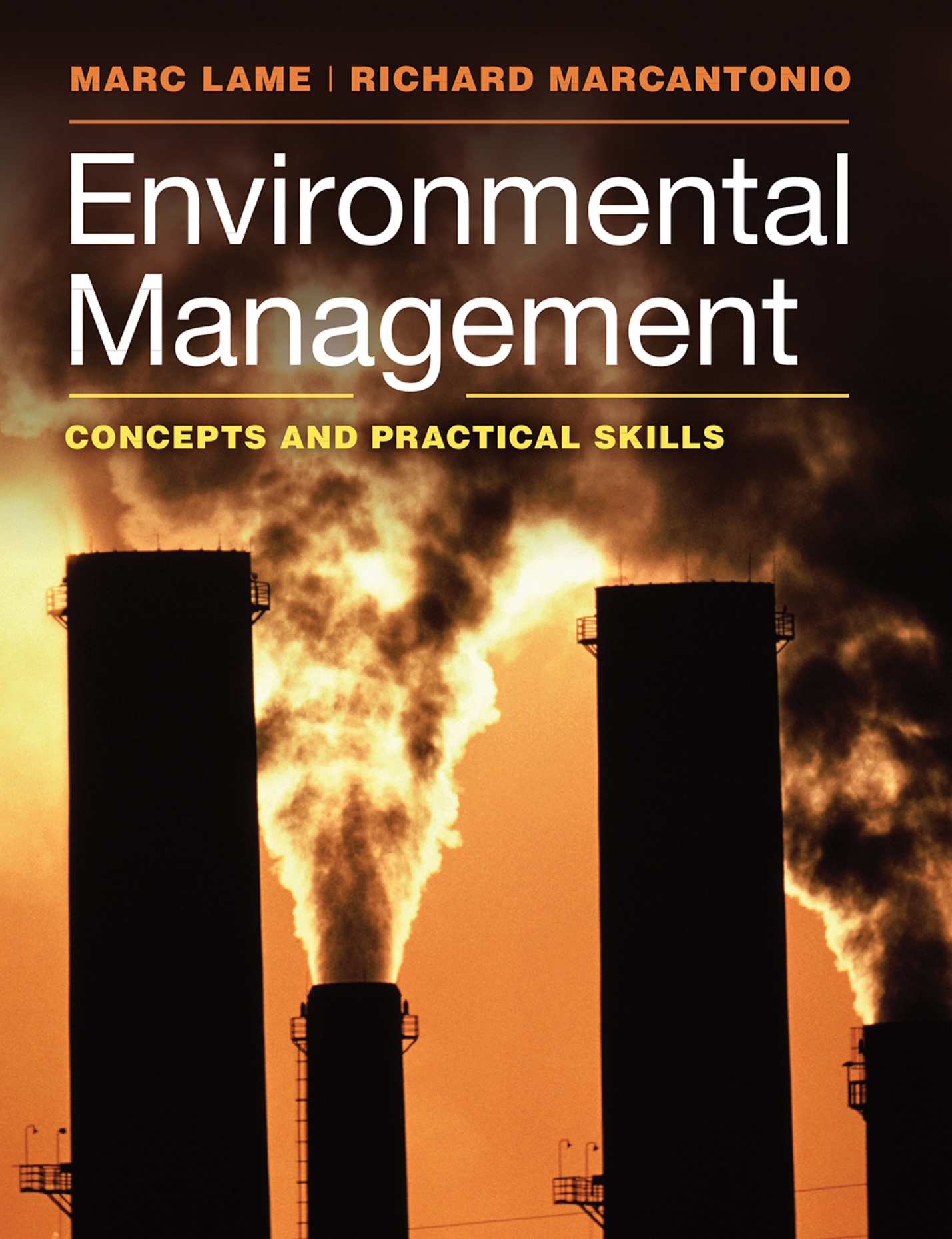
MARC LAME | RICHARD MARCANTONIO

Environmental Management

CONCEPTS AND PRACTICAL SKILLS



Environmental Management

Concepts and Practical Skills

This contemporary textbook and manual for aspiring or new environmental managers provides the theory and practical examples needed to understand current environmental issues and trends. Each chapter explains the specific skills and concepts needed for today's successful environmental manager, and provides skill development exercises that allow students to relate theory to practice in the profession. Readers will obtain an understanding not only of the field, but also of how professional accountability, evolving science, social equity, and politics affect their work. This foundational textbook provides the scaffolds to allow students to understand the environmental regulatory infrastructure, and how to create partnerships to solve environmental problems ethically and implement successful environmental programs.

Marc Lame is Professor Emeritus in the O'Neill School of Public and Environmental Affairs at Indiana University. He is an entomologist and has taught courses on Environmental Management; Risk, Trust, Credibility, and Public Participation; Natural Resource Management and Policy; and Applied Ecology. He maintains a clinical practice diffusing environmental innovations. Marc is on the advisory committee to the US Environmental Protection Agency (EPA) and helped to develop the Integrated Pest Management (IPM) education program offered by the National Environmental Health Association and the Centers for Disease Control and Prevention.

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"*Environmental Management: Concepts and Practical Skills* is an extremely timely book addressing the challenges that executives will face in the decades to come. It is useful to college professors, students, and practitioners in their careers."

Professor Jeff Anstine, North Central College

"*Environmental Management* offers sage advice, grounded in practical realities, for ethical and effective management of pollution and natural resource problems. Lame and Marcantonio have written a fantastic textbook, filled with real-world examples and concrete lessons, that instructors will find valuable for training future environmental leaders."

Dr. David Konisky, Indiana University

"In an era when environmental management is often clouded by partisan politics and rhetoric, this book is a breath of fresh air teaching the next generation how to manage *for* the environment."

Professor Rosemary O'Leary, University of Kansas

"The textbook is full of insightful details, from emphasizing that environmental management is managing both people and nature, to highlighting the importance of understanding the scale, effect, and history of an issue at hand, and using past knowledge to inform decisions while anticipating future conditions. It challenges prospective and seasoned environmental managers with tough but necessary questions, evaluating your effectiveness and inclusion of equitable practices."

Professor Brian Watts, Flood-Prepared Communities Initiative, The Pew Charitable Trusts

"As a natural resource manager and professional, the book, while environmental management focused, is still relevant, as many of the trends and discussions occur in my world the same as they appear in the environmental management sphere. It's a great book for being able to begin to understand the ever changing and evolving world of environmental management."

Ben Weise, Contra Costa Resources Conservation District

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Concepts and Practical Skills

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Preface

The United States has been learning critical lessons on how leadership and management, or more importantly, poor leadership and mismanagement, are addressing two human-caused existential threats to our species and planet: the pandemics and earth-systems change, the "Anthropocene." In a speech recently (2020) delivered at the Indiana University O'Neill School of Public and Environmental Affairs, former administrator of the United States Environmental Protection Agency (US EPA) Gina McCarthy opined in a 50-year review of the agency, originally "the mission was fundamentally to protect public health and the natural resources upon which we all depend." While this book is not about epidemiology or the global scope of managing human impacts on the environment, it *is* about the primary (to protect human health) and secondary (to protect the environment) management goals of our national environmental protection establishment. In this book we focus on domestic environmental laws, management concepts and skills, with the knowledge they can impact or be a model for international environmental management.

Environmental Management: Concepts and Practical Skills is written for scholars of environmental management and the environmental management professional. It is primarily focused on (1) the public sector – those of "Service" (civilian and uniformed service) – who are accountable for regulating human impacts on the environment; but also (2) those professionals in the private sector who, as corporate citizens, strive to comply with environmental policies (laws, rules, regulations, and guidelines); and (3) those in the not-for-profit sector who wish to influence the implementation of environmental regulation and requisite policy formulation. In other words, this book is intended to be of "tri-sectoral" utility.

We wrote this book from a perspective of clinical practice as opposed to management theory, though we do include a healthy dose of both. We thus incorporate management theories and the practical, real-world application and considerations of those theories. Collectively we bring together the experience of a state scientist and regulator turned environmental management professor and federal advisor, and a military professional turned human–environmental systems scientist and public health practitioner. The combination of our academic training and expertise brings to bear a management practicum for what our former students and clinical colleagues have suggested to us as "professional requirements to understand science, policy and management." This book should be viewed as a text for teaching and training but also as a reference and practical manual that can be used throughout the career of the environmental management professional. Our teaching philosophy relies on intellectual stimulation accompanied by entertaining stories, mantras, irreverence, and humor. It is written by authors who are and have been "mission oriented,"

who have participated in the program, resource and political management necessary to attain objectives: one who is old and crusty and one who is fresh, tested, and enlightened.

Much like how one might address an essay exam question, we provide detailed solutions (often by way of explanatory lists) to environmental management concepts and skills backed up with scholarly evidence and expert opinion. We rely heavily on a number of books, seminal articles and examples which bring together commonalities encompassing applied ecology, the importance of leadership and administration, ethics, economic competitiveness, and communication such that the environmental management professional can develop a foundation for accomplishment.

Special features in this text include Real-World Examples, Author's Notes, Interviews from the Field, and end of chapter questions. The first three features are meant to provide the reader with a clinical perspective to aid in concept and skill clarification but might also be critical of current practices based on real-world experiences. The Real-World Examples provide mini-case studies from the firsthand experiences of environmental management professionals ranging from civil servants at the US Environmental Protection Agency (EPA) to environmental practice consultants to a farming-focused non-profit. These professionals provide keen insights from their area of expertise that offer lessons for environmental managers of any stripe. The Author's Notes are our own take on a range of issues from funding of environmental management research to firsthand accounts of the challenges of diffusing innovations. Environmental management is rarely easy, so we offer our experience in certain challenging circumstances to help others better navigate their way when faced with similar contexts. The Interviews from the Field are a further extension of firsthand accounts of environmental management, from two environmental managers with a wealth of experience in public, private, and non-profit environmental management practice. The end of chapter questions were developed to allow the scholar to organize text material for application. We urge the reader to take advantage of these features.

Environmental Management: Concepts and Practical Skills addresses:

- Why we manage the environment – history from Malthus through Carson to current trends of human impacts on the environment including contemporary threats to human health and biodiversity.
- What is environmental management? Defining environmental management, what causes environmental problems and the differences between environmental management and natural resource management.
- What are the fundamental elements required for the successful environmental management professional? The diversity of training, worldview, expertise and experience requisite for an environmental manager and groups of managers to be effective managers is greater today than it has ever been.
- The nexus of management fundamentals, service and environmental protection – including the functions and requirements of the public manager. Multiple perspectives and approaches are needed because each area contributes to and has an interest in the environmental issues we face today.

- Who manages the environment? The different professions involved in environmental protection. How do inside and outside participants influence environmental protection and how do courts manage the environment? From the courtroom to the landowner, decisions about environmental management plans are made every day with a multitude of preferences, outcomes and regulations involved in the process.
- The structure of environmental regulatory programs in the US: federalism – US EPA HQ/region/state dynamics, tensions and solutions; understanding specific environmental media, offices and how to address "the silo" and the importance of mission with regard to the actions of federal departments or agencies.
- Critical and basic issues for the environmental manager and their managerial impact. Special attention is paid to environmental justice, jurisdiction, funding, sustainability, and legal/professional accountability and how these factors can and should affect the program, resource and political management of the environmental management professional.
- What authorities – laws, rules, and regulations – are in place for the environmental management professional to protect human health and the environment? Providing a basic understanding of 13 US environmental laws, summarizing their intent and major provisions.
- The basic legal trends and how they impact the environmental manager in terms of public accountability, property, and civil rights.
- The ethics of management for the environmental professional to understand and ethically address the forces that influence environmental managers. As well, how to co-produce environmentally ethical solutions with stakeholders while considering the managerial implications of the rights revolution. What defines environmental leadership?
- Communication: Why do we communicate and what are the differences between public and private communication? What are the professional requirements and responsibilities (legal and ethical) to address strategic communication planning, barriers to communication, and how to maintain trust and credibility? What are the specific skills required for risk and crisis communication including public participation and environmental dispute resolution? An observation of the skills and concepts necessary for working with the public and media including using the public ombudsman and public information officer.
- Program implementation and the questions that must be asked and answered before implementation. What are the necessary strategic planning and personnel management skills, including task assignment and situation analysis? The skills needed to get communities to adopt environmental innovations? How best to conduct a program evaluation and report? What management systems work for the environmental manager?
- Contracting for environmental management: Why do we contract out work and what are the advantages and disadvantages of contracting?
- How the environmental manager uses and/or reformulates policies. Understanding the participants and process for policy formulation. Basic policy tools and rules for the implementation of public environmental programs.

Acknowledgments

We would like to acknowledge those who helped this book to come to fruition after some years in concept and development. In general, there are three groups who come to mind: those who believed this text should be published as a contribution to the profession and its professionals; those who contributed to the text with their assistance and expertise; and those who allowed for its publication.

The first group consists of our graduate assistants who believed our conception of a text would help students and instructors to understand environmental management better. More so, that we could actually come up with stimulating and authentic ways of explaining the concepts and skills needed for today's environmental manager. For at least five years (ten semesters on the Teaching Assistant timescale), this group helped to brainstorm ideas for its organization and provided updated outlines. More important was the fact that they made us better scholars and instructors of environmental management, assisting us to improve our teaching continuously. Finally, this first group included some particularly persistent folks – Leanna McKeon, Julia Savia, Rebecca Ciciretti, Taylor Michel, Elizabeth O'Brien, Ashley Scholl, Ben Weise, Ben Young, and Rachael Sargent, who, as they became professionals, would follow up with the question, "How is your book coming along?"

We could not begin to acknowledge the contributions made to this book without starting with Rosemary O'Leary, Daniel Fiorino, Robert Durant, and Paul Weiland, whose 1999 text *Managing for the Environment* provided so much of the foundation of our book. Of particular value were the three elements that allow an environmental manager to be successful: understanding complex and volatile issues and trends; co-production of solutions; and the implementation of those solutions. This foundation guided us as we built new "scaffolds" and skills to encompass the profession and its scholarship as they have progressed since the publication of their book.

From there, we thank those colleagues who taught us as we were teaching and while we occasionally needed better information to include in this text. There are many such colleagues, but a few standouts would include: Jim Barnes, who patiently explained environmental laws in terms of the authority they provided and the goals they aspired to. Jim was a large part of crafting many of those laws, and then implementing them with his general counsel and administration as the US Environmental Protection Agency began and evolved – truly an honorable public servant. Evan Ringquist, who explained environmental policy and required policy wonks to follow the science; and David Konisky, who has a deadpan read of what is environmental justice and how it might be addressed. I (M. L.) thank my colleagues at the Arizona Department of Environmental Quality: Ed Fox, Bill Wiley, Nancy Wrona, Ira Domsky, Bill Norman, Dot Roberson, and John Godec, who taught me many

of the practical skills of environmental management. I (M. L.) also thank Leon Moore, one of the early cotton entomologists who implemented sustainable pest management practices (Integrated Pest Management) and always admonished, "If you are not getting your hands dirty, you are not doing your job."

We want to acknowledge our contributors, especially those who provided "Real-World Examples" from their perspectives as practitioners or researchers (or both) of environmental management: Tricia Balluff, Roy Fillyaw, Jenna Larkin, Marc Marcantonio, Stan Meiburg, Jessie Mroz, Stephanie Redick, Pat Regan, Jorgen Rose, and Mary Willett. We also owe thanks to the senior environmental managers who allowed us to interview them: Ed Fox, Roger Ferland, and Tom Neltner. And thanks to Victoria Andersen, Becca Haussin, and Emily Szwiec, former students and TAs who allowed us to use their homework as examples, read our draft chapters, manufactured figures, and provided feedback.

There are two essential entities that allowed us to publish this book. First, our editors and publisher. Our readers should be aware that finding a world-class publisher and convincing them to publish your book is HARD. Cambridge University Press is a world-class academic publisher, and we want to acknowledge their confidence in us. Finally, and most importantly, we must acknowledge our families who pretended to believe our excuse, "We have to work on our book!" – thereby allowing us to skip out on certain family functions. But, more than that, they listened to us, guided us, and allowed us to really dig into this project and make it happen. Without them it would have been a non-starter. Thank you.

1 Introduction to Environmental Management

Science is the key foundation of everything EPA does. Science has defined the challenges, pushed the discoveries, it has operated as the foundation to design new solutions . . . it has been EPA's professor, our prosecutor and our protector.

Gina McCarthy,
Environmental Protection Agency administrator, 2012–16

1.1 Introduction

Every year tens of thousands of Americans and millions of people worldwide die from pollution (Fuller, Sandilya, and Hanrahan 2019). Pollution is the single largest source of human-caused death, killing 15 times more people than all violent crime and warfare combined (Landrigan et al. 2017). While there are many professions that contribute to the monitoring of these deaths and to the development of technical solutions that address pollution of the water, air, built environment and our land, it is the understanding of risks and the application of these solutions that will save lives and protect our environment. The genesis of the environmental movement and the subsequent demand for environmental management derives, in part, from Rachel Carson's (1962) book *Silent Spring* in which she illustrated what follows when humans disassociate themselves from the ecosystem and are denied "the right to know" regarding their health and the health of the environment.

An ecosystem is "A unit of nature in which living and non-living substances interact, with an exchange of materials between living and non-living parts" (Odum 1971). This unit could be our body, where living microorganisms interact with the non-living molecule, oxygen (O_2). If these substances are not in balance our bodies fail. Thus, in many ways, what our doctors are always admonishing us to do is to manage *our* environment. Other professionals look at ecosystems within local, state, or national jurisdictions and, of course, at the planetary level.

Environmental management in the broadest sense addresses how to keep these units of nature in balance in terms of what humans put into the ecosystem and take out. From a curricular perspective, **environmental management** is most often taught in terms of pollution, how humans unbalance the ecosystem by what they put into it, whereas **natural resource management** is taught in terms of how humans unbalance the ecosystem by what they take out of it. In general, the issues, trends, and human management in each are the same and there is much overlap. Probably the reason for these two "tracks" is that pollution laws regulating air, waste and water are most often enacted by standalone state and federal agencies, i.e., they are more centralized, and natural resource laws are regulated by a multitude of agencies associated with a natural resource: the Fish and Wildlife Service, the Conservation Service, the Bureau of Land Management, the Forest Service, etc.

Different cultures throughout history, from Indigenous peoples' reverence for an integrated human–ecological kinship, to pagan naturalism, to Talmudic protections of trees, to the American Evangelical embrace of efforts to curb global climate change, have been and are concerned with environmental protection. Famed conservation biologist Aldo Leopold, considered the progenitor of the modern sustainability movement, argued that it is only "when we see land as a community to which we belong, we may begin to use it with love and respect" (Leopold 1949). This idea of nature and human well-being as being intertwined is represented in the cosmologies and worldviews of myriad human cultures throughout human history and still today (Francis 2015; Fuentes 2017; Grim 1997).

The major theme of *Silent Spring* is that rather than maintaining that "mankind" dominates the natural world, humans must understand that they are an integral part of the ecosystem. Pre-Carson in the US there were three dominant "environmental ethics" that categorized how humans view their "place" in environmental protection: John Muir's *preservation ethic* – that we should protect the natural environment in a pristine, unaltered state; Gifford Pinchot's *conservation ethic* – humans should put natural resources to use but also we have a responsibility to manage them wisely; and Aldo Leopold's *land ethic* – humans should view themselves and "the land" as members of the same community and people are obliged to treat the land in an ethical manner (Westover 2016).

These ethics were originally applied to natural resource management. But, as the "ecology movement" grew from *Silent Spring*, it can be argued that Leopold's land ethic was the one that most aligned with the realization that human health is inextricably connected to a balanced ecosystem, complemented by Carson's recognition that human-produced pollution posed a new and grave assault on human health. The preservation and conservation ethics of Muir and Pinchot gave rise to organizations such as the US Forest Service and the National Park Service; and Leopold's land ethic motivated the development of natural resource management organizations such as the United States Fish and Wildlife Service (USFWS). It was Carson's *Silent Spring* combined with subsequent environmental disasters (e.g., the burning of Cuyahoga River and the Santa Barbara oil spill, both in 1969) that led to the development of the first national environmental management policy and agency in the world: the National Environmental Policy Act (US EPA 1969) and the US Environmental Protection Agency (EPA; Barnes, Graham, and Konisky 2021), respectively.

1.2 Environmental Management Is People Management

Often environmental scientists mix up environmental management with applied ecology which can be defined as a scientific discipline which uses ecological concepts to solve environmental problems. To be clear, humans can practice population ecology, study the effects of pollution on the ecosystem, and develop tools to manage the environment, but environmental management is people management. For example, whether or not we yet have an understanding or even a consensus that global climate change exists, what its causes are, and how to mitigate them, it will not be solved unless and until humans change their current behavior. Further, the mission of environmental managers, like that of the US EPA, is often "to protect human health and the environment," and in that order, i.e., human health takes primacy over ecological balance, though they are usually interdependent.

These two disciplines, environmental management and applied ecology, are integral and in fact are part of a "scientific continuum" (Figure 1.1) which ultimately can allow for a balanced ecosystem.

1.3 The Successful Environmental Manager

Managing for the Environment (O'Leary, Durant, Fiorino, and Weiland 1999) is, to date, perhaps the most foundational text for our work as environmental managers. It defines environmental management as "an interactive process wherein we learn how social institutions can best reconcile humankind's needs and aspirations with the limits that the natural world imposes" (O'Leary et al. 1999). It outlines and explains the three criteria for environmental managers to be successful:

1. Understanding volatile and complex issues and trends
2. Co-producing with the community methods for dealing with those issues and trends
3. Delivering those methods effectively in a dynamic, politically charged, and legally contentious environment populated by interorganizational networks of actors with often competing interests. (O'Leary et al. 1999: xxiv)

1.4 We Don't Own Environmental Solutions, But We Are Accountable for Their Implementation

In short, the environmental manager must realize how laws, legal and social trends along with public sentiment affect their everyday management decisions and that often solutions

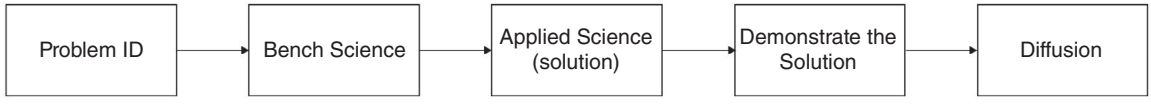

Figure 1.1 The scientific continuum.

or interventions meant to address these issues as specific environmental problems must be produced with others, especially non-scientists. Just as a pilot does not fly a plane without a co-pilot or ground control, the public manager is accountable for good management but requires assistance. Allowing stakeholders to "co-produce" ethical environmental solutions requires leadership by the environmental manager and the mindset that the manager does not "own," in the sense of controlling the decision as it applies to the solution or situation. As the reader will learn, many management disasters have been blamed on "bureaucrats" and "technocrats," who are often depicted as people disengaged with the people affected by the environmental problem at hand and found to be at fault for not addressing their needs which usually expand past the "science" of the issue; and too often the accusers are right.

Whereas there are those who since the publication of *Silent Spring* believe that the basic missions of environmental regulatory agencies have not been properly focused on human health, in fact the mission has always been "protecting human health and the environment." And at its inception this mission has had the primary goal of protecting human health, with a secondary goal of protecting the environment. Indeed, Carson herself pointed out that unless we address both we will fail as a species in the global ecosystem and are doomed.

1.5 Why Do We Need to Manage the Environment? From the Tragedy of the Commons to the 90/10 Rule

While our global ecosystem has been unbalanced by natural forces like epidemics, earthquakes, volcanoes, droughts, and other geologic events, today it is often human activities that cause this imbalance (Rockström et al. 2009; Steffen, Richardson et al. 2015; Steffen et al. 2018). Of course, one can argue that humans as an indigenous species of our planet are also natural. Nonetheless, Garrett Hardin (1968) in his seminal article "The Tragedy of the Commons" illustrates a simple but critical point regarding humans: without regulation there are humans that will take advantage of "the commons" and exploit them to ruin. The commons from our perspective are those resources such as air, water, and land that are held by all such that all can benefit. Common law such as the "Public Trust Doctrine" was first addressed in Roman law for navigable waters to be preserved for the benefit of all (WEF 2020). There are even contemporary movements to establish common law for air (Nevitt and Percival 2018).

From my (M.L.) clinical perspective – that of one who has conducted, studied, and taught environmental law enforcement for more than three decades – this comes down to the realization that 90 percent of people will do the right thing if they know what it is and they have or are given the means to do it, while 10 percent will not because they are either greedy, crazy, or both.[1] Whether it is individuals, communities, companies, or nations, there is an

[1] The 90/10 figure, a general rule of thumb for various organizations, regulatory schemes, etc., does have evidence to support it, even though the exact ratio is variable in every context. For example, the number of polluters included in the Toxic Release Inventory, managed by the EPA, that exceed their permitted amount usually hovers roughly around 10 percent (US EPA 2020a, 2020b). Obviously, despite being a small percentage of the whole, they have a big impact on ecosystems.

unequal distribution of pollution responsibility, with a small percentage of polluters responsible for most of the accumulated pollution in the US and the pollution shaping the global ecosystem today (EPI 2018; Fuller, Sandilya, and Hanrahan 2019; Hickel 2020b). For example, the top 1 percent of wealthy individuals in the world today emit twice the amount of greenhouse gases that the bottom 50 percent of people combined emit (UNEP 2020).

The consequences of this "tragedy" as witnessed by John Muir were the steady degradation of public lands by the late 1800s, the linkage of septic pollution to cholera in the mid-1850s (Snow 1849), and subsequent US public health water regulations in the early 1900s. After World War II, when belching smokestacks signified returning prosperity and coal heating was common in most homes in the West, cities in America and Europe experienced their first air quality emergencies killing tens of thousands. A single pollution event in the UK between December 5 and 9, 1952, now called the Great Smog of London, caused by a combination of frigid temperatures driving increased rates of coal use, high atmospheric pressure, and windless conditions, led to the death of an estimated 10,000–12,000 people (Stone 2002). A similar event, though causing fewer deaths, occurred in New York City in 1966, just before the advent of the Air Quality Act of 1967 and subsequently the Clean Air Act of 1970 (Barnes et al. 2021).

During the same period, with the advent of synthetic agrochemicals and an attitude of "better living through chemistry," industrial agriculture produced what Carson described as a "silent spring" (Carson 1962). Carson illustrated that the public's environment was so degraded by the indiscriminate use of pesticides that nature (particularly birds) was silenced. And until it happened, no US citizen would have believed a river would catch fire as the Cuyahoga River did in Cleveland in 1969. The list of historical examples goes on and on, impacting our "common" reliance on air, water, and biodiversity for our well-being and our desire to appreciate nature. As we will address in this text, the causes of these tragedies are basically twofold: the 90/10 rule described above and disregarding the public's right to know.

Environmental management professionals of today and of the future hopefully will be ready, willing and able to correct past administrative abuse and neglect with an increased acknowledgment of management concepts and skills that can result in success. They will have to deal with more contemporary tragedies including the facts that at least 7 million of the world's population die annually from ambient air pollution (Burnett et al. 2018), while at least 9 million die of some form of toxic pollution (Fuller, Sandilya, and Hanrahan 2019; Landrigan et al. 2017); 80 percent of all human wastewater is discharged back into the ecosystem untreated, causing cholera, dysentery, and a host of other enteric diseases, especially to children (UNESCO 2017); and the frequency and cost of "natural" disasters, from heatwaves to tropical cyclones, have been increasing since 2000, in the US causing a record US$300 billion worth of damage in 2017 (IPCC 2018; NOAA 2020b). And disproportionately it is disenfranchised communities that are exposed to these risks (EPI 2018; Konisky 2015; Landrigan et al. 2018; ND-GAIN 2019; Watts et al. 2019). One can continue listing these tragedies, whether due to mining operations, agrochemical abuse, or the myriad other ways humans are reshaping the global ecosystem.

Why do we manage the environment? Because the policy and implementation decisions of environmental managers are life-and-death decisions.

1.6 Who Manages the Environment?

Theoretically, we all manage the environment, as a matter of societal good and maintaining commonwealth. At the individual level we manage the environment by voting, running for office, and knowing about and participating in public processes at the federal, state, and local levels. There are professions that environmental agencies, the private sector and non-profit organizations value whether they be policy- or science-based: the law, politicians (yes, even them), financial management, accounting, communication, policy analysis, medicine, natural sciences (the whole gamut from agriculture through zoology), and engineering, to name a few. At this point, advanced thought related to understanding "complex and volatile issues and trends," co-production and implementation could also include historians, economists, sociologists, and anthropologists, to understand the how and why of human impact and behavior. In the end, all humans are environmental managers, albeit at radically varying scales, because we all put things into the environment: from cooking fires, to vehicle exhaust, to the water and chemicals that leave our body when we excrete, all humans contribute substances to the ecosystem. But in regulating these actions certain credentials are favored in the environmental management arena, with a healthy mix of environmental and social science and policy training usually being the best bet for success.

In the US, our three branches of government (executive, legislature, and judiciary) manage the environment at all levels. Executive agencies meant to enact laws, rules, and regulations have different jurisdictional authorities and responsibilities. Each agency acts in accordance with its mission. Some, like the EPA, regulate to protect human health and the environment, whereas the US Department of Agriculture (USDA) is tasked with the mission to protect and promote American agribusiness. Both missions can overlap whereas, depending on the contexts of the issue at hand, the EPA would typically have "primacy" and USDA might act in a "consultant" capacity in an environmental management problem; though agencies do not always play nice with each other despite often having similar goals.

Agencies that have primacy with regard to natural resource management, such as the US Fish and Wildlife Service in the Department of the Interior (DoI), would take the lead in a natural resource management issue while the EPA would then act as a consultant. At the same time many of the executive agencies also manage the environment in terms of their own pollution emissions, as required by the National Environmental Policy Act of 1970 (which we will discuss further in Chapter 4). One such is the Department of Defense (DoD), which is the largest source of pollution in the federal government and the single largest consumer of oil in the world (Crawford 2019). These are just examples of how complex the management of the environment is at the executive level.

Of course, it is the legislative bodies (e.g., Congress) that produce the laws under which the executive branch operates. As well, it is this branch of government that generally determines the fiscal resources required for executive enactment, i.e., they make the budget. Finally, it is the judicial branch (the courts) that interprets if the laws, rules, and regulations being enacted by the executive branch are constitutional. Further, one can argue that this branch can also conduct enforcement when an executive agency is not fulfilling its mandate per the law. For example, in 2007 Massachusetts and 11 other US states sued the EPA for not regulating carbon dioxide and other greenhouse gases, claiming that the Clean Air Act required the EPA to regulate any air pollutant from a motor vehicle that could endanger public health and welfare. Often it is the courts when forced by environmental activist organizations and sometimes by government (states suing the feds or other states) that ultimately manage the environment. Interestingly, while the US Supreme Court ruled in favor of Massachusetts et al. and declared that the EPA must regulate greenhouse gases, the EPA has yet to develop and implement such regulations.

1.7 Private and Non-profit Sector Management of the Environment

Aside from government (the public sector), management of the environment is also conducted by the private sector in terms of how lawful they are but also in terms of their participation in the policymaking process (lobbying) and their ability to serve as models and "peer enforcers" for achieving or degrading environmental standards. As mentioned above, often it is the not-for-profit (sometimes called non-governmental organizations – NGOs) sector's environmental activist organizations that practice environmental management by monitoring how well the public and private sectors are protecting human health and the environment. Perhaps most important it is these organizations that manage the environment by suing both government and private-sector entities to fulfill their mandates and holding them accountable for their actions (or sometimes inaction). We will discuss this management of the legal impacts of enforcement and public participation more throughout this text.

1.8 What Are Some Special Skills Required for the Professional Environmental Manager? Or What Skills Can Get You Hired and Promoted?

While the professional environmental manager must practice the three objectives O'Leary et al. (1999) outline for success (understanding, co-producing, and delivering), they themselves must develop certain skills or strategies for this "adaptive" or "high-level" management. This section provides a short introduction to each skill and the foundational knowledge required of the successful environmental manager. Importantly, none stands

alone, and each can be considered a discipline of its own. Skills unlike concepts take practice. Whether it be in heart surgery, karate, tennis, cooking, or management, one only obtains expertise through repetition.

The following skills (in bold text below) and knowledge, and corresponding short summary, are skills that are critical to the practice of environmental management. These skills are laid out and evaluated in detail in different chapters throughout the book but collectively they are the essential tools in the environmental manager's toolkit for operating in the trisectoral environmental management arena.

Situational Analysis – The professional environmental manager must be able to "paint a picture" for any environmental situation, for two basic reasons: to properly address the situation, and to make it understandable to superiors, peers, and subordinates. Executive memos or briefing papers are sometimes used as terms for this situational analysis; however, brevity is the key. Situations in terms of issues, legal trends, authorities (laws), jurisdiction, communication barriers, and policy impact with the recommended specific management actions should be included in this analysis. Another skill closely associated with situational analysis is being able to prioritize such that the environmental manager **operates with their "ducks in a row" and can identify threats and opportunities** for efficient and effective environmental management.

Navigating Government or Co-producing Solutions with Your Stakeholders – The professional environmental manager must learn how to navigate who has responsibility for achieving goals related to environmental management, who determines the goals and resources in terms of laws, rules, and regulations and who interprets and ultimately enforces environmental laws and their mandates. Critical to co-production of ethical environmental solutions is the implementation of **communication skills** particularly those associated with **public participation and crisis management**.

Skills critical to being able to deliver or implement co-produced solutions would be **leadership skills** to provide reality, expectations and give inspiration. **Strategic Planning** – The professional environmental manager must be able to develop a logical plan to solve problems, otherwise they will fail to achieve their goal or, at best, squander valuable resources. Strategic planning is a skill which when obtained allows the manager to "see the route and produce a roadmap." Other skills critical to mission-oriented management are those associated with **compliance assurance**, **quality control and assurance**, and **continuous improvement**.

Diffusion of Innovations – The professional environmental manager must be able to affect the behavior of communities needing to adopt innovations for protecting human health and the environment. Having established that it is human behavior and subsequent activities that unbalance the ecosystem, how can those behaviors be changed? There are management techniques related to communication science that can do so.

Policy Formulation – The professional environmental manager must be able to understand the process and participants that are critical to policy formulation, for two basic reasons: first, so they may wrap their head around what is being asked of them (their mission) and, second, because they often know what needs to be done and how to do it, so must influence the process such that the mission is achievable.

1.9 Conclusion

Environmental management is the practice of a range of skills, from strategic planning to program implementation, in a tri-sectoral world that is bound and shaped by multiscalar environmental laws, policies, and norms. In short, it is complex and ever-evolving. While the science of environmental hazards is a critical component of any environmental management issue, in this text we focus on the production, integration, communication, and full-spectrum management of people, programs, resources, and politics for effective environmental management practice at the local to national scale and in the public, private, and nonprofit arenas.

1.10 End of Chapter Questions

1. Why were environmental regulatory agencies created?
2. What is the stated mission of the US EPA?
3. Name the author of each of, and describe, the three dominant American environmental ethics.
4. In terms of what you are managing, how is environmental management different than natural resource management?
5. Define ecosystem.
6. Diagram the "scientific continuum."
7. In what two ways are the "courts" responsible for managing the environment?
8. Describe the three elements O'Leary thinks are required to successfully deal with issues of environmental management.
9. What is Carson's overriding consideration regarding humans and the environment?

INTERVIEW FROM THE FIELD 1.1 The tri-sectoral landscape

Tom Neltner, a tri-sectoral environmental manager

Tom, the reason I asked to interview you is because you are the only person that I've worked with that I believe has worked in all three sectors. As a chemical engineer you did some environmental management with Lilly, and after you earned your law degree you were in senior management with IDEM and then you advocated for environmental health with a number of different NGOs. So, what do you see are the major differences in environmental management between the three sectors?

The state agency regulates, but they are effectively subsidiary to the federal government. So everybody's got somebody else in charge. Here at the state you've got the

INTERVIEW FROM THE FIELD 1.1 (cont.)

federal EPA in charge. And if you're at EPA, you've got Congress involved and the White House involved. And even at the state, you've got the governor and EPA involved.

In industry I answered to somebody at the company who's doing the actual environmental management, running the wastewater treatment plant, overseeing the air pollution control device, or making sure the permits are in order and the paperwork is filed. Or you may be the one that's trying to do the higher-level corporate compliance instead of just the facility compliance – the internal regulator if you will. So everywhere there's a hierarchy.

In the advocacy groups there is also a hierarchy, and you're accountable often to your funders who want to see results, whatever that may be. And while you are also independent, just like the state of Indiana is independent from EPA, you're often looking to the national groups for guidance and support to help understand what to do and understand the details of issues. So everybody's got somebody overseeing them. And that it's important to realize.

And, what do you find the three sectors have in common regarding their management?

First, I've always found that no matter where you're at, there are dedicated people who care deeply about the environment and health. Some of the most strident advocates, the best advocates, work inside of companies because they felt that they could have the biggest impact from within a company. They're not necessarily seen as environmental advocates.

As an NGO, the key is finding those people in the agency and in the companies that are really focused on getting the job done right. There are a lot of people that are doing their job, but they define the job very narrowly and aren't necessarily focused on the outcomes. The goal is to find the people that are focused on outcomes. They're the ones that are really trying to manage and protect the environment. Don't ignore the others. In an NGO, you have some of the same differences. I try to recognize that there are outstanding people in any of those sectors and to work with them and leverage them. That's a big one.

Second, while we all may feel like we're the smartest person in the room, there's usually a lot of smart people there. So I tried to work from the assumption that there were always smarter people in the room. As a result, my approach to environmental management was it's OK to have an opinion but share the idea before you go public with it. Share ideas with people who are more knowledgeable. I still do that when I'm at EDF and I'm working on a blog about packaging and chemicals in packaging. I will try to share it with the agency to get their feedback and with the packaging companies. In essence, I share it with the people who don't like it and say give me your feedback and then listen carefully to it. They all know it's my work, but they often make it better because they have more knowledge

INTERVIEW FROM THE FIELD 1.1 (cont.)

about the process. They have insights I don't have. Don't assume that you know the most about a problem. Everybody sees a little piece of it. The analogy I always like is the elephant, right? Everybody knows a little part of the elephant. And it's only when we all get together and communicate can we really define how big the elephant is.

As a longtime environmental advocate who is also a lawyer, what are some basic problems with environmental advocates?

Well, you don't have to be a lawyer to do advocacy, but you have to do advocacy to be an advocate.

I often find environmental groups and advocacy groups use a strategy, especially at the state level where they're really resource-limited. As a result, they find themselves in "ready, fire, aim" mode. The challenge is how to shift to "ready, aim, fire" with resource limits, time crunches, and limited ability to control the agenda. Timing matters for success, and that timing may be different at the federal and state level.

So along with that, why have you chosen to stay in the not-for-profit sector for all these years?

Well, I started off with a very clear intent that I wanted to work for industry. That happened when I was 15 years old, I decided I wanted to become a chemical engineer, become a lawyer, work for industry for six years. And I wanted to learn everything I could about how the industry operates. Then I wanted to go and work for government for six years. By age 37, I wanted to be a full-time environmental advocate. It was a very conscious decision to learn as much as I could about a sector, but with the non-profit sector I wanted to change the world, that is the altruistic part of me. But I also recognize that I needed to have that experience. It also helps to have income complement that sound experience. Eli Lilly paid for my law degree. I got experience and that helped me be more effective.

I took a big gamble when I went to the non-profit side and didn't have any dedicated source of revenue. And it was difficult for the first year. But I had the confidence from working at Eli Lilly and the state and sufficient resources. Within the NGOs, I have moved around based on my interests and the fit. I am now at EDF for six years and three months – three months longer than I've been anywhere so far. I like it. I may stick around because the job keeps growing within me.

So, what should students or newly minted environmental managers know about working in the not-for-profit sector?

If you're working in the advocacy sector, it's about funding. A lot of your decisions are shaped by funding. And it's the liberating moment when you have flexibility that isn't driven by funding. When I left the state and started Improving Kids Environment, I made a