

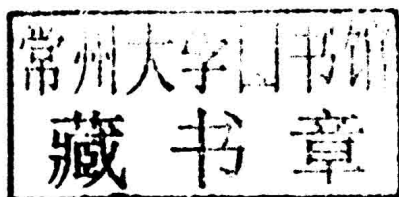


ELEMENTS **OF** ENVIRONMENTAL MANAGEMENT

BY WERNER ANTWEILER

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Elements of Environmental Management



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ELEMENTS OF ENVIRONMENTAL MANAGEMENT

As businesses face a growing array of environmental challenges, including climate change, air and water pollution, and solid waste management, environmental management has become an increasingly important area of expertise. *Elements of Environmental Management* is an interdisciplinary textbook for students and business professionals that integrates corporate environmental strategy with environmental economics, environmental law, and environmental engineering.

In *Elements of Environmental Management*, Werner Antweiler, an expert on international trade and environmental economics, considers a number of fundamental questions. How can businesses respond to public policies and regulatory requirements? How does emission permit trading work? What technological options are available to prevent or mitigate pollution? Using examples from a wide range of industries, Antweiler addresses these and other important questions, while providing the essential tools for examining and addressing environmental problems from a business perspective.

WERNER ANTWEILER is an associate professor in the Sauder School of Business at the University of British Columbia.

Preface

Environmental management is becoming increasingly important for businesses. Firms need to manage their direct and indirect impact on the environment, and they need to develop a corresponding corporate environmental strategy. At a managerial level, the interdisciplinary nature of environmental management poses a major challenge because decision-makers are often trained only in one subject area. Environmental managers need to develop competence in a broad range of subject areas, from law to economics to engineering. This book attempts to bridge the gap across these subject areas by making them accessible to a managerial audience. It provides a bird's-eye perspective on the "tools of the trade" of an environmental manager and develops an interdisciplinary framework for formulating corporate environmental strategy.

Many of the environmental management books currently on the market focus quite narrowly on management systems or quite broadly on incorporating sustainability themes into a business context. My book aims at a different audience. It is targeted at business students who wish to familiarize themselves with the role of an environmental manager in a business. This book originates in a course on Environmental Management that I have developed for the Sauder School of Business at the University of British Columbia. This course for senior undergraduate and first-year graduate students is less concerned with identifying environmental problems from a societal perspective and more concerned with identifying environmental solutions from a business perspective. Because of the interdisciplinary character of the book, the key building blocks (economics, law, engineering, and strategy) are covered at a level that is readily accessible to non-specialists.

I have tried to avoid mathematical notation and relied where necessary on diagrams and illustrative examples instead. The exception is the chapter on resource management, where dynamic optimization is used to develop the key principles of optimal resource extraction. I have also purposefully limited citations to those sources that the reader may find useful for further consultation, or where acknowledging the source of material that I have used is essential. At the beginning of each chapter I discuss relevant sources that the reader may wish to refer to for deepening the understanding of the subject matter of that chapter.

The books that I acknowledge at the beginning of each chapter were consulted extensively in the preparation of this book. I would like to acknowledge specifically Goodstein (2010) for environmental economics, Benidickson (2008) for environmental law, Esty and Winston (2006) for corporate environmental strategy, Davis and Cornwell (2008) for environmental engineering, and Bonnet and Woltjer (2008) for the conclud-

ing chapter on the time horizon of sustainability. The influence of these books is clearly visible in many places. I owe these authors a debt of gratitude and appreciation. As I am an economist by training, my domain expertise covers environmental economics. My business school experience influenced my thinking on corporate environmental strategy. Distilling the knowledge from other disciplines, especially law and engineering, has been a pleasant learning experience over the course of many years.

This textbook has been designed so that it can be used comfortably as a teaching tool for a one-semester course (about 36 teaching hours). This made it necessary to limit the scope of the book. The focus of this book is on industry and businesses. Environmental issues relating to private households and private transportation are not covered extensively. Along these lines, urban development and improving building designs are not covered here.

This book has been written from a North American perspective. Specifically, the chapter on environmental law has been written with a focus on the institutional context in Canada and the United States, highlighting both the similarities and differences of the regulatory approaches in both countries.

I would like to thank the many people who have contributed ideas and thoughts to this book. My co-authors on a number of research papers—Brian Copeland, Sumeet Gulati, Kathryn Harrison, and Scott Taylor—have all greatly influenced my understanding of environmental economics and environmental policy. They have all contributed to turning my attention towards this area of study. My divisional colleagues James Brander, Keith Head, Masao Nakamura, Peter Nemetz, and Ralph Winter have all engaged me in stimulating discussions about various subject matters related to this book. I would also like to acknowledge the feedback from the many students who have taken my Environmental Management course at UBC. The discussions I had with many of them have inspired me to explore new topics and issues. Last but not least, this book would not have been possible without the encouragement, support, and patience of my wife Melanie.

Finally, I would also like to thank Jennifer DiDomenico and her colleagues at University of Toronto Press for their advice, help, and expertise along the way towards publishing this book.

Vancouver, December 2013

Werner Antweiler

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Chapter 1

Sustainability and the Firm

1.1 What is environmental management?

Environmental management is becoming increasingly important for businesses. Yet there are many misperceptions about what environmental management entails. Environmental management is sometimes confused with *management of the environment*—but it is not the environment that needs managing but the human interaction with it. Environmental management is also sometimes equated with sustainability. We will explore the notion of sustainability in greater detail in the next section, but in short, sustainability is a concept that captures the ecological capacity to endure. As such, sustainability is a much more general concept and an *objective* that focuses on outcomes. Environmental management focuses more narrowly on tools, methods, procedures, and *process*, and therefore its scope is much more limited. Most environmental improvements require economic trade-offs, and therefore environmental management is primarily a decision-making framework.

Environmental management should also not be confused with the setting of environmental policies for businesses. Defining environmental objectives is primarily up to society, represented by governments and regulators. Businesses are primarily concerned with compliance: doing what they are asked to do by society when it comes to environmental concerns. Some businesses go beyond compliance by voluntarily exceeding government-mandated standards. We will explore the motivations behind these voluntary actions in much greater detail in a later part of this book.

To understand the scope and purpose of environmental management it is also useful to know the managerial roles in a firm that deal with environmental concerns. At the top, many companies have created the role of a Chief Sustainability Officer (CSO). A CSO is charged with a company's overall environmental strategy just like a Chief Financial Officer (CFO), Chief Operations Officer (COO), or Chief Technical Officer (CTO) is charged with top-level corporate strategy in their respective domains. At mid-management levels, we may often find a genuine 'environmental manager' (with a business administration background) who oversees the implementation of environmental policies, develops plans for deploying pollution abatement equipment, and is responsible for keeping track of the company's environmental performance. Environmental managers often work in a team with environmental engi-