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# Pro- environmental Behaviors

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# Preface

Environmental problems are common issues that we humans have to address. We should always behave in an environment-conscious manner and endeavor to reduce environmental loading through our behaviors. Some say the best way to achieve this is to develop machines or facilities that can automatically reduce environmental loading, disregarding environmental consciousness and without any effort on our part. Of course, while it is important to develop environment-friendly machines and facilities, we should always keep in mind that any and all of our activities have some environmental impacts on the Earth. It is our responsibility to act with environmental awareness in sharing the Earth with other living things.

Academic studies dealing with pro-environmental behaviors (PEBs) are increasing. Multidisciplinary approaches involving social psychology, education, and environmental engineering are also on the rise. However, despite this, each approach is quite individual and a truly holistic view is still lacking. It is difficult to find a good textbook on PEBs that covers not only environmental engineering but also the social psychology behind PEBs.

This book starts from a consideration of how we define and categorize PEBs (Chap. 1) and offers a holistic viewpoint. It also includes a long list of 200 possible PEBs that can help researchers and students who want to target more PEB options. Chapters 2 and 3 deal with the factors influencing PEBs. Chapter 2 focuses on barriers and accelerators and Chap. 3 summarizes the psychological models for PEBs that have been proposed by various researchers. Chapter 4 shows how to survey PEBs and related factors. Here, the basic concepts behind the design of questionnaires and various questioning techniques are discussed. This book covers not only psychological aspects but also engineering approaches, such as Life Cycle Assessment (LCA). Chapter 5 looks at methodologies to estimate life-cycle environmental loadings of PEBs in the LCA framework. Finally, for a possible implementation of the theoretical analysis to the real world, several ideas to foster PEBs are given in Chap. 6.

This book provides students, researchers and practitioners with a comprehensive overview of PEBs. Offering an in-depth introduction to the fundamental concept as

well as practical academic tools, it serves as an excellent guide for students new to PEB research. The featured scales for questionnaires will be useful for practitioners such as policymakers, as it can aid them in understanding citizens' environmental concerns and actual behaviors. Also included are a behavior list and LCA, which can be used to draft manuals or guidelines for the public to enhance pro-environmental behaviors. Lastly, the case studies presented provide an informative basis for designing public programs and workshops.

Tokyo, Japan

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# Acknowledgments

When I was a high school student in 1990, we were asked to write free essays about “the twenty-first century.” At the time, global warming was beginning to be recognized as an important and all-encompassing issue and I became very interested in it. For the essay, I wrote that human efforts and behaviors are essential to solve environmental problems. At that point, I started to realize my inclination toward solving environmental problems and I became involved with the academic field of environmental engineering. I really appreciate this opportunity to write about pro-environmental behaviors. I would like to express my sincere appreciation to Dr. Mei Hann Lee at Springer Japan, who gave me the chance to publish this book. I also want to express my deep appreciation to my former supervisor, Prof. Keisuke Hanaki, for our longstanding collaboration on research works at The University of Tokyo. I am also grateful to my life partner, Prof. Futoshi Kurisu, who is a specialist in environmental microbiology but has always encouraged me to move forward in the field of my interest.





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# Chapter 1

## What Are Pro-Environmental Behaviors (PEBs)?

**Abstract** This chapter provides an overview of pro-environmental behaviors (PEBs). There is no catchall definition or way to categorize PEBs; therefore, I propose various definitions and ways to categorize PEBs. Two main definitions for PEBs are shown here: purpose oriented and fact oriented. The relationships between these definitions are clearly shown in a diagram. Based on these definitions, narrowly defined PEBs and other definitions can be understood. In addition, based on various aspects, such as place, actor, influential fields, sub-impacts, household PEBs, and repeatability, the possible lower-level categorizations of PEBs are explained. Finally, I summarize behaviors proposed by various environmental agencies and present a list of 200 PEBs. In the list, the main classification is based on the major targets for reduction, such as greenhouse gases, air pollutants, water pollutants, resource consumption, and disturbance of nature, with 12 categories under the main targets, which are standard in many places. Under each category, subcategories are also shown, which can be modified by users.

**Keywords** Pro-environmental behavior • Definition • Purpose oriented • Fact oriented • Categorization • Place • Actor • Cost and benefit • Repeatability • Household pro-environmental behaviors

### 1.1 Definition of PEBs

*Some people may say that “PEBs are behaviors that can contribute to reduction of current environmental burdens.” If so, how do activities such as communing with nature fit in? Are these PEBs or not?*

As you can notice, the PEBs have not been clearly defined. In this section, the wider and narrower definitions of PEBs are discussed and the basic concept proposed by this book is explained.

To start with, how do we define “environment”? The basic meaning of the word is “surroundings.” However, it does not necessarily give us a clear idea. For example, in a book entitled *Environmental Psychology*, the content matter can be

**Table 1.1** Alternative terms for PEB

Term	Count <sup>a</sup> in Google Scholar ( <sup>b</sup> )	Examples
Proenvironmental behavior	1660 (376)	
Pro-environmental behavior	4970 (4240)	
Environmental behavior <sup>c</sup>	32,400 (17,400)	van Liere and Dunlap (1978)
Ecological behavior	4520 (4090)	Kaiser and Fuhrer (2003)
Environmentally responsible behavior	2920 (1570)	Thøgersen (2004)
Responsible environmental behavior	2390 (915)	Hines et al. (1987)
Environment-friendly behavior	1460 (1580)	
Environmentally significant behavior	1660 (552)	Stern (2000)
Environmentally related behavior	68 (65)	Bamberg (2003)

<sup>a</sup>Count in August 2014

<sup>b</sup>Count for “behavior”

<sup>c</sup>Involving the terminology of behaviors of chemicals or other substances in the environment

of two different types. One would be the psychology of dealing with environmental problems, while the other is a consideration of how people perceive their surroundings, such as heat, light, other people, and so on. The meaning of “environment” that we are targeting here is the former one, which is “**environment**” as **public goods**, such as the global environment, natural environment, water environment, and so on.

PEBs are sometimes called “ecological behaviors,” “environment-friendly behaviors,” or other variants, as shown in Table 1.1. The phrase “environmental behavior” appears most frequently. However, this can also refer to the behaviors of chemicals or other substances in the environment as well as to people’s behavior. To avoid any confusion, therefore, I use the term “Pro-Environmental Behaviors” (PEBs) in this book.

The definition of PEB has not been clearly delineated. Figure 1.1 shows the main possible definitions of PEB. There are essentially two options to define PEBs: **purpose-oriented** (dotted line) and **fact-oriented** (solid line) definitions. When we consider the purpose of PEBs, the narrow purpose is “conservation of environment” [B], whereas the wide purpose is “cultivation of environmental consciousness” [A]. The behaviors based on purpose [B] can also pursue purpose [A]; therefore, there is an inclusion relation  $[B] \subset [A]$ .

In the case of [A], there is a small difference between the purpose-oriented and fact-oriented parts. The example of communing with nature can be categorized into [A-a], where the behavior is conducted with the purpose of cultivating environmental consciousness and actually contributes to cultivation of environmental consciousness. Some of these behaviors can have spillover effects and also contribute to environmental conservation (overlapped part with [B’]).