinking about health was one from concern over discrete diseases and their environmental relations, to a focus on the more nebulous and contested notion of “environmental risk factors.”<sup>141</sup> Odum was not concerned here about the minutiae of vector population ecology, but in trying to study and reduce the myriad ways that human actions made

---

<sup>138</sup> Ibid.

<sup>139</sup> Odum, *Fundamentals*, 1959, 450.

<sup>140</sup> Ibid, 451.

<sup>141</sup> In “The Artificial Nature of Flouridated Water,” Christopher Sellers argues that public health historiography could benefit from a similar shift in which scholars focus more on competing ontologies of environmental risk, rather than studies focused on specific diseases.

their environment unsafe. This again reflects Odum's trend in thinking from “special interest” to “total ecosystem” conservation.

Despite significant expansion relative to the earlier chapters on public health, the 1971 iteration is quite narrow in its discussion of pollution and environmental health. Odum focused almost exclusively on industrial and home wastewater. He also treated the costs of pollution in a similarly narrow manner. Despite asserting that humans were “egotistical and self-centered” for making human health their main environmental concern, his formulation of environmental health shows little concern for anything outside of human well-being. In fact, Odum summarized the costs of pollution as “a terrible and increasingly intolerable burden to human society.”<sup>142</sup> Perhaps he recognized that anthropocentric arguments were the most convincing for his audience, but he did little to suggest that there were other reasons to be concerned with the health of the environment.

Although influenced by many of Aldo Leopold's ideas, Odum did not employ his concept of “land health” - either as metaphor or analytical metric.<sup>143</sup> Odum was not hesitant to judge ecosystems, but he used a much more quantitative and anthropocentric lexicon; “productive” and “mature” were his preferred descriptors. This tendency belies Odum's managerial ethos and suggests the limitations of relying solely on modern science for an environmental ethic. As Gregg Mitman argues, health can be the concept that bridges the human/nature dichotomy.<sup>144</sup> Eugene Odum's functional definition of health instead reinforced this dichotomy by suggesting that the environment was largely important as humankind's “life-support system.”<sup>145</sup>

---

<sup>142</sup> Odum, *Fundamentals*, 1971, 432.

<sup>143</sup> Odum consistently alluded to Leopold's influence, both in *Fundamentals* and other writings. He described Leopold as both a great experimental scientist and an excellent writer. Odum particularly drew on elements of Leopold's thought that stressed awareness of unintended consequences of environmental management. Gregg Mitman explores Leopold's use of health in “In Search of Health,” *Environmental History*, 2005.

<sup>144</sup> Mitman, “In Search of Health,” *Environmental History*.

<sup>145</sup> Odum often referred to the environment as “our endangered life-support system.” As late as 1998, after most had abandoned the apocalyptic language of the 1970s, Odum continued to suggest that the most important reasons for studying ecology were to “help avoid overpopulation, over-consumption, damage to life-support systems and other suicidal behavior.” This from *Ecological Vignettes*, xiii.

## Conclusion

The ecosystem concept was the fulcrum for the development of Odum's new ecology, and scholars have rightfully examined the changing ways that the concept was employed over time.<sup>146</sup> This emphasis on the concept of the ecosystem, however, has obscured another central part of Odum's ecology: succession theory. As we saw in Chapter One, succession was one of the first major research problems of ecosystem ecology. In these early decades, however, Odum understood succession – and, by analogy, his science – as important theory in its own right, which could also be usefully applied to traditional conservation issues: game management, forestry, and so forth. In line with the chronology traced through this chapter, Odum's understanding of succession shifted radically in 1969. That year, in one of his last significant theoretical papers, “The Strategy of Ecosystem Development,” Odum urged a marriage of rigorous science and environmental activism. “The framework of successional theory,” he insisted, “needs to be examined as a basis for resolving man's present environmental crisis.”<sup>147</sup> Odum's attempts to do so drew on a classic New Deal narrative: as with natural communities, human societies should temper booming growth, or else suffer a dramatic bust due to outstripping their resources. For the rest of his life, Odum defined succession not as an ecological theory with ancillary applications, but as an *ecological law* with dire consequences for human impertinence. This newly-defined succession is representative of Odum's attempts to redraw the boundaries of ecology in response to the growing sense of urgency and anxiety in American environmental politics.

While the first and second editions of *Fundamentals* were largely prompted by scientific concerns – the formulation of the ecosystem concept and the methodological innovations from atomic technology, respectively – the 1971 edition was clearly an urgent effort to engage with

<sup>146</sup> Joel Hagen, *Entangled Bank*, pp. 127-129.

<sup>147</sup> Eugene Odum, “The Strategy of Ecosystem Development,” *Science*, vol. 164, no. 3877, (April 18, 1969), pp. 262-270.

the popular environmental politics of this dynamic time. It is illuminating that there was little revision of the technical science between the 1959 and 1971 textbooks. The 1971 text was prompted by growing anxiety and Odum's ensuing attempt to broaden ecology's political agenda. In many ways, Odum and ecology did not lead environmentalism; instead he led ecology down the environmental path.<sup>148</sup> While Odum and ecosystem ecology were clearly influential and creative forces, they were also continually responding to and reflecting broader concerns. *Fundamentals of Ecology* played a definitive role in the evolution of ecosystem ecology, but through the first three editions we can see that the science – at least as Odum expressed it – did not steer the tone of environmental debate, the definition of conservation, or the role of health in environmental politics.

While the editions of *Fundamentals* that I have discussed here are only snapshots of a broader intellectual and political development, they nevertheless are representative of the key transition points along this journey. Indeed, each of them was sparked by an important change in Odum's conception of ecology. Therefore, it is fair to suggest that the texts broadly mark a chronology of Odum's and ecosystem ecology's development. For instance, another of Odum's landmark publications, the 1964 *BioScience* article "The New Ecology," opened with his reflections on the contemporary development of ecology. Consistent with the trend mapped here through his textbooks, Odum reasoned that the most important factors were "the exploitation of atomic energy, the exploration of outer space, and the human population explosion."<sup>149</sup> He did not criticize industrial society or emphasize humankind's moral crisis; nor did he suggest that

---

<sup>148</sup> Joel Hagen's recent article, "Teaching Ecology in the Environmental Age: 1960-1985," *Environmental History*, Oct. 2008, shows how ecologists split into two camps in reaction to Odum's "boundary work." Hagen's work has centered on understanding the disciplinary decline of ecosystem ecology. He argues that ecologists split into two camps over the question of their role in society – Odum leading the "applied" group. So, it seems intuitive that Odum, and ecosystem ecology, lost authority within the science for their attempts to reach out to the popular audience. However, the question also remains as to whether Odum and other ecosystem ecologists reached out to the popular audience precisely because they had already lost a significant part of their scientific audience.

<sup>149</sup> Eugene Odum, "The New Ecology", *Bio Science*, vol. 14, no. 7, (July, 1964), pg. 14.

pollution and environmental health were of grave importance. Odum voiced these concerns only when they emerged in popular political discourse.

During the late 1960s and early 1970s, Odum often suggested that the increased environmental consciousness of the times was a direct result of the insights of ecosystem ecology.<sup>150</sup> However, once more removed from these political and academic contests and with more perspective, he acknowledged the degree to which his science was affected by “the worldwide environmental awareness movement” which “burst upon the scene during two years, 1968 to 1970.”<sup>151</sup> In the introduction to 1983's *Basic Ecology* – a simplified version of *Fundamentals* designed for introductory undergraduate courses – Odum acknowledged that this “increase in public attention had a profound effect on academic ecology.”<sup>152</sup> He explained how public interest led to a broadening of the scope of ecology and encouraged the science's emergence from traditional biology into an “integrative discipline” that united the natural and social sciences. Odum also argued that increasing public interest in the late 1960s and early 1970s encouraged ecologists to study the ways that “individuals and species interact and use resources.”<sup>153</sup> Essentially, Odum was acknowledging how public concerns encouraged ecologists to redraw the boundaries of their field. For the “Father of Modern Ecology,” a new era of environmental politics required a new ecology.

---

<sup>150</sup> Eugene Odum, *Fundamentals*, 1971, preface.

<sup>151</sup> Eugene Odum, *Basic Ecology*, 1983, pp. iii, 3.

<sup>152</sup> *Ibid.*

<sup>153</sup> Odum, *Basic Ecology*, 3.

**“Backlashes, both Environmental and Social”:**  
**Agriculture and Environmentalism in the Age of Ecology**

*The so-called ‘green revolution,’ has resulted chiefly from the industrialization of agriculture, which involves large fuel energy subsidies, sophisticated chemical control, and highly-domesticated plant varieties . . . Maximizing for yield without regard to other consequences is producing very serious backlashes, both environmental and social.*

- Eugene Pleasants Odum, 1971<sup>154</sup>

A quick survey of Americans will indicate their growing concern over the nation’s agricultural system. In both supermarkets and cooperatives across the country, labels reflect this trend; the monikers “organic,” “biodynamic,” “sustainable,” and “natural” are now much more visible than only a decade ago. Throughout the 1990s, demand for organic goods in America grew by at least 20 percent annually, making North America the leading consumer of these products.<sup>155</sup> While this anecdotal evidence is partly the result of perceptive marketing strategies and a co-option of the “organic” label by corporate industries, it nonetheless reflect a growing critique of American industrial agriculture.<sup>156</sup>

This growing emphasis on food politics is thoroughly embedded in the mainstream American environmental movement. Contemporary environmentalists are perhaps more likely to read *Fast Food Nation* and *The Omnivore’s Dilemma* – both indictments of industrial food

---

<sup>154</sup> Eugene Odum, *Fundamentals of Ecology*, Third Edition, (Philadelphia, 1971), pg. 412.

<sup>155</sup> Organic Trade Association website: <http://www.ota.com/organic/mt/business.html>; accessed 11/21/07 at 11 a.m. EST.

<sup>156</sup> For a discussion of the industrial takeover of the organic movement’s momentum, see Michael Pollan, *The Omnivore’s Dilemma: A Natural History of Four Meals*.

production – than *The Sand County Almanac* or *Walden*. Supporting local farmers is as important to many current-day environmentalists as is launching a municipal anti-pollution campaign. However, this has not always been the case. The first decades of the modern American environmental movement, the 1950s and 1960s, were marked by concern over public lands issues and industrial manufacturing pollution. A quick review of texts central to the American environmental movement also reveals this early paucity of concern with agriculture. A close read of one of the most likely to deal with the issue, Rachel Carson's *Silent Spring*, shows that her main concern was not agricultural chemical use *per se*, but indiscriminate spraying resulting from an undemocratic decision-making process. This spraying was often for *non-agricultural* uses, such as mosquito and fire ant eradication campaigns.<sup>157</sup>

Most scholars agree that the modern American environmental movement took shape in the 1960s, with its direct roots extending back into the previous decade. Some argue that the 1962 publication of Carson's *Silent Spring* marks the first coherent coalescence, while others proffer April 22<sup>nd</sup>, 1970 – the first Earth Day – as the most logical launch point. These debates aside, by the 1970s the movement garnered significant public support and wielded measurable political influence. The decade witnessed a nationwide recognition that something must be done about the environmental crisis. Politicians heeded the cautions of scientific authorities and responded to the demands of concerned citizens with monumental environmental legislation: the Clean Air Act, the National Environmental Policy Act, the Water Pollution Control Act and the Endangered Species Act. In addition to lobbying for these legislative measures, environmentalists pointed attention to the near-disaster at the Three Mile Island nuclear reactor

---

<sup>157</sup> Rachel Carson, *Silent Spring*, Boston: Houghton Mifflin Co., 1987. The big exception to this claim is Wendell Berry's 1977 work *The Unsettling of America: Culture and Agriculture*, which will be discussed later; for a deeper analysis of the popular concerns of early environmentalism see Marilia Coutinho, "Ecological Metaphors and Environmental Rhetoric: An Analysis of *The Ecologist* and *Our Common Future*," *Environment and History*, 3, (1997), 177-195, and Julie Guthman, *Agrarian Dreams: The Paradox of Organic Farming in California*, (Berkeley: University of California Press, 2004), pp. 1-12.

and the scandalous Love Canal incident. Activists used these cases to warn their fellow citizens that to ignore pollution was to neglect public health.

A review of articles published in scholarly and popular sources adds texture to this chronology. *Environment and Planning* did not publish an article on agriculture or food from the late 1960s into the late 1970s; however, from 1978 until 1998 they published 15 “agriculture” and 10 “food” articles. All *Ecology* articles with “agriculture” as a keyword were printed either in the interwar years or after 1980. Publications in *American Historical Review* follow a similar trend; there were 3 articles published in the 1960s on food and agriculture, while the following two decades witnessed 22 and 38, respectively. The “Conservation” column in *Field and Stream* covered an amazing variety of issues and positions in the late 1960s and early 1970s, ranging from the expected game management topics to industrial pollution, mining, support for wilderness and opposition to dam building; however, there was virtually no mention of agriculture. *Sierra* magazine also shows a similar lack of early concern with agriculture; it was 1976 before the Sierra Club – an early leader in environmental politics – turned its attention to agriculture.<sup>158</sup> This outline of postwar environmental concerns is cursory, but representative. It reveals that agriculture was a late addition to the agenda.

Relative to the environmental politics of the 1950s and 1960s, efforts to understand the social and environmental impacts of agriculture were a central part of New Deal reform. Ecologists, sociologists, regional planners, soil and water scientists, and politicians of many stripes prioritized the revival of a healthy, food-producing countryside. Historian Sarah T. Phillips argues that these reformers were the last to voice an agrarian agenda in American

---

<sup>158</sup> Hank Graddy, “The Legal and Legislative Front: The Fight against Industrial Agriculture,” in *The Essential Agrarian Reader: The Future of Culture, Community, and the Land*, ed. Norman Wirzba, (Washington, D.C.: Shoemaker & Hoard), 2003, pg. 223. Graddy, the chair of Sierra's CAFO/Clean Water Committee, tells how the Sierra Club was slow to come to agriculture and acknowledges the divisions that still exist between wilderness advocacy and agricultural issues. For the Sierra Club's policy on agriculture: [www.sierraclub.org/policy/conservation/agriculture.asp](http://www.sierraclub.org/policy/conservation/agriculture.asp).



political discourse.<sup>159</sup> The sustainable agriculture movement of the 1970s ushered in the rejuvenation of widespread interest in the state of American agriculture.<sup>160</sup>

Unfortunately, the precipitous decline in post-World War II critiques of American agriculture has not received its due attention from scholars. This chapter will survey the limited historiography, synthesize existing histories and use Eugene Odum's ideas about postwar agriculture as a vehicle to make an initial foray into this topic. Odum's critique of industrial agriculture, voiced most clearly in the 1971 edition of *Fundamentals of Ecology*, was a part of the broad revival of interest in creating a sustainable agriculture. Here I will examine his critique and others that surfaced at this time in order to understand the divisions within the environmental movement and contests over its direction. The conclusions must be tempered with respect for the tentative nature and large scope of this inquiry, however, the evidence suggests that the environmental lobby only turned its attention to agriculture once scientific authorities had done so.

This thesis has thus far emphasized the ways that Odum's science and politics were influenced by broader social and environmental trends. That focus should not suggest, however, that the science of ecology had *no* impact on the rise of American environmentalism. Ecology was obviously a creative and visible force in postwar America. Thus, the task that follows is to determine the specific ways that the science contributed new dimensions to popular politics. Focusing on debates about food and agriculture is one way to begin this work. Farmers, intellectuals, politicians, ecologists, and environmentalists all offered critiques – sometimes overlapping, sometimes diverging – of the American food system in the postwar decades. Tracing this history suggests one way in which ecological science influenced environmental

---

<sup>159</sup> Sarah T. Phillips, *This Land, This Nation: Conservation, Rural America, and the New Deal*, (Cambridge: Cambridge University Press, 2007), pp. 1-20.

<sup>160</sup> Beeman and Pritchard, *A Green and Permanent Land: Ecology and Agriculture in the Twentieth Century*, (Lawrence: University Press of Kansas, 2001).

politics; once ecologists re-examined agricultural issues, their critiques granted the subject a measure of mainstream acceptability that it had not possessed since the New Deal. In the broadest sense, recognizing that agriculture figures into the environmental consciousness of modern America also speaks to a growing awareness among environmental historians that deeply cultural landscapes have also been a source of inspiration and direction for the American environmental movement.<sup>161</sup>

On October 17, 1973, the Organization of Arab Petroleum Exporting Countries (OAPEC) announced that they would no longer supply oil to countries that had supported Israel in the Yom Kippur War; black-listed countries included the United States, Japan and several western European countries. The Arab oil embargo, as it is now known, sent the black-listed nations into a state of panic over the impending energy crisis. To many in the oil-dependent industrial nations, the 1973 crunch was the first sign that their political economy was not, in fact, solely based on abstract notions like the free market and equal rights, but was also dependent on cheap and abundant fossil fuel.

Others however, like Eugene Odum, were keenly aware of this fact and had argued for years that Americans needed to reassess their energy use. Odum's awareness came from years of ecological research and teaching that studied energy flow through environmental systems in an attempt to understand their structure and function. Eugene called this research methodology "ecoenergetics," and along with his brother, ecologist H. T. Odum, offered it

---

<sup>161</sup> The historiography of American environmentalism reflects an early focus on the concept of wilderness and the role of the West in giving direction to the social movement. For examples see Roderick Nash, *Wilderness and the American Mind*, William Cronon, "The Trouble with Wilderness, or Getting Back to the Wrong Nature," in ed. William Cronon, *Uncommon Ground: Rethinking the Human Place in Nature*, and Paul Sutter, *Driven Wild: How the Fight Against Automobiles Launched the Modern Wilderness Movement*. Examples of works that highlight the importance of cultural places to the environmental movement include Adam Rome's *A Bulldozer in the Countryside: Suburban Sprawl and the Rise of American Environmentalism* and Robert Gottlieb, *Forcing the Spring: The Transformation of the American Environmental Movement*.

to both scientific and popular audiences as the best way to understand environmental systems. Among his many other research foci, Eugene Odum homed in on American agriculture because, as a nexus between nature and culture, it offered unique possibilities for creating “a framework for the integration of man’s systems with ‘natural’ systems.”<sup>162</sup> He concluded that synthetic chemicals, monocropping, and auxiliary (fossil fuel) energy inputs were the chief problems of industrial agriculture.<sup>163</sup>

As we have seen, Odum was one of the most respected ecologists during the post-World War II decades, but his critique of the dominant agricultural paradigm was not immediately well-received by all. Not surprisingly, the most ardent opposition to Odum’s analysis of American industrial agriculture came from the big-farm bloc: agribusiness, the United States Department of Agriculture (USDA), land-grant institutions, extension agents, politicians with big-farm constituencies, and industrial farmers themselves. In his insightful article, “Potatoes Made of Oil,” historian Mark Madison outlines and traces the Odum brothers' agroecological work. He argues that in the biological sciences, their work stimulated the growth of the sub-discipline of agroecology, but that not all scientists accepted their analysis either. Madison concludes that, more so than in ecology, their work had its most important academic influence in anthropology where the ecoenergetic method was used to study the farming systems of “others.” In Madison's final analysis, the most enduring legacy of Odum’s critique was not within the scientific community, however, but was actually an unintended impact on the environmental and sustainable agriculture movements of the late twentieth century.<sup>164</sup>

---

<sup>162</sup> Odum, Crossley, and Todd, “NSF Proposal: Analysis of Agricultural Ecosystems: No-till and Conventional Cultivation Practices,” 11/1/78, pg. 2-3. UGA Odum collection, Hargrett rare book and manuscript collection, box A151.

<sup>163</sup> This theme is omnipresent in Odum’s writing. One of the most developed iterations can be found in: Eugene Odum, “Input Management of Production Systems,” *Science*, vol. 243, January 1989, pp. 177-181. Also see Eugene Odum, “Resources: Agriculture and Forestry,” in *Fundamentals of Ecology*, third edition, (W.B. Saunders: Philadelphia), 1971, pp. 411-413.

<sup>164</sup> Mark Glen Madison, “Potatoes Made of Oil: Eugene and Howard Odum and the Origins and Limits of American Agroecology,” *Environment and History*, 3 (1997): pp. 209-238.

Madison's conclusion about the impact of Eugene Odum's agroecological work within science seems strong, but the evidence suggests that a reexamination of his other conclusions is in order. However helpful – and indeed welcome – support and acceptance from scientists and government would have proven, Odum saw beyond these audiences. He laid out his approach in an article he published in *BioScience*, a leading journal published by the American Institute of Biological Sciences, called “The Attitude Lag.” Odum argued that man’s “basic attitude and strategy towards the environment must undergo an about-face.” Speaking to fellow scientists, he urged them to reconsider the restrictions of the “publish or perish” doctrine and to recognize that “communication with citizens and students [should] be considered equal in importance to communication with scholars!”<sup>165</sup> As we have seen, Odum’s academic work was applied and value-laden from the start. Although his politics blossomed in response to the growth of environmentalism, he had always striven, in some degree, to be heard outside the walls of the ivory tower and beyond the halls of elected officials.

Madison concludes that “ecological” rhetoric or arguments present in the environmental and sustainable agriculture movements are the direct impact of a top-down relationship between science and society. In his reading, the scientific knowledge that Odum produced was critical to the direction that these movements took. However, Madison does not give sufficient weight to the critiques of agriculture that existed in postwar America prior to Odum's work and thus overlooks the degree to which non-scientific sources anticipated later critiques. By glossing over the dynamics of postwar environmental politics, Madison also misses an opportunity to explore the tensions within the evolving environmental movement.

After what seems a lengthy delay, scholars are turning their attention to twentieth century critiques of American agriculture.<sup>166</sup> The historiography is quite young and fractured, yet a

<sup>165</sup> Eugene P. Odum, “The Attitude Lag,” *BioScience*, vol. 19, no. 5, May 1969, pg. 403. Exclamation is Odum’s.

<sup>166</sup> Some of these include Julie Guthman, *Agrarian Dreams: The Paradox of Organic Farming in California*; Warren Belasco, *Appetite for Change: How the Counterculture took on the Food Industry*; Hugh Gusterson,

portrait of these critiques is emerging. Randal S. Beeman and James A. Pritchard's 2001 study *A Green and Permanent Land* argues that there are two coherent phases of agricultural critique: the permanent agriculture movement of the New Deal and the sustainable agriculture movement of the 1970s. In the 1930s, New Dealers such as Hugh Hammond Bennett of the Soil Conservation Service (SCS) and ecologist Paul Sears formulated early ecological critiques of American agriculture. Soil erosion – which they largely considered a failure of individual farmers – was their central concern. The Dust Bowl catastrophe of that same decade convinced farmers and bureaucrats alike that they must work together to ensure that American soils continued to produce food. The most ambitious response in the 1930s was the permanent agriculture movement, which claimed that reform was an “ethical imperative” and the situation Americans found themselves in was both “a soil crisis and a human crisis.”<sup>167</sup> Rapid urbanization during this period not only fueled concerns over the environmental consequences of an industrial agriculture, but also the social consequences of a depopulated and marginalized countryside. Reflecting the dominant ecological conceptions of the time – interdependence, balance, and harmony – the permanent agriculture school called attention to both the social and environmental costs of the new agriculture and offered a vision of permanence in its place. They communicated to a national audience and stimulated fierce debate, but the established “big ag” institutions eventually watered-down and co-opted their ideas. Historians Sarah Phillips and Donald Worster have also argued that farmers were willing to cooperate with improvement measures only as long as it remained economically beneficial, and that the commitment of the SCS to increased productivity resulted in technical change, but no significant change in the

---

“Decoding the Debate on 'Frankenfoods'”; Donald Worster, *Dust Bowl: The Southern Plains in the 1930s*; Randal Beeman and James Pritchard, *A Green and Permanent Land: Ecology and Agriculture in the Twentieth Century*; Sarah T. Phillips, *This Land, This Nation*; Kimberly K. Smith, *Wendell Berry and the Agrarian Tradition: A Common Grace*

<sup>167</sup> Beeman and Pritchard, *A Green and Permanent Land: Ecology and Agriculture in The Twentieth Century*, (Lawrence: Univ. Press of Kansas), 2001, pg. 23.

ethics of American agriculture. And, finally, new concerns after World War II sounded the death knell for the agricultural politics of the 1920s and 1930s.<sup>168</sup>

Although direct and immediate impact of the permanent agriculture movement was limited, it laid the groundwork and provided inspiration for another reform program that sprang up in the 1970s: sustainable agriculture. This time soil conservation did not prove the primary motivator, although it remained a prominent one. According to Beeman and Pritchard, a growing awareness of the shortcomings of technology and anxiety over population growth revived the dormant concerns about American agriculture. As with the permanent agriculturists, the authors see “ecological” knowledge as central to the environmental critique proffered by the sustainable agriculture camp.<sup>169</sup> Beeman and Pritchard outline four main strands of this movement: perennial polyculture, permaculture, the organic movement and agroecology. However, all of these are critiques that mainly target agriculture as a productive process. This list does not include those critiques rooted in an agrarian or populist tradition that examine the dominant social and political relations of American agriculture.

Agricultural critiques in the postwar years that drew on populism and agrarianism appeared on the national scene at about the same time as did the production critiques. The most prominent of the populist tradition is probably Jim Hightower's *Hard Tomatoes, Hard Times*, published in 1972. Hightower argued that corporations and industry had seized control of the land-grant institution complex and, in turn, disfranchised and marginalized the citizens of rural America. Hightower makes a compelling case that American industrial agriculture was the product of structural alliances between government and agribusiness, not the end result of farmers' desires. When published in 1977, Wendell Berry's *The Unsettling of America* was without a doubt the most important work of agrarian thought since World War II. Berry argues

---

<sup>168</sup> For the new concerns, see Beeman, and Pritchard, *A Green and Permanent Land*, pg. 64. Phillips, *This Land*; Worster, *Dust Bowl*.

<sup>169</sup> *Ibid*, 87.

passionately that American industrial agriculture was responsible for destroying the family farm and any hope of healthy and sustainable rural community.

Social and environmental critiques of American agriculture fell off sharply in the decades following World War II, likely due to the combination of rural depopulation and a growing faith in the ability of the new chemical-intensive, scientific farming to increase yields. Although public – and especially scientific – concern was almost entirely muted in the 1950s and 1960s, there remained pockets of dissenters who continued to look for alternatives to the emerging corporate, industrial food system. Scholars have not yet given enough attention to these important figures, often non-scientists, who toiled in the barren decades, resulting in a historiographical privileging of the scientific critiques that appeared in the sustainable agriculture of the 1970s.

J. I. Rodale, often considered the father of American organic farming, along with Helen and Scott Nearing, leaders in the back-to-the-land movement, are representative of these lonely activists. Rodale and the Nearings offered very different critiques. Rodale argued that chemical farming was destroying the health of the soil and the individual who ate its produce.<sup>170</sup> The Nearings proffered an amorphous social and political message grounded in the virtues of “the simple life.”<sup>171</sup> Despite these significant divergences, they both relied on the practices of the permanent agriculture laid out in the interwar period. As a result of their activism, they were both attacked viciously, and categorically dismissed as irrelevant on the basis that they lacked scientific credentials.<sup>172</sup>

This insistence on scientific credibility was nearly omnipresent in postwar American society and should remain in the foreground in any study of the era's agricultural or

---

<sup>170</sup> J. I. Rodale, *The Organic Front*, (Emmaus, PA: Rodale Press, 1949), 199.

<sup>171</sup> David E. Shi, *The Simple Life: Plain Living and High Thinking in American Culture*, (Athens: University of Georgia, 2007), pp. 255-257.

<sup>172</sup> Beeman and Pritchard, *A Green and Permanent Land*, pp. 84-85.

environmental politics. As one might expect, many scientists were vocal promoters of this ideology, and Eugene Odum was no exception. When Odum voiced his critique of industrial agriculture, he almost always embedded it within a larger claim about the social role of ecologists: they alone had the requisite knowledge and holistic viewpoint necessary to advise on the management of the environment. The intensity with which Odum made this claim paralleled the growth of popular environmental consciousness. As his potential audience grew, so too did the role that he claimed for ecologists.<sup>173</sup>

Mark Madison has illustrated the critical position that the Odum brothers filled in establishing the subdiscipline of agroecology. As Beeman and Pritchard's work shows, they were by no means the first to study agriculture from an ecological perspective.<sup>174</sup> However, their application of systems ecology to the problems of agriculture resulted in a very different kind of analysis than that of the Dust Bowl ecologists. The Odums' critiques were essentially identical in their scope and content, and I shall focus here on Eugene's because as the more visible scientist and public figure he offers a more direct window into the relationship between ecology and environmental politics.

Eugene Odum's interest in agriculture, which began in earnest in the late 1960s, stemmed from a variety of sources. The most obvious was the concern he shared with many others about the human "population bomb."<sup>175</sup> He consistently argued that, "since increased human populations will cause demand for food to continue to grow in the foreseeable future, agricultural sustainability needs to be addressed."<sup>176</sup> Also following the logic of many at the time, he reasoned that the landscapes of developing nations were critical ones on which this problem

---

<sup>173</sup> This can be seen in the first three editions of his textbook, *Fundamentals of Ecology* (1953, 1959, and 1971).

<sup>174</sup> Madison, "Potatoes Made of Oil"; Beeman and Pritchard, *A Green and Permanent Land*.

<sup>175</sup> Paul Ehrlich, *The Population Bomb*, (San Francisco: Sierra, 1969).

<sup>176</sup> Richard Lowrance, Paul F. Hendrix, and Eugene P. Odum, "A Hierarchical Approach to Sustainable Agriculture," *American Journal of Alternative Agriculture*, 1986, Vol. 1, No. 4, pg. 169; for an earlier example see, Odum, *Fundamentals*, 1971, pg. 405.



would play out. Odum's analysis of American industrial agriculture made him a staunch critic of exporting the ideal through the Green Revolution.<sup>177</sup>

Agriculture was also one of the places where high energy use was often overlooked. Odum recognized that many Americans, especially the young, mostly urban environmentalists that he often engaged, were oblivious to this inefficient and polluting industry.<sup>178</sup> Fossil fuels that powered both farm equipment and the production of synthetic fertilizers were enormous “auxiliary” energy sources which made the system unsustainable. Odum recognized agriculture as an overlooked part of popular environmental politics and hoped to add it to the agenda.<sup>179</sup> As he did so, though, he largely avoided engaging (or acknowledging) contemporary and historical critiques. As we shall see, this lack of historical foundation provided only a narrow platform on which to rest his politics.

Again, we cannot underestimate the influence of his father on Eugene's interests. Agriculture, largely in the form of labor and land tenure issues, was one of Howard Odum's main concerns. As we have already seen, Eugene recognized that the problems his father's generation had dealt with were reappearing in a different guise. And as Eugene noted, his father's work on these issues inspired him to work towards “more harmonious relationships between man and nature.”<sup>180</sup> There is no doubt the Eugene felt agroecology would contribute to this admirable goal.

Agroecology also offered Odum an opportunity to further refine ecosystem theory and illustrate the applied role of ecologists. To Odum, agricultural systems were an intermediate

---

<sup>177</sup> Eugene Odum, *Fundamentals*, 1971, pg. 412.

<sup>178</sup> As Sam Hays shows in his seminal work *Beauty, Health and Permanence*, many early environmentalists overlooked problems of industrial agriculture because of the naïve notion that rural landscapes were bucolic and “natural.”

<sup>179</sup> Madison, “Potatoes Made of Oil,” pp. 214-216; Odum, *Fundamentals*, 1971, pp. 43-56, 405-419 also illustrates Odum's desire to increase public awareness of American agriculture's problems.

<sup>180</sup> Eugene Odum, *Ecology*, (New York: Holt, Rhinehart, and Winston, 1963), iv.

landscape on a continuum from “natural” systems to entirely human-built environments.<sup>181</sup> Since the human element was central to agroecosystems, but not entirely determinative, these landscapes offered a revealing window into how humans interact with their environment. For Odum, agriculture provided a great canvas on which to experiment with not only understanding, but also theoretically modeling, human action on natural systems.

Derived from his ecoenergetic analysis, Odum’s message was clear and consistent: modern American agriculture had become too dependent on energy from fossil fuel inputs. After plotting the inputs against the yield in an industrial versus a traditional agricultural system, Odum concluded:

To double the crop yield requires a tenfold increase in fertilizer, pesticides and horsepower. Thus, industrialized (fuel powered) agriculture . . . produces four times the yield per acre as does man-and-domestic-animal powered agriculture . . . but is 100 times as demanding of resources and energy. It is not hard to understand, then, why *agroindustry is one of the chief causes of air and water pollution*.<sup>182</sup>

Odum's focus on energy allowed him to make two important points. First, the gains of the new industrial agriculture must be thought of in conjunction with their associated soaring energy costs. Second, agricultural efficiency must be redefined in terms of yield per unit input, not yield per acre. The final argument in Odum's critique was that industrial agriculture as it was practiced in the United States at the time often resulted in tragic “non-target” effects, mainly soil erosion and chemical pollution.

In many ways, Odum's formulation of the agroecosystem was a broad one. It included not only the crop fields but also the larger environmental context, as well as some external economic and sociopolitical factors.<sup>183</sup> This made it more clear to mostly-urban environmentalists that not only were industrial farms some of the nation’s most egregious

---

<sup>181</sup> Eugene Odum, “Properties of agroecosystems,” In: *Agricultural Ecosystems*; R. Lowrance, B.R. Stinner, and G.J. House, Eds. John Wiley & Sons, New York. 1984, pages 8-11.

<sup>182</sup> Eugene Odum, *Fundamentals of Ecology*, Third Edition, (Philadelphia, 1971), pg. 412. Emphasis is Odum’s.

<sup>183</sup> Odum, Eugene, “Properties of agroecosystems,” 8-11.

polluters, but also that city-dwellers were connected to this system through social, economic and political processes. Odum's conceptualization of the agroecosystem as not only a place of production, but also one inclusive of distant consumption was an attempt to illuminate the disconnections of industrial society. The early concerns of the modern environmental movement reflect the values and limits of its urban and suburban roots. Odum's agroecosystem concept was aimed at broadening these concerns.

Many interested in environmental issues during the Age of Ecology also absorbed Odum's focus on energy as a critical measure of socio-environmental relations. Odum consistently used ecoenergetic analysis to point out the inefficiencies and inequalities sprouting from industrial agriculture. Another of the most strident critics of American farming, the Kentuckian Wendell Berry, picked up this language and mode of analysis. Kimberly K. Smith argues in *Wendell Berry and the Agrarian Tradition* that Berry explicitly wed agrarianism and environmentalism – two often conflicting traditions in American history – by drawing on the “fragile planet thesis,” its central claim being that humans are capable of destroying the environment and, thus, themselves. It is important to recognize that this idea can be traced back at least to the nineteenth century works of George Perkins Marsh and Edmund Ruffin. Ecologists, Odum prominent among them, relied heavily on this popular thesis as well, and by drawing on it Berry turned a failing political agrarianism into a thriving “ecological” one.<sup>184</sup>

A man of letters and a small-scale farmer, Berry is now synonymous with critiques of industrial culture and agriculture. His 1977 work *The Unsettling of America* is a call-to-arms for the cause of local economies and appropriate technology:

It is an old story. Evil is offering us the world . . . What is new is the *guise* of the evil: a limitless technology, dependent upon a limitless morality, which is to say upon no morality at all. How did such a possibility become thinkable? It seems to

---

<sup>184</sup> Kimberly K. Smith, *Wendell Berry and the Agrarian Tradition: A Common Grace*, (Lawrence: University Press of Kansas, 2003).

me that it is implicit in the modern separation of life and work. It is implicit in our assumption that we can live entirely apart from our way of making a living.<sup>185</sup>

Now in its third edition, *The Unsettling of America* explicitly advocates ecological thinking – in that he relies on the methodologies and explicitly scientific knowledge of ecosystem ecologists. It also represents the first, and arguably the only, canonical environmentalist text to focus attention on industrial agriculture.

Berry began working on this piece in 1974 in response to the policies of Secretary of Agriculture Earl L. Butz, who offered “the most optimistic, the most widely obeyed and the worst advice ever given to farmers: that they should plant ‘fencerow to fencerow.’”<sup>186</sup> Berry reinforced his cultural and economic critiques with the natural science of Odum and ecosystem ecology. In the first chapters he laid out his argument that American agriculture suffered from a crisis of character and culture. He then devoted an entire chapter to “The Use of Energy,” that echoed many of Odum’s warnings. Chief among these is the caution that contemporary use of fossil fuels resulted in “serious geological and ecological damage.”<sup>187</sup> As Odum was fond of doing, he reminded readers that there were two types of energy, “that which is made available by living things and that which is made available by machines.” His point was that we must not forget that fossil fuel energy has significant costs, while solar energy is essentially free for the taking. Again appropriating Odum's language, Berry argued that an appropriate “energy economy” was one where individuals were not “greedy” or individualistic because they are “indissolubly linked in complex patterns of energy exchange.”<sup>188</sup> Perhaps more than in any specific premise, Odum’s presence in *The Unsettling of America* is most obvious in the belief that energy is what allows for and also what limits a society. Berry added that energy use reveals

---

<sup>185</sup> Wendell Berry, *The Unsettling of America: Culture and Agriculture*, Sierra Club Books: San Francisco, 1997, pp. 78-79.

<sup>186</sup> *Ibid*, vii.

<sup>187</sup> *Ibid*, 84.

<sup>188</sup> *Ibid*, 85.

much more than efficiency; it reveals values. Although Berry never cited Odum – *The Unsettling of America* is a work of literature with very few citations – he clearly relied on both Odum's language and ideas.<sup>189</sup> Odum's ecoenergetic analysis was the scientific anchor for Berry's rhetorical assault on the industrialization of the countryside.

While Berry's *Unsettling of America* may very well represent the convergence of agrarianism and environmentalism, we should not let this obscure the very real and persisting divisions between these two traditions. Many agrarians remain wedded to the moral ideal of rugged individualism and represent the older Jeffersonian tradition, while many environmentalists – even those critical of American agriculture – are not at all sympathetic to the plight of rural farm communities. Revisiting Eugene Odum's agricultural politics suggests some reasons as to why Berry's synthesis, which hinged on ecology, did not thoroughly unite these two movements.

Odum's analysis of the environmental costs of industrial agriculture was patently ecological, yet his conclusions regarding the social costs were often crudely *biological*. Overestimating the explanatory value of science, Odum reduced humans – and thus human values – to just another quantifiable stream of energy or trophic level. “Man does not differ from rats or monkeys,” Odum argued when discussing agriculture, “in his need for an environment that permits a stabilized social behavior.”<sup>190</sup> While this kind of logic may be true in one sense – like other animals, humans are social beings – it shows no attention to the significant ways in

---

<sup>189</sup> Although Odum is not acknowledged specifically in *The Unsettling of America*, Berry does make extensive use of a scientific study in agriculture that explicitly employs ecoenergetics: Berry, *Unsettling*, 197. Berry also acknowledged in a personal communication to the author that he was exposed to the ideas of Odum through their mutual friend, Wes Jackson. Letter in the possession of the author.

<sup>190</sup> Odum, *Fundamentals*, 1971, 412-413.

which humans differ from other animals.<sup>191</sup> In this sense, Odum's biological analysis of human “systems” tended to naturalize what were in reality complex and contingent political matters.

Odum's functional approach also tended to value the countryside for what are now widely called “ecosystem services,” and not as a human and natural community. He proclaimed that the “agricultural engineer of the future must be more concerned with the ability of rural landscapes to provide the cities with clean air and water.”<sup>192</sup> Neither was he openly concerned with preserving vibrant rural communities, perhaps because he saw urbanization and the mechanization of farming as inevitable. He argued that the proper solution to this was a slowing of the rural exodus and “compensatory adjustment in social and political systems.”<sup>193</sup> Informed by his biological training, Odum understood these social issues as analogous to the behavioral patterns of animal populations. Thus, when it came to analyzing the social impact of industrial agriculture, Odum's analysis diverged significantly from the agrarian tradition. The failure of postwar agroecology to incorporate a humanistic perspective drove a wedge between two powerful factions fighting the same industrial forces.

It is important to recognize that Odum and other ecologists drew on existing challenges to industrial agriculture. Why did these earlier critiques of the industrial food system not directly inform the genesis of modern American environmental politics? The decades following World War II produced several discrete attacks on the new agriculture. J.I. Rodale began publishing *Organic Farming and Gardening* in 1942 and established a sizable following over the next two decades. Rodale criticized the postwar embrace of chemical farming and advocated an

---

<sup>191</sup> Anthropological research shows that human language systems and sophisticated kinship networks are the critical differences between humans and other animals, William A. Haviland, *Cultural Anthropology*, (Belmont: Wadsworth, 2002), 10<sup>th</sup> edition, 533. These monumental differences allow for the creation of distinctively human cultures and value systems which cannot be analyzed in the same way that a biologist studies other animal populations.

<sup>192</sup> *Ibid*, 421.

<sup>193</sup> *Ibid*, 412.

agricultural system that he argued would restore the health of the soil through natural processes. In the late 1960s, the counterculture turned its attention to food politics, rejecting everything from “plastic” foods to white rice while organizing cooperative groceries and rural communes. By the early 1970s different critiques merged or at least tested common ground for a synthesis. Not only did Wendell Berry offer a tenuous union of agrarianism and ecology, but the counterculture and the organics also reinforced each others message.<sup>194</sup> However, it seems that it was only when Odum and other ecologists lent their scientific clout to critiques of agriculture that the environmental movement admitted food politics to its agenda.

Food politics offers a unique window into the contests over the direction of the early environmental movement. This broad narrative reveals that several holistic reactions to the American food system existed in the postwar decades. The non-scientific critiques often preceded others, were countercultural, and were based in a spiritual holism, while Odum and other ecologists framed theirs as an authoritative, material and scientific holism. The fact that agriculture was only admitted to the mainstream agenda when ecological critiques surfaced suggests that those who set this path were hesitant to accept the “less reliable” knowledge of non-scientists.

To some, this story may echo others that suggest ecologists led the environmental movement, in the sense that they provided knowledge essential to its direction. However, we must recognize that ecologists were products of the same social *milieu* as many other environmentalists. Ecosystem ecologists drew on the “fragile planet thesis” just as much and often for the same reasons as did Wendell Berry and other environmentalists. While the incorporation of ecological critiques of agriculture into mainstream environmental politics suggests a tight relationship between the science and the social movement, it should not be

---

<sup>194</sup> Warren Belasco, *Appetite for Change: How the Counterculture Took on the Food Industry*, (Ithaca: Cornell University Press, 1993).

assumed that ecologists consistently played a leadership role. Indeed, the organics message likely influenced many of Odum's suggestions for agricultural reform, which included detritus agriculture and compost heaps. Odum and other agroecologists did not create the awareness that industrial agriculture was problematic, nor did they push the environmental movement in that direction. What they *did* do was legitimize peripheral critiques and make them more palatable to core environmental politics. This story suggests that ecology's main contribution to the environmental movement was not a unique or essential holism – as many suggest – but instead its cultural authority as science.

As ecosystem ecology and environmentalism took shape in postwar America they often ran parallel, both drawing on long-standing strands of holistic thought to counter the same modernizing, industrial forces. This recognition illuminates the cultural biases' behind assumptions of scientific leadership that informed both the birth of environmentalism and subsequent histories of the era. Viewing environmental politics and science through the window of agricultural critiques also highlights the contests over the direction of environmentalism in its early years. In a broader sense, recognizing that this story is not simply one of scientific dominance supports the notion that there are indeed other ways of coming to know nature.



## Conclusion

Late in his career, Eugene Odum often recounted his version of the history of ecosystem ecology. These accounts generally acknowledge that the “environmental awareness movement” prompted ecologists to broaden their field of inquiry.<sup>195</sup> While Odum's version of this history is illuminating, it is only a partial one. This thesis shows that popular values affected the science in many more ways than just a vague broadening of interests. On one illuminating occasion, however, Odum told a story of his scientific work that suggests these other influences.

As he approached retirement, Odum sat down with then-UGA History professor Emory Thomas to record an oral history of ecological research at Sapelo Island. In the early 1950s, Odum and other UGA scientists had secured permission to use the island for university research from R. J. Reynolds, the wealthy tobacco tycoon who owned the vast majority of Sapelo. Odum then helped establish a marine research institute on the island. The Sapelo Marine Institute was the launching pad for ecological studies crucial to the passage of the landmark Coastal Marshlands Protection Act of 1970. These early trips to the Georgia coast also inspired in Odum a lifelong love of this unique environment.<sup>196</sup> During his activist years, Odum often used the Georgia coastal marshes as an example of the importance of “natural systems” for human health; he emphasized that intact marshes filter and recycle water, produce vast amounts of food for wildlife, and are critical habitat for a wide variety of commercial seafood.<sup>197</sup> When he spoke

---

<sup>195</sup> See, for instance, Odum, *Basic Ecology*, 3.

<sup>196</sup> Odum, oral history, Hargrett.

<sup>197</sup> J. Thomas Chafin, “Whole Earth Mentor: A Conversation with Eugene P. Odum,” *Natural History*, 1998, accessed online 1/16/09, 2:57 p.m.

about this in public, Odum framed this knowledge as ecological – that is, stemming directly from his scientific work.<sup>198</sup> However, when he spoke with Thomas for the interview, Odum told a story that diverged from the public one in important ways. He revealed to Thomas that when he first visited Sapelo, ecologists were not aware of the value and function of coastal marshes; it was actually local fisherman who tipped Odum off to the role of marshes in sustaining a healthy, productive marine environment.<sup>199</sup>

To some, this variation of the story may seem trivial. I submit, however, that it is representative of several overlooked chapters in the history of ecosystem ecology – and points to broader theoretical concerns about the relationship between science and society. First, it highlights the importance of place in the production of ecological and environmental knowledge. The site of this research, Sapelo, was not a “placeless” *tabula rasa*; it was a dynamic, living environment filled with historical actors, whether human or otherwise.<sup>200</sup> The environmental and human particulars of this place fundamentally shaped Odum's understanding of nature and ecosystem ecology. Beyond this, Odum's exposure to the environment of Sapelo and his discussions with local fishermen also informed his politics, as evidenced by his extensive efforts to secure protection of coastal marshlands. It is thus important to highlight that this environmental knowledge, which would eventually form much of the popular basis for coastal protection, was not only place-based, but also explicitly of non-scientific origin. The Georgia fishermen who instructed Odum on the workings of the coastal environment came to this knowledge through their labor. Had Odum not later “scientized” their knowledge – adding texture and I would suggest, most importantly, authority – it seems highly unlikely that the

---

<sup>198</sup> Eugene Odum, “The Attitude Lag,” *BioScience*, vol. 19, no. 5, (May 1969), pg. 403.

<sup>199</sup> UGA Hargrett Library, Manuscript Collection, Box A18, transcription of oral history conducted by Emory Thomas. This story closely mirrors that told by Daniel Schneider in his article, “Local Knowledge, Environmental Politics, and the Founding of Ecology in the United States: Stephen Forbes and “The Lake as a Microcosm,” *Isis*, 2000, 91: 681-705.

<sup>200</sup> For more on the “placelessness” of 20<sup>th</sup> century knowledge, see Robert Kohler, *Landscapes and Labscapes*.

efforts for coastal protection would have achieved the success that they did. Either way, this story is a clear example of the ways in which specific environmental concerns are often assumed to be the product of ecological science, when they in fact sprouted from a “less authentic” seed.

There are many stories that could be told about Eugene Odum. This one is about his personal intellectual journey. One of Odum's most defining qualities was his unquenchable thirst for knowledge. Fueled by the famous “Odum drive” and a deep sense of moral responsibility, it was indeed an amazing journey.<sup>201</sup> First in 1920s Chapel Hill, then into the postwar landscapes of the American South, and finally the political arena of Earth Day-era environmentalism I have traced the most formative moments of this journey. Within this realm, my main interest has been his changing scientific and political message. How did one of the most visible leaders of both postwar ecology and environmentalism formulate his personal politics? How did his politics and science inform each other? And in turn, how did his message both react to and act upon the views of others?

Eugene Odum was a brilliant and creative synthesizer, an unrivaled academic impresario, and a passionate activist. He was also a complex man. The scene that appears from peering through the window of his life is one of tension and change; tension between new and old, lab and field, humans and nature, radicalism and conciliation. It may seem strange that a story about Odum lacks stability and order, but perhaps this is the ultimate lesson: Odum saw order everywhere precisely because that it was what he so desperately desired. Like his father, Eugene was all too aware of the disturbing side of 20<sup>th</sup> century America. And also like his father, his goal was to foster harmony where it did not exist. Daniel Singal has argued that Howard W. Odum was a man torn by the transition from Victorianism to Modernism.<sup>202</sup> Eugene was also a

---

<sup>201</sup> First H. W., then later Eugene, referred to their intense motivation as the “Odum drive.”

<sup>202</sup> Daniel Joseph Singal, *The War Within: From Victorian to Modernist Thought in the South, 1919-1945*, (Chapel Hill: UNC Press, 1982).

transitional figure, straddling the divide between scientific natural history and the “modern ecology” of the postwar years.<sup>203</sup> He did more than perhaps anyone else to usher in the “new ecology,” merging the “hard” science of physics and chemistry with the holistic ecology of Clements and Sears. Odum's writing, however, betrays continuing conflict over the direction of both ecosystem ecology and American environmental politics.

Ecosystem ecology was essentially a synthesis of physical and biological sciences, yet Odum hoped for it to be – and continually claimed it was – a hybrid of the social and natural sciences. Odum consistently argued that ecology was an integrative discipline, and hence the disciplinary bridge needed to solve complex socio-environmental problems. However, his understanding of the humanistic perspective was limited. For one, he defined the humanities rather peculiarly as “law, economics, planning and political science.”<sup>204</sup> When stressing the importance of interdisciplinarity, Odum often qualified this by adding that one’s program of study should have a heavy emphasis on quantification.<sup>205</sup> In sum, his understanding of humanistic thought was merely one where inquiry was directed towards humans as subjects, regardless of the methodology or starting assumptions which the scholar brought to the question. Since he included humans in the ecosystem, Odum deemed his work humanistic. Although he recognized the need for interdisciplinary perspectives, he remained a scientist through and through.

One of Odum's central arguments was that humans must recognize that they are a part of nature in order to develop an appropriate environmental ethic. Yet he also portrayed humans as outside of nature, acting on it, and, unless guided by the science of ecology, destroying it. Although he used these two rhetorical devices inconsistently – sometimes nature is passive,

---

<sup>203</sup> More speculatively, one can also see Odum as a product of a postwar American intellectual shift from modernism to post-modernism.

<sup>204</sup> Ibid, 406.

<sup>205</sup> Odum, *Fundamentals*, 1971, 406.

sometimes active; sometimes humans were natural, other times not – they do share one important common assumption. In all of these varied uses, Odum defined both humans and nature as singular entities. This conceptualization of a uniform “humankind” and a monolithic “nature” is rooted more in abstraction than reality, and suggests some of the shortcomings of Odum's politics as well as those of postwar environmentalism in general. The human-nature duality, still a common one, implies that social inequalities are at best secondary to the environmental crisis, and at worst, non-existent. While ecological science and popular environmental values absorbed many facets of postwar politics, they too often eschewed minority social movements.

Odum's personal politics illustrate this tendency. Although deeply influenced by his father, who understood clearly the divisions and inequalities between humans, Eugene tended to overlook these questions. Eugene's identity as a Southerner was of great importance to him, and his reflections on the region's history reveal the ways that social problems were marginalized by the over-simplified conception of a “human-nature” crisis. As noted earlier, he believed that, “much of H.W. Odum's prescription for curing the ills of the South has been carried out,” and argued that “the southern states are well on their way to becoming 'developed,' with all the different problems that come with that status.”<sup>206</sup> Essentially, his history is one where economic modernization solved pre-existing social problems, but created new environmental ones. For Eugene Odum and many others in postwar America, the conception of a singular “humankind” that was destroying “nature” obscured the persistence of social problems and the common ground they shared with the environmental crisis.

Odum's fascination with the Space Age reveals another of these intellectual tensions. In 1964 he cited “the exploration of outer space” - along with the onset of the atomic age and human population growth - as a cause of his discipline's “rise to a front-line position in man's

---

<sup>206</sup> Odum, “The Emergence of Ecology as an Integrative Discipline,” pg. 1291.

thinking.”<sup>207</sup> His interest in the exploration of space did not wane. The 1971 edition of *Fundamentals* included a chapter authored by a UGA postdoctoral fellow entitled “The Ecology of Space Travel,” which argued that this field of research was useful as a way to ecologically engineer the minimum self-sustaining ecosystem.<sup>208</sup> In 1984 Odum used space travel as a metaphor for the imperiled earth: “agroecosystems, coupled with natural ecosystems, constitute the human life-support module for spaceship earth.”<sup>209</sup> Like many Americans, Odum was excited about the possibilities of the Space Age. He used the spaceship as a metaphor for the earth as life-support system and also relied on the pictures sent back from the Apollo mission to support the fragile planet thesis.

Although other scholars have understood the importance of the Space Age for Odum, they have overlooked the inconsistencies it reveals in his thought.<sup>210</sup> If we look beyond Odum's fascination with the topic, we can see another point of tension that wracked Odum's science and politics. Not only did he eagerly support space travel, he also trumpeted the development of space colonies as a solution to “the population bomb.” As other historians have pointed out, this kind of “technocratic optimism” indicates a deep contradiction within environmentalism.<sup>211</sup> While claiming that technology was the root of the environmental crisis, many environmentalists simultaneously looked to new technological developments as a solution. On an individual level, Odum's thoughts on technology were especially ambiguous. As early as 1953 he warned that humans must develop a cautious approach to the development and use of new technologies. He continued to make these warnings, yet would follow them with support for projects like

---

<sup>207</sup> Eugene Odum, “The New Ecology,” *BioScience*, vol. 14, no. 7, July 1964, 14.

<sup>208</sup> Odum, *Fundamentals*, 1971

<sup>209</sup> Odum, “Properties of Agroecosystems,” in *Agricultural Ecosystems: Unifying Concepts*, (New York: John Wiley and Sons, 1984), pg. 8.

<sup>210</sup> Joel Hagen, *Entangled Bank*, “Epilogue: The Flights of Apollo”; Hagen, “Teaching Ecology,” 2008.

<sup>211</sup> Peter Taylor, “H.T. Odum, Technocratic Optimism and the Partial Transformation of Ecological Metaphor after World War II,” *Journal of the History of Biology*, vol. 21, no. 2, (Summer 1988), 213-244; Andrew Kirk, *Counterculture Green: The Whole Earth Catalog and American Environmentalism*, (Lawrence: University Press of Kansas, 2007), 172.

BioSphere 2. Odum argued in a *Science* op-ed in 1993 that the “bioregenerative life support” experiment was “a new, more holistic level of ecosystem science . . . research at the interface between the natural and the social sciences, where the real world problems of the future lie.”<sup>212</sup>

In a similar way, this position suggests the conflict Odum faced when pondering the role of ecologists: Should they serve as environmental engineers, ordering the natural world to serve humans in the most efficient manner, or should ecologists merely point to “the wisdom of nature” and let it take its course? Odum often did both.

Metaphors have more than just a superficial meaning in science, and in Odum's case they represent another persistent tension. Scholars of science have long recognized their subjects' choice of metaphor as a significant marker of meaning. In ecology they are especially illuminating because they often signify the way that the scientist understands nature. When Odum began his training, organismal metaphors dominated the language of ecologists and he thought of the function of species in an ecosystem just as his predecessors had – they were analogous to the role of a bodily organ in relation to the creature of which it was a part. However, he and his brother H. T. played central roles in the shift to a machine – or spaceship – metaphor in the postwar language of ecologists. Yet Eugene vacillated on this important point, often reverting back to his description of nature as an organism. This wavering is emblematic of another central tension in his thought: Was nature an organic whole with a progressive, self-ordering design; or, was nature a finely-tuned artifact, an engineered collection of parts?<sup>213</sup>

Odum and ecosystem ecology consistently struggled to reconcile these tensions. Initially, the malleability of the ecosystem concept drew support from a wide range of constituencies. As Frank Golley points out, industry and government were attracted to the science for the potential it showed to manage nature.<sup>214</sup> Perhaps, they hoped, ecosystem ecologists could develop waste

<sup>212</sup>Eugene Odum, “BioSphere 2: A New Kind of Science,” *Science*, May 14, 1993, vol. 260, pp. 878-879.

<sup>213</sup> Much of this is drawn from Peter Taylor, *Ibid.*

<sup>214</sup> Frank Golley, *A History of the Ecosystem Concept.*

treatment schemes that would allow them to continue the profitable practices that drew public outcry. At the same time, the environmentalists who targeted industrial polluters as “public enemy number one” relied on the ecosystem concept to justify their holistic notions of interconnectedness. While this flexibility garnered government, industrial and public support for ecosystem ecology, the internal contradictions from which it sprang eventually weakened ecosystem ecology and led to the growth of other ecological disciplines.<sup>215</sup>

Recognizing this internal duality adds new dimensions to our understanding of postwar science and politics, for it suggests another way to conceptualize the relationship between ecology and environmentalism. Instead of seeing the top-down influence of ecological science on environmental politics, we can now see this exchange as one where environmentalists appropriated the facets of the science that suited them best. After all, the popularized version of ecology was very different from the formal science. Environmentalists were not using nutrient exchange rates and electric analogue circuitry to model the effects of pollution. Just as industrialists used ecosystem ecology for its technical proficiency, environmentalists used its cultural authority as science to reinforce their preexisting notions of holism. Neither camp *adopted* ecosystem ecology, they *adapted* it to their own agenda, leaving the scientists to debate the direction of the field.

It is just as important to recognize the common assumption that environmentalists and industrialists shared at this time as it is to understand their points of divergence. That common ground is their mutual recognition that science granted them power and legitimacy. This near-universal reliance on science in the postwar decades has had significant consequences for American society. For one, American political discourse has too often uncritically accepted scientific authority on social issues. There are very few – if any – purely scientific questions.

---

<sup>215</sup> *Ibid.*



Science produces knowledge, and often very useful knowledge, but it should always be balanced with other perspectives. Barry Commoner and other “politico-scientists” in the Age of Ecology recognized this and argued that science should be democratized, meaning that public access to scientific information and decision-making should be maximized. In contrast, Odum saw ecologists not as participants in the environmental crisis, but as *the* leaders. While Commoner challenged the idea that scientific “experts” could make objective management decisions, Odum saw this as the main role for ecologists.<sup>216</sup> In his earnest efforts to create a better world, Odum was handicapped by a dogmatic belief in the primacy of science. In addition to textbooks and test-tubes, we must not forget that there are other ways of understanding the world around us.

---

<sup>216</sup>Michael Egan, *Barry Commoner and the Science of Survival: The Remaking of American Environmentalism*, (Cambridge: MIT Press), 2007.

## **Appendix:**

### **A Note on Research Methodology**

As my first major research project, this has been an extremely challenging and rewarding one. I have pushed – and been pushed – past many obstacles, and as I approach the finish line I think it wise to include a note on the methodological lessons learned through my research. Hopefully this appendix can also be of some use to researchers who plan to work with the Odum materials at UGA.

When I began this topic, I was a neophyte graduate student with little sense of what direction I would like to take my research. The son of two UGA-educated biologists, I grew up hearing about the legendary Eugene Odum, “Father of Modern Ecology.” So when I took up the topic in my second semester of the master's program, my ideas were very broad and open-ended.

I dove head-first into the Odum materials at UGA. There are actually two separate collections in UGA's Hargrett Library, one in the university archives collection and one in the manuscript collection. The university archives collection is made up of materials that Odum sporadically sent to that division starting in the mid-1970s. UGA archivists familiar with the collection recall that Odum insisted he would organize them himself, yet he never got around to it. Only when Betty Jean Craige began research for her biography of Odum in 1997 was the collection organized. Records exist that could be used to piece together an accession guide, which would document the dates that each segment of the collection arrived at university archives. Now, the collection is cataloged neatly with an online finding aid. The university

collection is generally administrative and formal in tone, and the larger manuscript collection contains more material of a personal or reflective nature. The manuscript collection is currently in the process of being organized and cataloged.<sup>217</sup> When Odum died in 2002, the materials in the manuscript collection were taken from Odum's home by his accomplished friend and colleague Frank Golley. Unfortunately, Golley passed away unexpectedly when he was in the very early stages of organizing this important collection. The materials remained in this state until January of 2009, when the Hargrett library received the necessary funding and put me to work organizing the collection. As the manuscript collection consists of nearly 400 unorganized boxes, the process has only just begun.

This brief introduction to the collections with which I have been working probably suggests some of the research challenges that I have faced. With the university collection, there are huge volumes of material, however, much of it is very formal and detached. This tone is partly due to the fact that it is largely an administrative collection, but it also suggests something about Odum. He was entirely absorbed in his research and institution-building efforts; judging from the archives, he did not take the time to write many personal letters or reflections.<sup>218</sup> As I was not interested in writing an institutional or strictly internal history, long sessions in the manuscript collection often revealed very little of use to my line of inquiry. The obvious challenge in the manuscript collection – where I decided that I was most likely to find pertinent sources – was that it was only roughly organized and labeled. Some brief examples drawn from the (unpublished) finding aid illustrate this obstacle: Box A6 contains “brochures, card files, SRP maps, photographs, and posters/teaching”; Box A83 contains “working papers, papers and

---

<sup>217</sup> The University Archives Collection of the Hargrett Library is cataloged online at [www.libs.uga.edu/hargrett/archives/newcollectionguide/guidee.html](http://www.libs.uga.edu/hargrett/archives/newcollectionguide/guidee.html).

<sup>218</sup> This observation is especially true in the 1950s and 1960s when Odum was fully absorbed in formalizing ecosystem ecology and building the programs in ecological research and teaching at UGA, which recently became the UGA Odum School of Ecology. Starting around 1970, the archives reveal that Odum shifted his concerns from theoretical and institutional issues towards interacting with the public on issues of environmental politics. As he did so, his writings become less formal and more personal.

books, and fieldtrips”; and Box A95 holds “task force mtgs., and physical resources of georgia.”<sup>219</sup> As these selections suggest, the listing of contents is often maddeningly broad, and within a single box the materials may be entirely unrelated. The Hargrett staff was generous to allow me access to as much as they did, and they offered as much assistance as they could with the manuscript collection, yet it was still an exceedingly difficult task.

Of course, both collections hold promising materials. I feel that they both lend themselves to institutional histories that would examine Odum's progression as an academic impresario. They could also be critical for a history of the internal tensions and debates of ecosystem ecology in the 1960s, a story that should be told, indeed.<sup>220</sup>

The manuscript collection holds a wider variety of sources that should be of more interest to historians. For example, there are field notes which Odum recorded while on trips around the Southeast in the 1940s and '50s. Written in the more journalistic narrative style of a naturalist, these sources reveal Odum's reflections in a much more personal and informal way.<sup>221</sup> There are also many more personal letters to family and friends in the manuscript collection. As both his brother and father are important and interesting historical figures, this correspondence is valuable in several ways. First, it is interesting for the fact that it gives more texture to Eugene's personality and reflections. Also, as the Odum family is a central one in American intellectual history, these letters could form the foundation of an interesting study of their place in 20<sup>th</sup> century developments.<sup>222</sup> The manuscript collection also holds a vast assortment of Odum's

---

<sup>219</sup> As the collection is being re-organized now, these references will likely not be useful for long. The finding aid from which this information is drawn is in the possession of the staff of the Hargrett Library manuscript staff.

<sup>220</sup> For more on this see Joel Hagen's recent article, “Teaching Ecology During the Environmental Age, 1965-1980,” *Environmental History*, October 2008, 713. A study that focused on the rising tensions within ecology in the 1960s would mesh well with Hagen's article, which, in effect, studies the aftermath of this rift.

<sup>221</sup> Of course, this very transition from personal to detached writing tells us something about Odum as well. To me, this change is suggestive of the path that he took in his efforts to legitimize ecology within the sciences: he changed the way he both studied and wrote about nature.

<sup>222</sup> For instance, there are letters between H. W. Odum and E. P. Odum from the 1930s and '40s which explore the possibility of synthesis between the disciplines of ecology and sociology. In general, there is a significant amount of material related to Howard W. Odum in this collection.

personal materials relevant to the rise of modern American environmentalism. There are boxes and boxes of information (including correspondence) related to public organizations and campaigns engaged in environmental politics. Geographically, these files range from the local to global (with a heavy emphasis on Georgia), and cover issues from agricultural land preservation to noise pollution to BioSphere II. As this collection is still being organized, there is likely much more to be uncovered.

Unfortunately, I only found much of this manuscript material in the final stages of my writing and revising and have not been able to explore it fully. Approximately half-way into this project I made a practical decision – due to time constraints and the early troubles that I was having in the archives – to focus my attention on published sources. Published sources allowed me to highlight the changing ways in which Odum defined ecosystem ecology – specifically, the changing political content of his scientific message. I plan to reassess and reinforce the ideas in this thesis with more archival evidence as it becomes available, and hope that other researchers will join in the task of understanding Eugene Odum and his role in modern America.