

This assessment goes beyond economics to appraise impacts such as:

- how people's way of life will be affected;
- how significant the alteration produced in the social fabric will be;
- what the result will be of using certain renewable and non-renewable resources;
- how much the expected economic development will cost in terms of loss of resources sustainability;
- how to measure what is not easily measurable: enjoying a sunset, a stroll in a tropical forest, climbing a mountain, etc.;
- how to integrate the technical and environmental aspects of projects with the desires, wishes and needs of the population.

The book's subtitle contains the words "a practical guide" and so it is. The book is designed to allow one to conduct a study of the environmental impact of a project with a view to identifying alternatives that would cause a minimal environmental impact. The book is very much a "how to" rather than a "theoretical" approach to the topic.

In Chapter 1 definitions are given regarding the different concepts involved in the environment assessment procedure, and a key question is answered related with the necessity of developing an EIA for most projects. Topics discussed include (as noted above) the definition of strategic environmental assessment, environmental and socioeconomic impact assessment, economic development and sustainability. A key section discusses the EIA problem as "The EIA tries to find a balance between the benefits a project brings and the damages it will produce, in other words tries to compromise between economic development and the damages to the environment."

The chapter ends with two sections discussing the decision-making process, i.e., how a decision is reached for selecting a project or program. References given in this chapter, as in the other chapters, are to Internet web sites, in contrast to normal procedure where the print literature is cited.

Subsequent chapters go into the details of evaluating projects and their impacts. Numerous examples of the evaluation process and useful check lists are given. The book is thoroughly up-to-date with one section discussing the latest concept in project review—Life Cycle Analysis.

This is very much a "how to" book. It is not a book that you pick up and read randomly. However, if one is tasked with environmental impact analysis he/she will find the book very useful.

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**Ruediger Kuehr, Eric Williams (Eds.), Computers and the Environment: Understanding and Managing their Impacts, Kluwer Academic Publishers/Springer, Dordrecht, The Netherlands, 2003, ISBN 1-4020-1679-4, 293 pp., Price US\$ 83.00, € 75, GBP 52.**

This book is the 14th published by Kluwer in their Eco-efficiency in Industry and Science Series. As the title notes, the environmental impact of computers, especially personal computers (PCs) beginning with their production continuing through their useful lifespan and ending with their disposal is discussed.

Given the meteoric increase in computer usage and the potentially harmful components used in their manufacture, this is a timely publication. In the first chapter, the editors note that global annual production of computers in 2000 was 113 million machines and in April 2002, the billionth personal computer was shipped.

Unfortunately, as all users have discovered, PCs have a short useful life. Consequently, discarded products from the PC sector have the highest growth rate of all materials in municipal and industrial waste. Of the 20.6 million PCs that became obsolete in the US in 1998, only 12% were recycled and 75% were put into storage.

The goal of this book is to "... shed light on the following specific issues:

- The environmental impacts incurred when producing PCs.
- Electricity consumption in the use phase.
- Environmental impacts of disposing of computers in landfills.
- How green design of PCs can reduce environmental impacts.
- Industrial perspectives and activities of leading computer companies.
- Economic, managerial, and technological aspects of recycling.
- The role of consumers in influencing the supply of green PCs and implementing environmentally friendly end-of-life options.
- Evaluation of the environmental effectiveness of reselling, upgrading, and recycling computers.
- How used-PC markets can extend the product lifespan.
- How governmental (both national and regional) and non-governmental policy initiatives deal with the environmental management of PCs."

In Chapter 2, "The authors discuss how the disposition (i.e., storage, landfilling, and recycling) of end-of-life equipment plays an important role in the direct environmental impacts of used PCs." Continuing on in Chapter 3, the discussion focuses on the environmental impacts of both the

manufacture and disposal of computers. Computer-contained chemicals, lead and brominated flame retardants are potential human hazards. Of note in the chapter are some interesting data on the resources needed for the manufacture of one desktop computer: 240 kg of fossil fuels, 22 kg of chemicals, and 1500 kg of water. I was surprised to learn that with regard to energy usage, 80% of the total energy involved with PCs is consumed in the computer's manufacture as opposed to 20% used during its lifetime of use.

The implications of the use of electricity by PCs is discussed in Chapter 7. It is estimated that approximately 3% of total electricity use in the US goes to computers. Some developments tend to increase energy use (i.e., increase in the power of microprocessors and monitor size) while other developments (liquid crystal display screens and laptop computers) tend to decrease energy.

Other chapters examine the end-of-life options. Discussed is the extent to which the upgrading and resale of computers are environmentally effective options compared to the recycling of parts. Another section of the book examines the

impact of extending PCs life spans—the conclusion, not surprisingly, is that this process has environmental benefits.

At the end of the book, the editors provide a list of contributors giving both their e-mail and postal addresses. I find this a very beneficial inclusion.

Given the number, use and disposal of PCs and the resultant social and environmental impacts, my conclusion is that this book is relevant, timely and informative.

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