

The background of the cover is a vibrant, high-angle photograph of a forest. A dirt path winds through the center of the image, flanked by tall, leafy trees. The sunlight filters through the canopy, creating a dappled light effect on the path and the surrounding foliage. The overall color palette is dominated by various shades of green, from bright lime to deep forest green.

L. MICHELLE BAKER



# Writing in the Environmental Sciences

A Seven-Step Guide



As an environmental scientist, you're used to writing scientific articles, but how confident do you feel writing policy or regulatory documents? Do you feel you have the necessary writing skills to influence policy and inform the public?

This refreshingly clear guide provides environmental scientists and conservation professionals with an effective writing process that can be applied in a range of financial, political, or organizational contexts. Baker outlines a replicable seven-step writing formula based on practical experience that acknowledges the complexities inherent in the worlds of endangered species, habitat conservation, and recovery planning. Using the formula, scientists will be able to communicate confidently and successfully with a multitude of audiences.

Baker's guide is written for scientists, not professional writers. In it, best practices abound. Practical examples, strategies, and diagrams guide the reader at every step, and selected resources are provided for further reference.

**L. Michelle Baker** is the founder of *Conservation Writing Pro* (<http://conservationwritingpro.com/>), which she established to help environmental scientists communicate their message and achieve their conservation goals. She gained a PhD in English Language and Literature from the Catholic University of America, Washington DC, in 2008. She has developed courses and tools based on extensive experience teaching college students and training environmental scientists from government agencies including the United States Fish and Wildlife Service and the United States Geological Survey as well as various non-government organizations.

"This seven-step guide is as well-written as it is instructive... For those seeking to make science relevant, interesting, and compelling, *Writing in the Environmental Sciences* is the hammer in the conservation toolbox."

**David Rothstein**,  
*Environmental Attorney, Wildlife Biologist and Conservation Educator*

"... a clear, thoughtful, and comprehensive guide to a kind of writing that is both necessary and daunting... It shows writers how to be clearer, more concise, and more persuasive. And it includes plentiful examples of what good writing looks like."

**Michael Austin**,  
*Executive Vice President for Academic Affairs, University of Evansville*

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Writing in the

To my very own *Turdus migratorius* –  
you are a fierce and mighty hunter.  
As much as you love to wander,  
your nest is safe from any intruder.  
The nobility and delicacy of your profile arrest me.  
Your song will ever be my beacon;  
your wing forever my haven.





# Preface

## The Need

Research scientists who struggle to write well have numerous resources at their disposal. Books about how to write scientific articles abound. Many address the ever-pressing need to publish (Day and Gastel, 2006; Katz, 2009; Schimel, 2012). Others focus more broadly on how a scientist can become proficient in the genre (Alley, 2013; Cargill and O'Connor, 2009; Harmon and Gross, 2010; Hofmann, 2010). They vary in style from the theoretic (Montgomery, 2003) to the practical (Matthews and Matthews, 2008). While few focus on the scientific article exclusively, all take it as their *raison d'être*.

Some are organized by the article itself, with sections on the Abstract, Introduction, Materials and Methods, Results, and Discussion. Others use a process model instead and talk about establishing constraints, understanding your purpose, working in “one plausible order of composition,” or gathering information (Alley, 2013; Day and Gastel, 2006; Harmon and Gross, 2010; Katz, 2009). Most also include advice on graphs and figures, oral presentations, PowerPoints, and working with the media. All contain sections on English language construction, including advice about the passive voice, overuse of technical terms, and suggestions for how to manage unwieldy noun phrases.

With such a wealth of resources at the research scientist's disposal, the question obviously arises: why do we need another scientific writing guide? The answer lies in the type of scientific writing this book addresses. *Writing in the Environmental Sciences: A Seven-Step Guide* does not ignore the scientific journal article; neither does it adopt it as the standard mode of discourse (a term used in composition studies to describe a common way of writing within a discipline). Instead, this book acknowledges that environmental scientists often work in applied, rather than research, capacities, many times for government agencies, in which they write technical and regulatory documents, including all of the following:

- Annual reports
- Best management practices
- Briefing papers
- Brochures
- Conceptual management plans
- Correspondence
- Environmental assessments
- Factsheets
- Grant proposals
- Grant reports
- Listing petitions
- Management initiatives
- Memorandums of understanding
- Newsletters
- Performance reports

- Policy frameworks
- Press releases
- Scopes of work
- Species reports
- Step-down management plans
- Strategic plans
- Technical reports
- White papers

Environmental scientists may conduct original research, but the documents they write most often are not research articles. Instead, whether they work for government agencies or NGOs, environmental scientists cull the best scientific and commercial information available to report on the status of and make decisions for limited and imperiled natural resources. They write to other scientists but also to grant makers, legislative bodies, world leaders, and citizens. The steps contained in this book help environmental scientists make good writing decisions while assessing all of the many and complex factors that surround their work.

Trainers who use the scientific article as a teaching tool assume that the arrangement of material, even the generation of content, is done for the writer through the scientific method. However, environmental scientists either have to use intricate templates that are tied to the regulatory framework of a document (but are often counterintuitive to its content) or they have to draft a new document without guidelines or parameters. For these reasons, *Writing in the Environmental Sciences* focuses on the *process* of writing, not the product. Examples used in the book range from correspondence to species' descriptions, threats assessments, policy statements, and scientific reporting found on websites and in social media, because environmental

scientists are often responsible, if not for writing all of the above, for at least contributing to their production.

The scientific journal article provides a standard template for writers, helping them to manage the organization of their document. Research scientists who still have difficulty organizing their work may have found some relief in Janice and Robert Matthews' text, *Successful Scientific Writing* (2008), which includes multiple practical examples of how to stay organized during a literature review and how to code notes to tie with bibliographies. However, their advice is more about keeping your research organized than it is about organizing the logical flow of your argument. F. Peter Woodford offers good examples in *How to Teach Scientific Communication* (Woodford, 1999) on sorting concepts into what he calls "ragbags." Still, those ragbags are all tied to the sections of a research article. *Writing in the Environmental Sciences* offers practical advice about how to arrange your explorations using either logical thought categories or diagrams so you have a schematic for your document before you begin crafting it (see Step 3).

Many scientific writing textbooks include guidance regarding English language and style, but the guidance varies widely and can be confusing or even contradictory. For example, while Joseph Harmon and Alan Gross (2010) advocate for a plain and straightforward scientific style, Scott Montgomery (2003) argues that scientific writers should be as creative and elegant as their literary counterparts are. In some books, the passive voice is eschewed; in others, it is embraced. The use of technical terms is widely discouraged, but few options are offered in their stead. Because many environmental scientists work in a regulatory context, *Writing in the Environmental Sciences* adopts many of the principles of plain language, most importantly recommending that all language choices be made with the reader in mind.

While research scientists write primarily to their peers, environmental scientists write for a wide range of audiences. The concept of audience is discussed at length in Step 1—Laying the Foundation, where the concept of “the author” is also introduced. Writing a scientific journal article can be a collaborative process, but writing in the environmental sciences is fundamentally so. Environmental scientists work, not even in collaboration, but often in subordination to reviewers, both internal and external. Sometimes these are peers, who check for sound science. Sometimes these are legal advisers, ensuring that regulations have been correctly applied. Often these are superiors, who will sign the document before it is made public, who may be held legally responsible for its contents, who freely impose their own style, and who expect the writer to incorporate their corrections. *Writing in the Environmental Sciences* talks candidly about the ways this type of extreme collaboration affects the decisions a writer makes while drafting a document (Step 1) and during the revision process (Step 6).

## The Hope

*Writing in the Environmental Sciences* is not intended to help scientists pad their résumés, attain promotions, or procure tenure, although scientists who adopt its method should certainly see tangible benefits from its contents. It was written to achieve two aims: reduce anxiety and conserve natural resources.

For too long, I have watched environmental scientists struggle to write well. The people that I work with represent government agencies across the United States. They include fish and wildlife biologists, hydrologists, botanists, policy specialists, engineers, law enforcement officers, cartographers, economists, public affairs specialists, realtors, and regulators. They were not trained as writers, and the terminology familiar to

English composition instructors, writers, and editors is foreign to many of them. Yet their jobs consist not of field work nor of research but of communication.

Every day, these intrepid souls sit down to a stack of PDFs, a series of conference calls, and a computer to hammer out a lengthy technical and regulatory document by which their performance will be assessed. If the document is well written, they will never hear about it again. If it is not, they will have to re-work it endlessly. For most of them, drafting and revision are solitary activities that occur with little guidance and less feedback.

Environmental scientists who draft documents are often stationed in the lower echelons of environmental agencies, while reviewers are in management positions. Therefore, for reasons we will discuss later (see Step 1 and Step 6), writers are not always privy to decisions regarding content, organization, and tone. This lack of communication between leadership and staff leads to mandatory revisions that are incumbent on the writer to make but that often seem arbitrary, or worse, capricious. When the document is finally signed, others in the organization might bear formal, even legal, responsibility for it, but the environmental scientist is still listed as the author, leaving that person feeling confused and perhaps even demoralized about the quality of their work.

All of these factors—the lack of composition knowledge or training; the complexity of the documents; the lack of contextual communication from leadership; the lack of substantive feedback during drafting; the potential for substantive, seemingly arbitrary, edits; and the pressure of performance evaluation—when taken together lead to demonstrable, inevitable, disastrous consequences for the environmental scientist:

- writer's block
- rush or inability to meet deadlines
- feelings of dread or anxiety

- confusion regarding content or context
- poor grammar
- unwillingness to produce quality work
- unwillingness to participate in personal development<sup>1</sup>

This book is intended to help reduce an environmental scientist's anxiety by improving his or her understanding of the writing process. When environmental scientists work in a stepwise fashion, when they understand that writing is a process and not a nebulous energy vacuum, they work with more confidence and less anxiety, as my course participants attest:

*I am ready to let go of the expectation that [I] need a large block of time to write a document all at once. I want to practice writing in small pieces by keeping the writing cycle handy and especially focusing on the 'left-brain' activities with writing. I realize now that it is worth taking the time to formulate a solid plan and write different pieces of the document instead of trying to do everything from start to finish at once.*

Emily Granstaff, Private Lands, United States Fish and Wildlife Service (USFWS), TN

*The most important concept I took away from this course is that the writing cycle is an iterative process. With that being said, I need to give myself enough space and time to 'mold the clay.' Just do it!*

Brittany Morlin, Biologist, USFWS, ID

<sup>1</sup> Based on personal observations from coaching calls with course participants and student surveys from courses such as *Critical Writing and Critical Thinking* (2007–present) as well as *Eight Weeks to Writing with Clarity* (2010–present).



*Embarking on a process, as opposed to just plunging into a white screen really is beneficial.*

Brett Parks, Outreach Specialist, USFWS,  
Office of Science Applications, AK

My second hope for *Writing in the Environmental Sciences* is that it will help to conserve natural resources.

I came to the environmental sciences by way of the humanities. I had the opportunity to participate in a government writing training with a conservation agency while I was finishing a dissertation on the nature of aesthetic philosophy in postmodern literature. I was inspired by the conviction of the environmental scientists I met, as well as by the beauty and fragility of the natural world to which they reintroduced me. Their careful stewardship enticed me to take up birding and inspired me to transform my yard into a native habitat at the same time as my newfound colleagues were haunted by the fleeting, fragile, and flailing state of the resources I had just learned to love.

I am humbled and grateful that we live in a world that has chosen to recognize its responsibility to nature and its resources. I am saddened that among the many barriers to protecting it is language. Thoughtful, reasoned discourse is the basis of democratic civilization. If we cannot think and write clearly, we cannot make the big decisions that affect our future. I do not aspire to politics, but in this one corner of the world, I hope to make a small, significant difference.