

students. The text notes that energy units are discussed later on, but the “solar constant joule” is never defined, nor (excepting in the index) ever again cited.

The presentation of energy is subtly misleading. Consider this statement: “Without expenditure of potential energy, there can be no activity in the natural environment” (p. 31). This formulation leads the reader to a view that potential energy is somehow more significant than kinetic energy. In fact, the principle of conservation of mass-energy together with thermodynamics assures us that it is transformation of energy from one form to another and the utilization of available energy that are the drivers. Why is potential energy singled out for special attention?

The discussion of thermodynamics covers the major ground, but I found it awkward. On page 33 a joule is defined as “the amount of energy needed to heat one cubic centimeter of water by about a quarter (actually 0.239) of a degree Celsius” Yet on the page 34 appears a table defining a joule as 4.187 calories. The adjacent use of reciprocal quantities without explanation is rendered more confusing by the appearance in the same discussion of a reference to kilocalories which, the text asserts, were “shortened to ‘calorie’ for use in food and dietetic matters” (p. 33). This confuses the *calorie* [lower case ‘c’; equal to 1/4.187 joule] of physics and the *Calorie* (capital ‘C’) used in nutrition, equal to 1000 calories.

A strong point is the careful treatment of the relation between economic and biophysical measures. Unlike physical quantities which are constrained, dollars can grow (exponentially or otherwise) without limit. Since limits are what Peet’s book is all about, this distinction is critical. There is a good discussion of the systems perspective and of the importance of stocks and flows, also of the importance of equity considerations in any ethical treatment of sustainability.

John Peet has provided a useful starting point for those who want to gain a preliminary understanding of the reasons why so many of us see our era as a time of limits. As a fellow technologist and educator, I was pleased to find values I believe in so well articulated. It is not customary for an engineer to put his beliefs on the line. I am pleased Peet has done so, and hope others will follow his example. The sorts of problems I noted above will, I expect, be addressed in the next edition.

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Ishmael

Ishmael. Daniel Quinn. 1992, Bantam/Turner, New York, 266 pp., ISBN 0-553-07875-5.

Ishmael is the most compelling book I’ve read in a long, long time. For those concerned about sustainability, it vividly articulates some fundamental, but as yet poorly articulated problems with the structure of the currently dominant human society. For those not yet concerned about sustainability it has the power to change their minds. Not many books can do that.

The book is a novel structured around the premise of a Socratic dialogue between a man and a gorilla (named Ishmael) about the nature of human “civilization,” its fundamental flaws, and the path to sustainability. It was the winner of the prestigious Turner Tomorrow Fellowship, created to encourage positive and creative solutions to global problems. Ishmael was

raised in captivity, but acquired the ability to read and communicate with humans telepathically. He used his time in captivity to study and think (with the help of a patron who supplied him with access to the entire store of human knowledge) and developed a unique and powerful wisdom. The story line concerns Ishmael’s attempt to teach the human protagonist and narrator of the story some of this wisdom. This story device gives Ishmael enough distance from human society to be an objective outside observer and also representative and spokesperson for the “natural” world which at least a part of human society has declared war upon. This part of human society, labeled “Taker” society by Ishmael, arose along with the advent of agriculture some 10000 years ago as a branch of the “Leaver” human society. Leavers existed for over 3 million years before the rise of Takers and still exist today in small enclaves around the globe. The difference between Takers and Leavers is in fundamental world view.

Takers see humans as the end product of evolution, destined to rule the world. Leavers see humans as a part of nature, destined to play their role in a continuously evolving sustainable biosphere. Takers think the world belongs to humans, Leavers think humans belong to the world. Not bad as a shorthand definition of the conventional (Taker) economics world view compared to an ecological (Leaver) economics world view.

Taker society's fundamental flaw is that it is inherently unsustainable. Its attempt to rule the world will inevitably lead to the destruction of that world, on which it depends for its very existence. It breaks a fundamental law of sustainable competition, which, according to Ishmael, states that you can compete with other species for food and resources, but you can't wage war on them by eliminating them or their habitat from existence. This Hitlerian elimination strategy is exactly what Taker society does when it argues that since the world is made for and belongs exclusively to humans, we are not only justified but compelled to expand continuously and at all costs. Leavers do not wage war on nature and thus managed to live sustainably as part of the biosphere for over 3 million years.

So what are the prospects? Can we break out of the cultural prison of Taker society? Is there still time for the Leaver world view to reassert itself before it's too late? What would a viable Leaver alternative to modern Taker society look like? According to Ishmael, the

only hope is in developing and articulating this vision of a modern Leaver alternative and convincing enough people that it is not only our only hope for survival, but that it is a much more desirable and humane society in which to live. It seems to me that this is exactly what *ecological economics* and the entire "sustainability" movement is trying to do. This book will help by carrying the discussion to a new and more compelling level. Tinkering at the edges of Taker society will not get us to sustainability. We need to adopt a new Leaver world view, envision what that world would look like, and convert the mass of humanity to that vision. In Ishmael's words "...people need more than to be scolded, more than to be made to feel stupid and guilty. They need more than a vision of doom. They need a vision of the world and of themselves that inspires them." "...breaking out of the Taker prison is a common cause to which all humanity can subscribe."

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Integrated Environmental and Economic Accounting

Integrated Environmental and Economic Accounting. United Nations publication ST/ESA/STAT/SER.F/61, 1993, United Nations, New York, NY, 182 pp., ISBN 92-1-161359-0.

This is an important and long-awaited document. Its ambitious goal is to set forth a standard set of guidelines for integrated environmental and economic accounting at the national level. Implementing the guidelines will allow the value of the environment to become a more obvious and integral part of the assessment of all nation's performance.

This inclusion of ecological services and natural capital in national accounting is a very good thing, albeit a very difficult one. The report is refreshing in its refusal, when confronted by the many obviously important but fundamentally irresolvable questions that this task entails, to simply take an arbitrary stand. Instead it adopts the much healthier attitude of open-

ended experimental adaptation and gradual improvement. It spends the first 33 pages on a conceptual introductory overview that lays out not one, but six different versions (with several subversions) of the proposed System of Integrated Environmental and Economic Accounts (SEEA) and their relationship to the standard System of National Accounts (SNA). The conceptual overview carefully differentiates between a conventional economic point of view and a more ecological point of view and describes their integration into an ecological economic framework. For example, the report asserts that: "An integrated framework should reflect a synthesis of, or at least a compromise between, the ecological and anthropocentric (economic) points of view. The economy should not be considered only in terms of its being a part of the environment nor should the natural environment be viewed only in terms of its economic usefulness. The natural environment and the economy could be interpreted as constituting two sides of the same coin. An accounting framework should therefore assist in identi-