

Introductory Economics Textbooks: What do they teach about sustainability?

Tom L. GREEN¹

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Abstract

In response to accelerating ecological deterioration, many universities have made commitments to ensure they graduate ecologically responsible citizens and to integrate sustainability across the curriculum. This study involves a content analysis of how Econ101 textbooks address environment-economy linkages. In North America, introductory economics courses ('Econ101') are standardized and rely heavily on textbooks. A small number of textbooks dominate this market. Orthodox Econ101 textbooks in current use in British Columbia, Canada were included in the study as well as three leading US textbooks. These were contrasted against a pair of micro/macro texts explicitly written to address sustainability. The orthodox textbooks are found to largely ignore or misrepresent ecosystem-economy linkages and to include content that is unhelpful in furthering student understanding of sustainability and in providing them with the tools to contribute to its achievement. Universities that have made a commitment to integrate sustainability across the curriculum should examine carefully the textbooks used in their introductory economic courses and consider adopting textbooks that have explicitly integrated sustainability-relevant content throughout the text.

1.1 Introduction

Ecosystems are increasingly under stress and degrading mainly as a result of the dramatic increase in the scale of economic activity fuelled by population growth, the shift to a consumer economy, technological innovation and the availability of cheap energy (United Nations Environment Program 2005; Rees 2003; Fischer et al. 2007; Ayres 2006). As evidence of accelerating ecological decline has accumulated, many North American universities have made a commitment to integrate sustainability across the curriculum (Wright 2002; Haigh 2005; Lukman & Glavič 2007). The Thessaloniki

¹ PhD Student, Interdisciplinary Studies Graduate Program, 4th Floor - 2202 Main Mall (AERL Building) University of British Columbia, Vancouver BC, V6T 1Z4

Declaration of 1997 stressed that “...all subject disciplines must address issues related to the environment and sustainable development and that university curricula must be reoriented towards a holistic approach to education” (cited in Wright 2002, p.210). The Talloires Declaration of 1990, which most universities in BC have signed on to, requires that universities: “ensure that all university graduates are environmentally literate and have the awareness and understanding to be ecologically responsible citizens.”² The UN declared a Decade of Education for Sustainable Development (2005–2015). The UNESCO implementation scheme for this decade stresses “learning for sustainable development embedded in the whole curriculum, not as a separate subject” (cited on page 5 of Owens & Moore 2008). Universities have a responsibility to ensure curriculum equips students for informed participation in decisions that have sustainability implications (Moore 2004). How introductory economics courses address – or fail to address – sustainability is therefore highly relevant to whether universities meet their commitments to integrate sustainability across the curriculum.

Each year, over a million students representing about 40% of undergraduates in North America study the principles of economics at the introductory level (hereafter ‘Econ101’).³ Since less than 2% of students major in economics, for many, Econ101 will be their only formal training in economics (Salemi & Siegfried 1999). Econ101 serves as an important conduit for the transmission of economic theory and values to the population at large (Sleeper 2007; Marglin 2008; Benton 1990). Econ101 courses are highly standardized across North American universities and rely heavily on textbooks (Colander 2003; Colander 2000; Boulding 1988). A small number of orthodox textbooks dominate this market, all of which can be considered descendents of Samuelson’s classic text that was first published in 1948 (Sleeper 2007; Stiglitz 1988; Gottesman et al. 2005). Thus the mould for current Econ101 textbooks was cast when the global economy was smaller and few ecological constraints, such as concerns over global warming or the depletion of ocean fish stocks were apparent. These texts focus on training students in the

² The declaration and the signatories can be viewed at the website of the secretariat for the declaration: www.ulsf.org.

³ In this paper, the short form ‘Econ101’ will be understood to include all mainstream permutations of first year economics, whether it is taught as an overarching principles course or as two separate courses, one each in microeconomics and macroeconomics.

fundamentals of orthodox theory with little or no space given to other schools of economic thought, transdisciplinary perspectives or the limitations of the economic worldview presented in the text (Underwood 2004; Knoedler & Underwood 2003).

Econ101 textbooks and courses have been found to be encyclopaedic and to bury students in abstract theoretical details (Becker 2003; Becker 2007). Previous research has shown that students who do not go on to higher levels of studies in economics retain little of the theory covered in an introductory economics course (Allgood et al. 2004; Walstad & Allgood 1999; Strober et al. 1997). Nevertheless, it seems probable that many students will have better retention of normative content that is frequently reinforced in the textbook and that they will be influenced by the text's worldview and framing of issues. Indeed, there is evidence suggesting that the study of standard economics, with its emphasis on atomistic, selfish, maximizing individuals promotes or reinforces values and behaviours that are more selfish and less cooperative (B. Frank & Schulze 2000; R. H. Frank et al. 1996; R. H. Frank et al. 1993; Kirchgassner 2005) and results in lowered support for measures to protect the environment (Ewert and Baker 2001). Though this evidence has been contested (e.g., Frey & Meier 2005), it does suggest attention should be paid to the more subtle effects of studying mainstream economics on students. The coverage of and stance towards the environment and sustainability adopted within Econ101 textbooks may therefore be an important influence on student knowledge, beliefs and values when it comes to understanding economy-environment linkages and potential policy tools for addressing sustainability. While researchers have previously examined introductory economic textbooks from a sustainability perspective (Northrop 2000; Northrop 1996; Reardon 2007), the present study was undertaken to generate more extensive data on how Econ101 textbooks address environment-economy linkages and to assess whether they are suitable for use in universities that have committed to integrate sustainability across the curriculum.

2 Why examine the environmental content of introductory economics textbooks used in BC?

Many students will not pursue economics beyond the introductory course; for them, the textbook helps shape their attitudes toward economic

institutions and policies and helps establish the authority of economists, whose pronouncements they will continue to encounter long after they have left school. (Klamer 1990, page 158).

Economic theory and analysis influence the organization of modern society, shape its institutions and guide the decisions of economic entities (Heilbroner & Milberg 1995; Ferraro et al. 2005). If severe degradation of the biosphere and erosion of human prospects is to be avoided, goods will have to be produced in an environmentally benign manner, consumption levels in rich countries will have to be reduced and inequity in the global distribution of income will have to be lessened (Homer-Dixon 2001; Daly 2002; United Nations Environment Program 2005; Rees 2002).

Since less than 1% of students will become research economists, the relevant criterion for selecting the content to include in the Econ101 curriculum is not that what prepares students for advanced study in economics, nor that which reflects the frontiers of economic thinking, but rather that which will most aid the students' understanding of the economy (Boulding 1988; Colander 2000; Colander 2005; Ormerod 2003). Achieving an adequate "understanding of the economy" in the twenty-first century requires considering economies in their broader ecological context.

Econ101 textbooks have spawned a considerable literature. Even in cases where adverse empirical evidence suggests theory should be discarded, economic textbooks have been found to "...play a powerfully conservative role in the transmission of doctrine" (Stigler 1978, p.200). Kenneth Boulding asked whether textbooks are "...transmitting real knowledge of the economy, for instance or are we transmitting a lot of ritual that is useful for passing examinations?" (Boulding 1988, page 123). While Samuelson claimed to represent the state-of-the-art in the first twelve editions of his textbook, in fact there was little substantive change in core content (Klamer 1990). What is taught in the principles course once reflected what economists do, but no longer – the textbooks lag behind by reflecting the research approach that economists followed in the 1930s-60s (Colander 2005). While my study has been informed by the above literature, the present review is not intended to assess and does not comment on the clarity, validity or pedagogical

quality of economic theory contained in the textbooks where that theory does not directly intersect with the environment or sustainability.

Since the only formal course in economics for most students will be at the introductory level, it is important that course textbooks address environment-economy linkages and other issues relevant to sustainability in a way that is consistent with the state-of-the-art in the natural sciences and pertinent social sciences (e.g., psychology). There has been relatively little work on assessing the adequacy of textbooks from a sustainability perspective but these reviews have found the textbooks downplay the severity of the sustainability crisis and promote policies and values that make the achievement of sustainability more unlikely (Northrop 2000; Northrop 1996; Folsom & Brauer 1998; Reardon 2007). The present study builds on this previous work.

3 Methodology

3.1 How textbooks were selected

To select the textbooks for this study, I gathered data on textbook adoption from January 2008 to April 2009 for introductory economics courses offered at public universities in British Columbia (BC), Canada. This involved contacting economics departments, university bookstores and viewing course descriptions on university websites. From this analysis, eight mainstream economics textbooks were identified for inclusion in the study on the basis that they were used at more than one BC university and/or by at least two hundred students (6 of these 8 textbooks were paired micro/macro texts, so when these two volume texts are “amalgamated”, the BC sample results in the equivalent of 5 principles textbooks). Based on published data on Econ101 textbook adoption in the US over the period 2002-2004 (Sleeper 2007), the leading US textbook, by McConnell and Brue, was added as a point of comparison (the runner-up textbook by sales, authored by Mankiw, is represented in this review by its Canadian edition). Because Samuelson’s textbook has had such a defining influence on textbooks and economics education (Gottesman et al. 2005; Skousen 1997) and because it has been deemed the profession’s “textbook of record”, the latest edition, now co-authored by Nordhaus, was added to this

initial list, even though it no longer figures prominently in North American textbook sales. Finally, because Joseph Stiglitz, a recipient of the memorial Nobel prize in economics, has written expressing great concern about the environment (see for instance Stiglitz 2006), his pair of textbooks (co-authored by Carl Walsh), was added to the mix since it seemed plausible that he might pay special attention to sustainability. A recent pair of micro and macro economics textbooks, written with the express purpose of addressing ecological sustainability was also included in the study as a point of comparison. The team of authors of these two texts, headed by Neva Goodwin of Tufts University, have credentials in both the economics and the sustainability literatures (hereafter I will differentiate between the “standard” textbooks and the “sustainability” or “Goodwin” textbooks).⁴ The total sample then is 14 textbooks, or the equivalent of 9 principles textbooks once the micro/macro pairs are amalgamated (see Table 2) and list of textbooks in Appendix A.

3.2 Integrating sustainability: implications for Econ101 textbooks

To proceed with a sustainability assessment of textbooks, some form of an operational understanding of sustainability and its minimum requirements is needed. Sustainability requires attention to a complex set of issues, including deepening our understanding of ecological systems, process and limits; revisiting the end goals of human societies and of economic development; reinventing our lifestyles; reconsidering the technologies adopted and evaluating their impacts; redesigning institutional arrangements and governance systems; redressing inequities in the distribution of wealth, etc.

I focus my analysis of Econ101 textbooks on their treatment of environmental aspects of sustainability and downplay the social dimension. The sustainability literature is quite clear that sustainability has environmental, social, cultural and economic dimensions. For instance, improving equity within and between generations is considered to be an important aspect of sustainability. However, to analyze all instances where textbook

⁴ Another textbook that was considered as a point of comparison was *Ecological Economics* by Herman Daly and Joshua Farley. However, this textbook does not attempt to cover the standard curriculum of an introductory economics course sequence so it was omitted from the study.

content had some bearing on equity such as the distribution of income, a large proportion of the textbook would be under the microscope and the analytical task would become overwhelming. Given that ecological sustainability is a prerequisite for the long-term persistence of functional human societies wherein equity is a relevant concern, I reasoned that focusing on the environmental dimension of sustainability would suffice as an initial assessment of the textbooks and would make the analysis more tractable.

3.3 How textbooks were analyzed

Before reviewing the textbooks, I developed a list of markers that would help identify content could be considered sustainability-relevant as one means of assessing the “richness” of sustainability-relevant content included in the various textbooks. These markers are used to populate Table 3.⁵

The main sections of each textbook (i.e., excluding preface, glossary, index, web-based chapters and other online materials) were read in their entirety. The proportion of each page devoted to environmental content was recorded on an excel spreadsheet. As in any research project involving measurement, there was a need to standardize measurement procedures. For instance, if a sentence includes one environmental marker (e.g., “Governments also face trade-offs, having to chose how to allocate its budget on defence, heath care, education or the environment”), does just the word “environment” or the entire sentence count as environmental content? There is also the added complication that the textbooks have very different styles and make very different use of page space. There was also a trade-off between coming up with a very precise measurement that would be time consuming and a measurement protocol that produced sufficiently consistent results that could be applied more rapidly. The greatest precision might be offered by counting words vs. estimating the proportion of page space as was done here. However, there would be little to be gained with such precision given the essential coarseness of a quantitative measure that fails to capture the quality dimension (i.e., how sophisticated was the content in question). In interpreting the following results, readers should take into

⁵ These markers are not intended as a checklist that each text must include.

account the limitations implied by the approach to measurement taken here. The methodology and the weighting system are described in more detail in Appendix B.

The data recorded per the above procedures supported the quantitative analysis of the textbooks, allowing for a comparison of the extent to which environmental and sustainability related content was emphasized in the various textbooks. The quantitative measures used in this study and the rationale behind them are reported in Table 1.

Table 1: Description of quantitative measures reported for the textbooks included in the study

Quantitative measure reported	Rationale
% of environmental content out of total content in main sections of textbook	Measures emphasis given to including content that addresses environment-economy linkages/ecological sustainability in the textbook.
% of environmental content out of total content in main sections of textbook subtracting for sections on externalities, public goods and environmental economics	A measure of how well content that addresses environment-economy linkages/ecological sustainability informs chapters not specifically focused on the environment. This measure is also relevant because instructors typically face time pressure and may omit material that is not felt to be the core of economics (and in some textbooks, the preface suggests that the sections on public goods and externalities can be omitted).
Greatest number of consecutive pages without environmental content.	If environment/sustainability content and issues do not appear in large blocks of the text, students may well assume they are of little relevance.
% of pages with at least some environmental/sustainability content	If environment/sustainability content is frequently encountered, its importance is likely to be reinforced.
% of chapters with at least some content linked to environment/sustainability concepts or issues (cut-off was at least one sentence coverage per chapter, e.g., to qualify a chapter had to score more than 5% of one page within entire chapter devoted to environment/sustainability concepts/issues—a single word per chapter would not qualify).	A measure of how well environment/sustainability coverage is integrated across the text; extent to which authors emphasize environment-economy linkages.

As well, passages that had not been captured by the environmental screen but that were of interest because of the “worldview” they presented were also recorded on the spreadsheet (but not included in the quantitative measures described above). In particular, I noted passages of interest that reflected on the likes of the end goals of economic activity, views on progress, use of energy in the economy, economic growth, consumption and discussions of equity-efficiency trade-offs. This screen was not intended to capture all such passages (because the volume would be too large and many passing references to the above issues would be repetitive), but rather representative passages as well as passages that stood out as being particularly interesting or unusual.

Having assembled key passages from textbooks that were considered relevant to the understanding of environment-economy linkages and sustainability, as well as for their “worldview,” I approached them as “artefacts of social communication” suitable for analysis by qualitative methods (Berg 1998, p.306). Rather than using line-by-line coding more typical of grounded theory (Charmaz 2001), recognizing that the textbook passages represented complex information, I sought to code significant concepts, rhetorical techniques, referencing and other matters. Once I had coded all the captured material, I was able to quickly search across texts to discern commonalities and differences on given dimensions of interest. Through this process it was quickly confirmed, not unexpectedly, that there were two genres of textbooks: the mainstream versus the sustainability-oriented. The standard texts do vary in the extent that they express confidence in the market mechanism, their enthusiasm for government involvement in the economy and their emphasis on distribution. Yet they vary very little when it comes to promoting economic growth, presuming that higher levels of consumption are desired and in neglecting environment-economy interactions. Accordingly, in the discussion of content in Section 5, the standard texts are treated as one body of literature.

4 Analysis and Results

4.1 Conventions used in this report

In describing the results in this report, I will use the first author's last name as a short form reference and specify if the textbook is micro or macro (if the textbook is a single principles volume covering both micro and macro there is no need for disambiguation). To ensure equivalency in comparisons, I also report results with textbook micro-macro pairs being amalgamated into the equivalent of a principles text (in cases where specific chapters were repeated in a two volume set, the chapters in question were only included once in the amalgamated calculations). In this report I also differentiate at times between the "core" content of a textbook versus "optional" or enriched content (e.g., Krugman has a number of boxed passages entitled "For inquiring minds"; Mankiw has asides entitled "In the news"). The rationale for differentiating between core and optional text is that time-pressed professors and students are known to concentrate on the core content and because it is given more weight by the authors (e.g., core content translates into problem sets at the end of the chapter).

4.2 Quantitative results

The proportion of total content that relates to the environment in the standard texts ranges from a low of 0.8% (Mankiw Macro) to a high of 5.4% (Krugman micro). McConnell's principles text, at 1.8% is by far at the lowest end of the scale if one considers what students would be exposed to in the combined micro/macro sequence; other standard texts in amalgamated form range in a narrow band from 3.1% to 4.0%. If chapters on public goods and externalities are subtracted from the total, the texts in range from a low of 0.4% for McConnell to a high of 1.5% (Micro editions of both Krugman and Frank); as amalgamated textbooks, the upper end of the range is 1.3% for Ragan. We can also see that students could read from 64 (Krugman micro) to 289 pages (Krugman macro) without encountering any environmental content. From a low of 4% (Frank macro) to a high of 15% (Samuelson) of pages within the main sections of the textbook have at least some environmental content (i.e., at least one word). McConnell, at 25%, has the lowest number of chapters with at least some environmental content while Krugman micro, at

77% has the highest; in amalgamated form, the high end of the range is 56% for both Samuelson and Krugman. The environment is downplayed in all of the macro volumes of two volume texts, a finding which echoes Daly's (1991) observation that the economics discipline lacks an environmental macroeconomics.

In comparison with the standard texts, the sustainability-oriented texts by Goodwin have better scores on almost all measures. Although the Goodwin micro volume at 4.4% comes in below Krugman micro's 5.4% and Frank's 5.1%, the Goodwin micro textbook clearly outscores the others once sections devoted to externalities and public goods are excluded from the standard texts (Goodwin does not follow the standard externality model; the section of Chapter 6 on "Accounting for the Environment" from the macro volume was considered an equivalent and omitted in the second calculation though arguably a instructor using Goodwin's text is unlikely to omit this material). The Goodwin macro text, with 9.6% (6.6% if the aforementioned section is subtracted) far exceeds the other texts. In amalgamated form, the Goodwin texts come in at 6.9% and 4.5%. Environmental content is more evenly dispersed in the Goodwin texts: the number of consecutive pages without environmental content is at the low end of the scale; 23% to 27% of pages have at least some environmental content; and 84% to 87% of the chapters have environmental content.

Table 2: Quantitative results, sustainability-linked content (reported in amalgamated form)

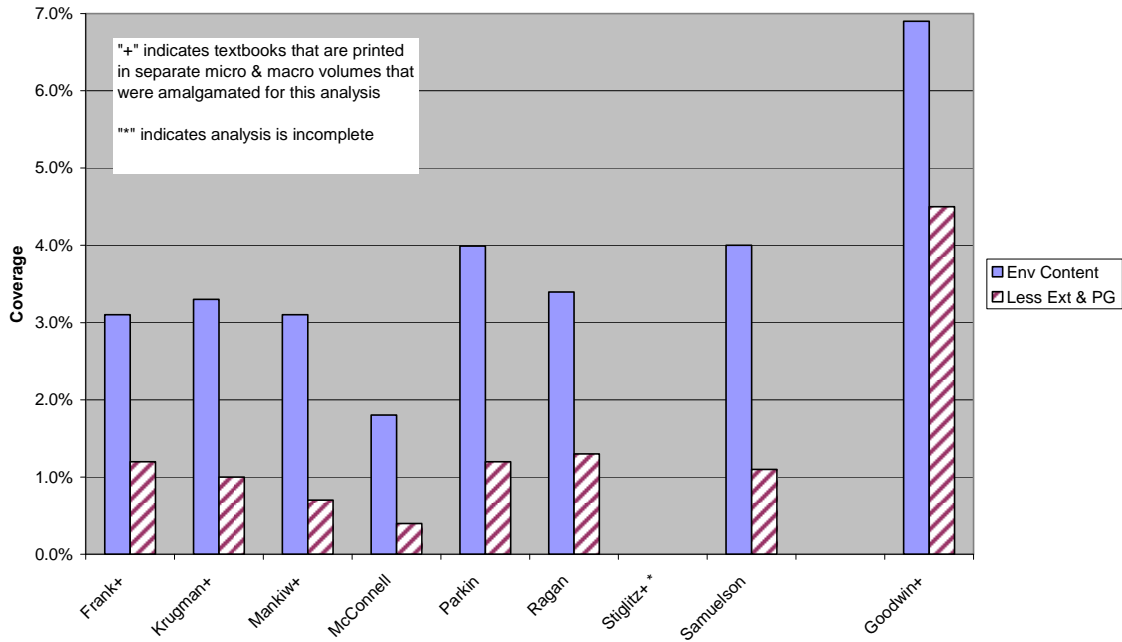
#	First Author	Textbook format for reporting results	Year	Edition	CAN/US Edition	Documented use in BC?	Total pages (main sections only)	% Text Env-related	% Env (excl. Extn & Public Goods)	longest consecutive pages with no env	pages with some env content	chapters with some env content
1&2	Frank	Combined Micro/Macro	2005	2nd	CAN	Yes	816	3.1%	1.2%	117	7%	41%
3&4	Krugman	Combined Micro/Macro	2006	1st	CAN	Yes	952	3.3%	1.0%	289	9%	56%
5&6	Mankiw	Combined Micro/Macro	2008	4th	CAN	Yes	819	3.1%	0.7%	157	6%	36%
7	McConnell	Economics (Principles)	2008	17th	US	No	703	1.8%	0.4%	220	6%	25%
8	Parkin	Economics (Principles)	2006	6th	CAN	Yes	788	4.0%	1.2%	201	9%	44%
9	Ragan	Economics (Principles)	2008	12th	CAN	Yes	885	3.4%	1.3%	193	7%	34%
10&11	Stiglitz	Combined Micro/Macro	2006	4th	US	No	*	*	*	*	*	*
12	Samuelson	Economics (Principles)	2005	18th	US	No	715	4.0%	1.1%	108	15%	56%
13&14	Goodwin	Combined Micro/Macro	2008	1st	US	No	884	6.9%	4.5%	86	25%	85%
Total / Averages:							6562	3.2%	1.0%	184	8.4%	42%

* = analysis incomplete

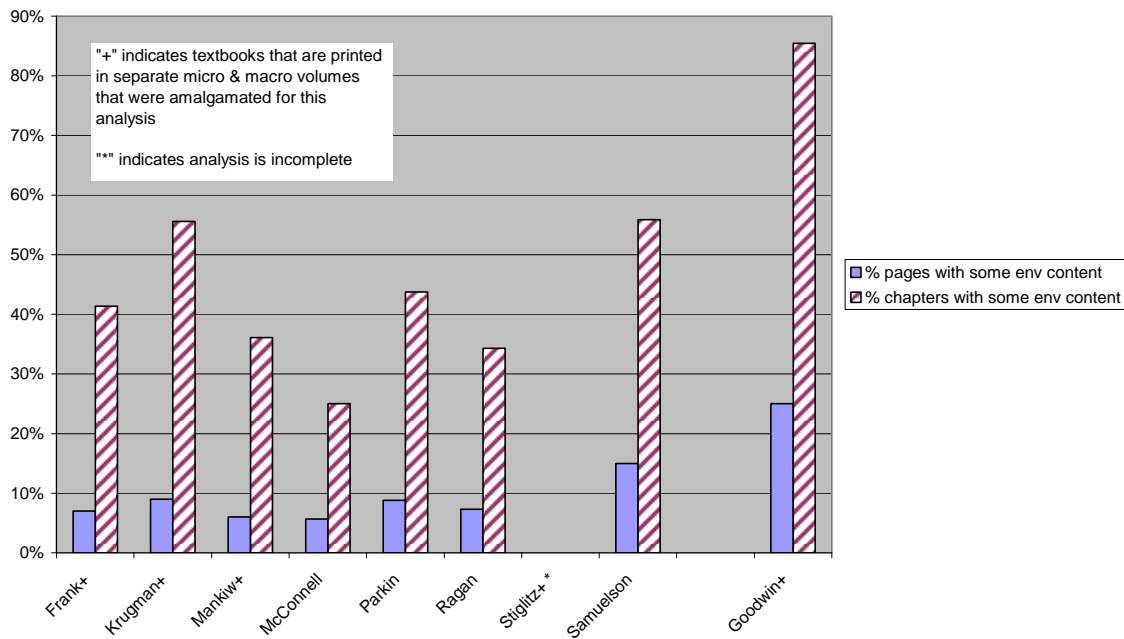
Standard Textbooks
Sustain. Text

The above data are also represented graphically. The following two graphs illustrate how the standard texts put significantly less emphasis on coverage of environmentally related content.

**Proportion of environmental content in "amalgamated" textbooks
(full textbook & excluding chapters on externalities and public goods)**



**Dispersion of environmental content in "amalgamated" textbooks
(pages & chapters with at least some environmental content)**



While the quantitative assessment reported above gives some indication of the emphasis placed by the various textbook authors on covering environment-economy linkages, it gives little insight on the content. It does not illuminate the perspective taken in the textbook towards the challenge of sustainability (e.g., scepticism towards environmental problems, sympathy towards action), or the sophistication involved in such coverage. To this issue we now turn.

5 Content review—the standard texts

Table 3 provides an overview of the difference in the breadth and sophistication of sustainability-relevant coverage between the standard texts and the Goodwin texts. Even were a student to read all the standard texts included in this study, they would be exposed to a narrower range of topics than they would by reading the pair of sustainability texts.

Table 3: Richness of coverage of sustainability-relevant concepts

Issues / concepts / terms:	Standard texts*	Sustainability texts*
acid rain	commonly included	included
biodiversity	rarely included	passing mention
complexity	not found	included
cumulative effects	not found	#
deforestation	commonly included	included
desertification	not found	#
discontinuity	not found	#
ecological limits	rarely included	included
ecology / ecosystems	rarely included	included
ecosystem services	rarely included	included
endangered species	rarely included	included
eutrophication	rarely included	included
exotic species	not found	#
extinction	rarely included	included
fisheries collapse	commonly included	included
global warming / greenhouse gases	included	included
habitat / habitat loss	rarely included	included
habitat fragmentation	not found	included
health effects of env. degradation	commonly included	included
impact assessment	rarely included	included
irreversibility	rarely included	included
life cycle analysis / industrial ecology	not found	included
limits to growth	included	included
Malthusian predictions	included	included
natural capital	rarely included	included
natural areas and “wilderness”	rarely included	included
nitrogen cycle	not found	included
nutrient	rarely included	included
ozone	commonly included	included
precautionary principle	rarely included	included
soil erosion	rarely included	included
sustainability	rarely included	included
thermodynamics / 1st and 2nd laws / entropy	not found	included
throughput	not found	included
references from recognized journals in the natural or environmental sciences, or sustainability literatures	rarely included	included
empirical data on the state of the environment	rarely included	included
predictions on future environmental conditions, particularly as relevant to economic activity / policies and options	rarely included	included

* micro/macro textbook pairs are evaluated as an amalgamated principles textbook

further analysis required

By quoting representative passages from the standard textbooks, the next section is intended to give the reader a richer understanding of the kinds of limitations found in the standard textbooks (space limitations do not permit presenting equivalent passages from the Goodwin text)⁶.

As might be expected, the influence of Robbins (1935) is seen in how textbooks limit the scope of economics to the science of choice under scarcity.

Economics is the study of how people make choices under conditions of scarcity and of the results of those choices for society. (Frank Micro, p. 3).

This narrow conception of economics as focused on choice, rather than broadening the perspective to examine provisioning (Lourdes 2003; Nelson 1993), reduces the relevance of environment-economy interactions and pushes out of view issues such as why superfluous wants of the rich are attended to while the pressing needs of the poor remain unmet.

The texts argue that scarcity emerges because humans have insatiable desires, but downplay or neglect scarcity implied by ecological constraints:

For better or worse, most people have virtually unlimited wants. We desire various goods and services that provide utility. Our wants extend over a wide range of products, from necessities (for example, food, shelter, and clothing) to luxuries (for example, perfumes, yachts, and sports cars). (McConnell, p. 7)

Economists come across as giving the market the scientist's stamp of approval. Mankiw is perhaps the most enthusiastic endorser of the market:

We can now better appreciate Adam Smith's invisible hand of the marketplace.... The benevolent social planner doesn't need to alter the market outcome because the invisible hand has already guided buyers and sellers to an allocation of the economy's resources that maximizes total surplus. This conclusion explains why economists often advocate free markets as the best way to organize economic activity. (Mankiw Micro, p. 158)

⁶ Further details are reported in (Green 2009).

However, this endorsement is somewhat qualified since externalities or other distortions may impede economic efficiency:

But the invisible hand isn't always our friend. It's also important to understand when and why the individual pursuit of self-interest can lead to counterproductive behaviour. (Krugman Macro, p. 3)

The textbooks are strongly supportive of economic growth:

...Robert E. Lucas Jr., a leading macroeconomist ...remarked that once you begin to think about the benefits of faster economic growth, it is hard to think about anything else! (Parkin, page 451)

You may not think that it matters much whether the economy grows at 2 percent or 3 percent per year but your children and grandchildren certainly will. (Ragan, p. 613)

The textbooks concede that GDP as a measure of economic wellbeing has its limitations:

GDP is a reasonably accurate and very useful indicator of a nation's economic performance, but it has its limitations. It fails to account for nonmarket and illegal transactions, changes in leisure and in product quality, the composition and distribution of output, and the environmental effects of production. The link between GDP and well-being is tenuous. (McConnell, p. 121)

...but then argue that GDP is a good enough or the best available measure and that growth is desirable:

Still, in the relatively short term, changes in GDP will usually be a good measure of the direction, if not the exact magnitude, of changes in material living standards. (Ragan, p. 493)

Growth is a widely held economic goal. The expansion of total output relative to population results in rising real wages and incomes and thus higher standards of living. An economy that is experiencing economic growth is better able to meet people's wants and resolve socioeconomic problems. Rising real wages and income provide richer opportunities to individuals and families—a vacation trip, a personal computer, a higher education—without sacrificing other opportunities and pleasures. A growing economy can undertake new programs to alleviate poverty embrace diversity, cultivate the arts, and protect the environment without impairing existing levels of consumption, investment, and public goods production. (McConnell, p. 125)

Economic growth is portrayed as leading to increased demand for improved environmental quality:

Economic growth provides the higher incomes that often lead to a demand for a cleaner environment, thus leading to higher average living standards that are not directly captured by measures of per capita GDP. (Ragan, p. 614).

...and as helping to reduce pollution and as enabling investments in improved environmental quality:

Growth has allowed economies to reduce pollution, be more sensitive to environmental considerations, set aside wilderness, create national parks and monuments, and clean up hazardous waste, while still enabling rising household incomes. (McConnell, p. 315)

The role of energy in explaining growth (Warr et al. 2008; Ayres & van den Bergh 2005) is neglected in the standard textbooks; instead, the textbooks emphasize the role of technological progress, which is claimed to reduce resource requirements:

The technological advances that bring economic growth help us to economize on natural resources and to clean up the environment. For example, more efficient auto engines cut gasoline use and tailpipe emissions. (Parkin, p. 452).

The environment is generally dealt with in a very abstract manner, even being abstracted away from entirely:

Suppose that two factories—a paper mill and a steel mill—are each dumping 500 tonnes of glop into a river each year. (Mankiw Micro, p. 217)

Traditionally, economists also have highlighted the importance of a third input, land, but in modern industrial economies land is of secondary importance. For most purposes, it suffices to focus attention on the three major markets—product, labor, and capital—and this text will follow that pattern. (Stiglitz Micro, p. 15)

Some of this language suggests that the environment has aesthetic value, not that it is essential to human wellbeing. It also suggests the simplified portrayal of environmental

issues of the 1960s and 70s, of clean vs. dirty environments and that with a little elbow grease the environment can be “cleaned up” with no loss.

Put another way, in a very dirty environment, a little cleanliness will be much prized, but in a very clean environment, a little more cleanliness will be of only small additional value. (Ragan, p. 410)

Sometimes language and examples are used to trivialize the extent of our ecological predicament. For instance, consider how in a discussion on limits to growth, humans “displace marsh reeds” – without any indication that the potential consequences of losing wetland ecosystems could have a significant effect on human wellbeing or sustainability.

There is no doubt that as humans spread around the globe, they tend to displace trees, wolves, and marsh reeds to make way for farms, cities, and human settlements. (Samuelson, p. 363)

The textbooks generally downplay how environmental deterioration affects human health and where the linkage is discussed it is described in a very abstract manner that downplays the consequences for human wellbeing:

Air pollution continues to cloud major U.S. cities, imposing large costs in terms of reduced property values and increased health care expense. (McConnell, p. 592)

For example, in estimating the impact of emissions of sulfur dioxide, environmental economists first estimate the impact of higher emissions on health, and they then place a dollar value on health changes using either survey techniques or estimates that are revealed by people's actual behavior. (Samuelson, p. 373)

Indeed, it often appears as though there are no linkages between health and the environment or even that one must be traded-off for the other:

As society we must choose among healthcare, national defense, and the environment. (Parkin, p. 2)

It appears that many of the textbook authors desire to reassure students that, some problems areas aside like global warming, environmental trends are improving,

potentially leading students to an overly optimistic assessment of our current predicament:

Today, Lake Erie supports a fishing industry, just as it did in the 1930s. No longer treated as a garbage dump for chemicals, the lake is regenerating its ecosystem. (Parkin, p. 383)

You'll be glad to hear that the acid rain problem today is much less serious than it was in the 1960s. (Krugman Micro, p. 478)

The standard texts are unreliable guides to the limits to growth literature. For instance, the Club of Rome's work is incorrectly described by Ragan:

Extrapolating from the oil shortages caused by the OPEC cartel, the Club of Rome concluded that industrialized countries faced an imminent absolute limit to growth. (Ragan, p. 634).

As the foreword to *Limits to Growth* makes clear, their computer modeling exercise was initiated following a meeting of the Club of Rome in April 1968. The results were published in 1972. The OPEC oil embargo did not begin until the fall of 1973. Clearly, the authors of *Limits* could not have based their analysis on the oil shortages caused by OPEC.

The standard textbooks downplay and sow confusion when it comes to the importance of energy and natural resources to industrial economies and their implications for sustainability. McConnell apparently has concluded that natural resources and energy are of such limited interest to most instructors that the chapter on the topic is not included in the textbook but must be downloaded. A number of the texts turn to empirical data in the form of prices to demonstrate that concerns about resource scarcity are unfounded:

If we were depleting natural resources faster than their discovery, we would see the prices of those resources rise. That has not been the case for most natural resources; in fact, the prices of most of them have declined. And if one natural resource becomes too expensive, another resource will be substituted for it. (McConnell, p. 315)

This argument is flawed. Note first that it deals with resource inputs as raw material but not the impact on ecosystems of resource extraction (e.g., habitat loss and fragmentation)

nor the impact of disposing of the wastes generated by high levels of natural resource consumption. Current thinking suggests that when it comes to how non-renewable resources constrain growth, the more pressing problem is not depletion but rather how high levels of natural resource consumption threaten to overwhelm the environment's assimilative capacity (Simpson et al. 2005). For instance, the remaining stock of coal is sufficient to supply demand for several more centuries, but were it all to be burned the resulting global warming would be catastrophic. With respect to renewable natural resources, most of the economically important stocks are already being overharvested (United Nations Environment Program 2005). But more importantly, it is well established that market prices will not necessarily indicate natural resource scarcity (Victor 1991; Victor 2008; Norgaard 1990). Resource owners may face economic incentives to liquidate natural resource stocks if alternative investments offer a higher rate of return or if they feel they may lose the rights to extract the resource in the future. There is also circularity in assuming that prices provide a signal of natural resource scarcity if resource owners, with imperfect information, are seeking to know if resources are becoming scarce by observing prices. It must also be remembered that future generations do not get to bid in current markets and thus do not get to participate in intertemporal allocation decisions.

A number of textbooks suggest from the fact that some countries like Japan are rich despite being resource-poor that natural resources are no longer important to rich countries:

The second classic factor of production is natural resources... the possession of natural resources is not necessary for economic success in the modern world... Many countries, such as Japan, had virtually no natural resources but thrived by concentrating on sectors that depend more on labor and capital than on indigenous resources. (Samuelson, p. 558)

The above statement would not be problematic were it made clear that industrialized nations actually consume prodigious amounts of natural resources and can thrive without resource stocks within their borders only so long as other nations have the required natural resources and are willing to trade them at affordable prices.

The textbooks present an optimistic perspective on the future supply of nonrenewable natural resources. With little theoretical justification or empirical evidence to back up their claims, they suggest that the market does an adequate job of allocating resources over time:

Important examples of appropriable, nonrenewable natural resources are fossil fuels such as oil, gas, and coal. Economists argue that because private markets can efficiently price and allocate their services, such natural resources should be treated the same as any other capital asset. (Samuelson, p. 379)

A particularly absurd and unsupported assertion common in the 1970s, the claim that human imagination can overcome material limits, still makes its appearance in a number of the textbooks:

Moreover, say economists, economic growth has to do with the expansion and application of human knowledge and information, not of extractable natural resources. In this view, economic growth is limited only by human imagination (McConnell, p 317)

The perspectives of environmentalists are caricatured and they are often portrayed as being ignorant of rudimentary economic theory. The diversity of perspectives held by the environmental community is lost in the textbook and it seems as though many textbook authors have only exposed themselves to the least sophisticated exemplars of environmental thought. It is unclear who the authors intend to include under the environmentalist label – does this label include professionals working in the environmental sector, scientists with advanced training working on environmental issues, or merely activists and campaigners paid by ENGOs? Consistent with their problematic neglect of referencing and attribution (Paxton 2007), rarely do the standard texts quote specific environmentalists or provide sources to allow readers that the text’s description of what environmentalists believe or advocate is accurate.

Despite the stated goals of some environmentalists, it would be impossible to prohibit all polluting activity. For example, virtually all forms of transportation—even the horse—produce some undesirable polluting byproducts. But it would not be sensible for the government to ban all transportation. (Mankiw Micro, p. 217)

For example, the EPA staff allegedly sees all pollution as bad and all polluters as “bad guys.” They have been accused of avoiding the challenge of trying to identify the optimal amount of pollution based on a careful analysis of marginal costs and marginal benefits. (McConnell, p. 592).

Following the error in Hardin’s (1968) original article (Dietz et al. 2003), the standard textbooks continue to provide a simplistic and distorted description of “the tragedy of the commons” and from this provide an overly bleak assessment of the viability of collective responses to resource management and environmental challenges. The textbooks conflate common property regimes (where the members of a group have defined property rights to exploit a common pool resource under a set of collectively derived rules and use enforcement mechanisms to ensure compliance) with open access (where no property rights are defined and where there are no management rules or enforcement mechanisms). The textbooks explain the enclosures that took place in England in terms of a necessary step to improve the productivity of agricultural land, ignoring the empirical data which shows that in the open field system predominant in England, rights to use were carefully defined, enforcement mechanisms were in use, management was effective and innovative and enclosure did not result in increased yields (Allen 1982; Allen 2001; Marglin 2008). They fail to mention that enclosures took place because members of a dominant class forced a change in property right entitlements to better suit their personal interests and that a large portion of the population lost its means of subsistence and suffered gravely as a result.

The term “tragedy of the commons” comes from fourteenth century England where areas of rough grassland surrounded villages. The commons were open to all and used for grazing cows and sheep owned by the villagers. Because the commons were open to all, no one had an incentive to ensure that the land was not over grazed. The result was a severe overgrazing situation. During the sixteenth century, the price of wool increased and England became a wool exporter to the world. Sheep farming became profitable, and sheep owners wanted to gain more effective control of the land they used. So the commons were gradually enclosed and privatized. Overgrazing ended, and land use became more efficient. (Parkin, p. 370)

The lesson that students are supposed to take away is that by privatizing natural resources, they will be better managed.

6 Conclusion and Recommendations

Introductory economics textbooks in current use in BC, as well as 3 leading US textbooks, one of which includes a Nobel laureate who has written with great concern about the environmental crisis as its lead author, are poorly suited for Econ101 courses at institutions that have made a commitment to sustainability and are seeking to integrate sustainability across the curriculum. The textbooks treat the environmental implications of economic activity in an overly stylized manner that is unrealistic and may well confound or even impair student understanding of the nature of our environmental predicament. They rely on models that omit the environment or natural resources entirely, even in discussions that relate to sustainability. They leave a long list of environmental side-effects of economic activity unmentioned. The one area where the standard textbooks consistently pay some attention is with respect to climate change. However, they still downplay the scientific consensus on the severity of global warming. While the standard textbooks present the “limits to growth” debate, the presentation is weak, outdated and typically biased to show that growth should continue to be society’s primary macroeconomic policy objective. While textbooks usefully set out favoured economic tools that might be used to reduce the impact of economic activity, they fail to discuss instances where those tools would not work. They include little or no content that might enhance student understanding of the role that less consumerist lifestyles in rich countries and that redistribution of wealth might play in moving towards sustainability. They presume that increased output and consumption is desirable.

Because the standard textbooks tend to concentrate material that relates to the environment in chapters on externalities and public goods, and because some textbook authors explicitly suggest in their preface that those chapters are not core chapters and may be omitted due to time constraints (e.g., Parkin, p. xxii), many students will be receiving little exposure in Econ101 to environment-economy interactions. This will

leave them poorly prepared to understand how economic activity can degrade the environment and what policies might be implemented to ameliorate the outcome.

A deeper problem with the standard texts in their treatment of environment-economy linkages nearly exclusively through the lenses of externalities and public goods is that such an analytical framework likely gives students limited insight into the nature of our environmental predicament. From the 1st and 2nd laws of Thermodynamics, we know that matter and energy are conserved through the economic process but that the end result of production and consumption is the generation of waste. Degradation of the environment then is not merely a problem that emerges because parties transacting in market settings ignore the side effects of their production and consumption on third parties unless compelled to consider them through government regulation, through pollution charges or through negotiation. It is that production and consumption inevitably involve the use of energy, the drawdown of natural resources and the emission of wastes. While it is possible to choose production processes and to design products and services so as to make more efficient use of natural resources and to generate fewer and less harmful wastes, there are limits to “eco-efficiency” (Baumgärtner et al. 2001; Baumgärtner 2002; Huesemann 2004). Continued economic growth therefore poses fundamental challenges to achieving sustainability (Victor 2008).

Not surprisingly, the pair of textbooks that were explicitly written by Goodwin and her co-authors to be relevant to sustainability, *Microeconomics in Context* and *Macroeconomics in Context*, are clear market leaders when assessed for their relevance to integrating sustainability into the introductory economics curriculum. They have a high proportion of the overall text that links to the environment and sustainability and this content is well dispersed throughout the text. As opposed to the highly stylized (and often unrealistic or potentially misleading) portrayal of environment-economy linkages in the standard texts, Goodwin and her team have written textbooks that describe environmental-economy interactions in a sophisticated manner without burying readers in too much detail. Their pair of textbooks gives an overview of the myriad ways in which humans are dependent upon the environment and the range of environmental effects

induced by economic activity (further details in Green 2009). At the same time, the texts still cover the core material that will be essential to students taking higher level courses offered at mainstream economics departments. Indeed, because they present economic theory in its environmental and societal “context”, it may well be that students will find the material less abstract and alien and more relevant to the world they know, with the net result that learning outcomes will be improved.

Authors of standard textbooks owe it to their students to improve the sophistication with which the texts address environment-economy interactions and to provide students with the analytical framework to understand the challenges of sustainability. Textbook authors, already under much pressure to add new content to their texts, may well object that a fuller and more sophisticated treatment of economy-environment interactions would expand the total page count well beyond the envelope that can be managed by first year students. There are two rejoinders to this argument. The first is that integrating sustainability into the text – the key word is integration – does not so much mean adding more topics and hence pages, but rather rewriting existing content such that it more realistically addresses environment-economy linkages. Many of the mundane examples included in standard texts could be replaced with examples that both illustrate economic principles and are environmentally realistic and relevant. The Goodwin texts show how this can be done. The second rejoinder is that if one goes back to what a good course in introductory economics should accomplish, providing a basis for a better understanding of the economy, much of the existing content could and should be omitted, a point that others have made before (Becker 2007). For example, few Econ101 students in North America major in economics, fewer still will go on to get a PhD, and but a handful will become Chair of the Federal Reserve. Why then so many pages devoted to describing in elaborate detail how the Federal Reserve influences interest rates? Given humanity’s current environmental predicament, is it not more relevant to equip students with an analytical framework for understanding the challenges and potential solutions that society faces in putting the economy on a sustainable footing? Furthermore, most textbooks have much trite that could be deleted, such as a page devoted by McConnell to considering whether a robot could replace Ben Bernanke (p. 333).

Even within the current inadequate allotment of pages to sustainability relevant issues, there are tradeoffs that authors of the standard texts should consider. Textbook authors would likely produce a better text if they spent less of their scarce pages exploring the efficiency properties of tradable permit schemes and used up more ink giving students a more sophisticated description of how the biosphere and the economic sphere are linked. After all, most students are not going to spend their working hours defining a tradable permit scheme or comparing pollution charges to cap and trade systems. They will, however, be working at workplaces that place demands on the environment, voting as citizens in elections where environmental issues will be important and making decisions as consumers that influence their ecological footprints.

To avoid the inaccuracies and weaknesses that now plague the standard texts with respect to the linkages between the environment and the economy, textbook authors should draw upon recent literature in the environmental sciences. The fact that so many shortcomings have been documented in the standard texts, despite the review process that a typical textbook undergoes (Parkin and Bade lists 30 reviewers, representing 22 Canadian Universities and 3 colleges) suggests that the review process itself is flawed. To improve textbooks, reviewers should include individuals trained in other disciplines such as the environmental sciences.

This study is also relevant to non-economics programs of study that make Econ101 a required course. Other disciplines should be concerned that what their students are learning in the Econ101 course, if it relies on a standard-type textbook, may actually impede student understanding of sustainability. The next phase of the author's research is intended to examine this issue in more depth.

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Appendix A Textbooks included in the study

Standard texts

- Frank, R. H., Bernanke, B. S., Osberg, L., Cross, M. L., & MacLean, B. K. (2005). *Principles of microeconomics* (2nd ed.). Toronto: McGraw-Hill.
- Frank, R. H., Bernanke, B. S., Osberg, L., Cross, M. L., & MacLean, B. K. (2005). *Principles of macroeconomics* (2nd ed.). Toronto: McGraw-Hill.
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- Parkin, M., & Bade, R. (2006). *Economics: Canada in the global environment* (6th ed.). Toronto: Pearson Education Canada.
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- Samuelson, P. A., & Nordhaus, W. D. (2005). *Economics* (18th ed.). New York: McGraw Hill.
- Stiglitz, J. E., & Walsh, C. E. (2006). *Principles of macroeconomics* (4th ed.). New York: W. W. Norton.
- Stiglitz, J. E., & Walsh, C. E. (2006). *Principles of microeconomics* (4th ed.). New York: W. W. Norton.

Sustainability-oriented texts

- Goodwin, N., Nelson, J. A., Ackerman, F., & Weisskopf, T. E. (2009). *Microeconomics in context* (Second edition.). Armonk, New York: M. E. Sharpe.
- Goodwin, N., Nelson, J. A., & Harris, J. (2009). *Macroeconomics in context*. Armonk, New York: M. E. Sharpe.

Appendix B Methodology used to record and weight textbook content

1. Any environmental content is identified, annotated and marked on the record sheet. Environmental content includes:

- Mention of key words (e.g., biodiversity, environment, etc.), discussion of environmental topics such as global warming, economic analysis of environmental issues and policy responses (e.g., tradable permit schemes).

Environmental content excludes:

- Mention of land or natural resources in an abstract sense (e.g., “Capital, labour and land/natural resources are the factors of production” would not merit inclusion; while “natural resources can be depleted” would be included). For the purposes of this study, environment had to relate to the natural environment, rather than merely attributes of, say, the urban environment (e.g., a city preserving its architectural heritage).

Content considered on a case by case basis:

- Discussion invoking two economic terms in particular, “externalities” and “public goods” may or may not be related to environment. For instance, biodiversity and a healthy atmosphere are public goods, but so is national defence and building a lighthouse. Externalities include both those with environmental content (e.g., a factory emitting wastewater into a stream) and those that do not (e.g., one person getting vaccinated reduces likelihood of disease transmission to others). Where the text clearly related to the natural environment, they were scored accordingly; otherwise, they were not scored. Petty instances of externalities unlikely to impact ecosystems – most often, disturbances of stereo noise or cigarette smoke – were also excluded from the scoring.
- Population growth was not included unless it was discussed in an environmental context.

2. Also recorded was any reference to a publication that drew on an environmental sciences / natural science literature.
3. Also recorded were images or graphics with an environmental focus (e.g., picture of billowing smokestacks).
4. For each page with environmental content, an estimate is made of the proportion of the page that is devoted to environmental content. The following convention was used:
 - if one or two words occurred in a sentence, but the sentence is not specifically related to the environment, 1% (e.g., “the government budget must cover expenditures for defence, health care and environmental protection”)
 - a single sentence, focused on environmental content, 5%

- otherwise, the available proportion of the page covered by environmental content was estimated, providing a value from 0 to 100%.
5. In calculating statistics, any pages that were blank or that contained no substantive content were deducted.

Note that the omission of web-based chapters will affect the environmental content tally of the textbooks that use them (e.g., McConnell Brue). The rationale for excluding such chapters is that if the authors present them as so clearly optional that they must be downloaded then students are likely to be required to read them.