A Critical Study of the Literature about Deforestation in the Brazilian Amazon

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A Critical Study of the Literature about Deforestation in the Brazilian Amazon

Honors Thesis

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Abstract

The purpose of this honors thesis was to summarize and analyze the competing positions about the causes and consequences of the continuing deforestation in the Brazilian Amazon based on the positions recently presented (*i.e.*, from 2000 to 2010) in published sources on the subject. This analysis of the competing positions on the causes and consequences of deforestation in the Brazilian Amazon has focused on and has been guided by a search for answers to two critical questions:

- Which groups of people in the world *benefit* from the way in which the causes and consequences of deforestation in the Brazilian Amazon are presented in the book, and which groups of people are *neglected or harmed* by the way in which this issue has been presented?

- Which *assumptions* about the causes and consequences of deforestation in the Brazilian Amazon have been accepted as truth and have not been questioned by the authors of the books?

In short, this honors thesis has been structured as a study centered on *ideological bias* and a study of how ideological biases affect the contemporary debate about the causes and consequences of deforestation in the Brazilian Amazon. The researchers whose books were examined in this thesis did not, for the most part, relate the role of ideology to the question of deforestation and its causes and consequences.

All of the researchers, whose books were critiqued, seemed to be aware of the severe shortcomings of the cost-benefit method as applied to the issue of deforestation in the Brazilian Amazon; all except one researcher (Lomborg) seemed to lean toward the precautionary principle in decision-making on issues of deforestation. There were discernible gaps between and among the researchers regarding the necessity of regulation, at various governmental levels, of forest utilization and management.

The issue of deforestation in the Brazilian Amazon can be seen to be more than just a debate between developmentalists and conservationists or a debate between the advocates of unregulated free-market decision-making and advocates of governmental regulation. The issue of deforestation in the Brazilian Amazon illustrates that individuals and corporations pursuing their seemingly rational self-interest do not produce long-term benefits for the society or the world as a whole and certainly do not produce benefits for future generations commensurate to the costs of the activities they undertake.
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Chapter 1

Introduction

The purpose of this honors thesis is to summarize and analyze the competing positions about the causes and consequences of the continuing deforestation in the Brazilian Amazon as reflected in relatively recent (2000-2010) publications on the subject. This analysis of the competing positions on the causes and consequences of deforestation in the Brazilian Amazon applies two critical questions to the selected literature:

• Which groups of people in the world benefit, and which groups of people are neglected or harmed, by the way in which the causes and consequences of deforestation in the Brazilian Amazon have been framed and presented in the selected literature?

• Which assumptions about the causes and consequences of deforestation in the Brazilian Amazon have been accepted as fact and have not been questioned by the authors of the books?

In short, this honors thesis is a study of ideological biases and a study of how these biases affect the contemporary debate on the issue of deforestation.

The Oxford Companion to Philosophy (2005, 419) defines an ideology as a set of “beliefs and values held by an individual or group for other than purely epistemic reasons” and lists as examples: bourgeois ideology, nationalist ideology, or gender ideology. In other words, ideologies and ideological biases are held by groups of people because their aims and objectives in society are served by their ideology’s particular set of beliefs and values. They do not hold the beliefs and values because they know that the beliefs and values can withstand the critical scrutiny of reason and logic or of experience. It is not their purpose to be neutral or objective with regard to defining what is and what is not knowledge. Rather, they hold the beliefs they do because the beliefs serve their interests.

The people in these groups hold the beliefs and values that they do because this provides a justification for social arrangements that are, in the end, more important to the people in these groups than is the process of searching for and possibly finding truths that can withstand tests of reason and logic, which is what constitutes true knowledge (the purely epistemic part of the above definition of ideology). It is immaterial whether people are guided consciously or unconsciously by the basic tenets of their ideology; the end effect is the same: their beliefs are more important to them than the search for truth is.
Generally speaking, tests of truth are as follows:

- Is the explanation consistent with our experience?
- Does the explanation violate any of the rules of reason and logic, e.g., does it contain any fallacious arguments?
- Is the explanation phrased as simply as it can be so as to not cause confusion or doubt?

The need for the study undertaken in this honors thesis is rooted in the idea that the open and free debate of ideas is important to the workings of a democracy and important to the testing of the truth of ideas. The prevailing theory of truth in contemporary American culture seems to be the concept that was formulated by Supreme Court Justice Oliver Wendell Holmes Jr., who asserted, in a dissenting opinion in the case of Abrams v. United States, 250 U.S. 616 (1919), that “the best test of truth is the power of the thought to get itself accepted in the competition of the market.”

Holmes went on to say that the truth is the only sound basis on which to ground faith and conduct. However, this American cultural concept that truth emerges from a competition of ideas can lead to strange and even dangerous versions of the truth, which is why the critical questions posed above are so important.

The particular need that has been addressed in this thesis is the need for an examination of the extent to which the publication of ideas about deforestation has been as open and free as it should be. Specifically, this honors thesis aims to fill the need for an examination of the available literature about deforestation to see if certain perspectives and points of view have been neglected or slighted.

Structure of the thesis

This honors thesis has been structured in the form of a literature review and has been organized into five chapters. First, the introductory chapter establishes the thesis’ theoretical framework. The theoretical framework draws primarily from the work of the ecologist Garrett Hardin and the geographer Jared Diamond.

The second chapter, focused on the rationale, provides an overview of the causes and impacts of deforestation and presents the context as to the importance of the debate over the consequences of deforestation. This chapter’s content is drawn from academic, peer-reviewed journal articles.

The third chapter, the methodology chapter, explains how the literature review was conducted for this study and presents the framework for the analysis that forms the thesis’ core. The third chapter identifies the books, published between 2000 and 2010, about the deforestation of the Brazilian Amazon that have been summarized and analyzed. These books were found through a subject search in the USF online book catalog (found at: http://usf.catalog.fcla.edu/sf.jsp) and by following references to books in peer-reviewed journal articles. The scholarly articles have been retrieved from the library on-line.
journals, and include *Environmental Sciences and Pollution Management, Academic Search Premier*, and *Science Direct*.

The fourth chapter, the analysis and findings chapter, contains the actual summaries of the selected books. This chapter focuses attention on which groups in the world benefit from the way in which the issue of deforestation is presented and on which points of view are ignored or dismissed.

The fifth chapter, the discussion and conclusion of the honors thesis, examines the implications of the findings for the quality of the debate on the causes and the consequences of deforestation. It also includes recommendations for further research into the openness and freedom of expression in examining environmental and ecological issues such as deforestation in the Brazilian Amazon.

Appendix A provides pictures of Amazonian rain forests and deforestation.

Appendix B provides Food and Agriculture Organization (FAO) gross deforestation estimates in square kilometers for the Legal Amazon region for the period 1988 to 2008.

Appendix C provides a glossary of terms, and Appendix D provides background information about the credentials of the researchers whose work is critiqued in this thesis.

**Background**

Diamond (2005), mirroring a broad range of other researchers such as Wilson (2001) and Raven (2000), states that one of the primary values of the tropical rain forest to humans, beyond the timber and non-timber products it supplies and beyond its acting as a major carbon sink, is its provision of a “habitat for most other living things on land” (469).

He has estimated that “tropical forests cover 6% of the world’s land surface but hold between 50% and 80% of the world’s terrestrial species of plants and animals” (469). Rain forests, in Diamond’s estimation, are more important to humans than other types of forests -- more important, for example, than temperate forests, montane forests, coniferous forests, and Mediterranean forests -- precisely because of the concentration of biodiversity that they foster.

**Geologic history of the Brazilian Amazon tropical forest**

The geologic history of the Brazilian Amazon region is important for various reasons. The record of past events can show under what conditions the tropical rain forest developed, how past variations in climate (temperature and precipitation) and tectonic plate activity have had varying effects on the biodiversity in the region. It is important to know as much as possible about the differences, then and now, in the extent and diversity of plant and animal life, and it is important to know how extinction rates in earlier times
compare with present-day extinction rates. The geologic history can also be studied to discover whether past climate changes have been gradual or abrupt.

With respect to the size of the Amazon Basin, Colinvaux and de Oliveira (2010) point out the area of the Amazon Basin is as extensive as the continent of Europe, including European Russia (52; see Fig. 1), so endemism, the development of species particular to or peculiar to specific localities, is likely relatively common within the Amazon Basin even without the existence of grassland savannas.

Figure 1. Map of the Amazonian Rain Forest Region.
Source: www.mongabay.com
Because an understanding of much of the following summary of the paleontological literature about the Amazon lowland rain forest depends upon an awareness of the terminology of geologic time periods, the geologic time scale of the Cenozoic Era is shown in Table 1 below.

Table 1
The Geologic Time Scale of the Cenozoic Era

<table>
<thead>
<tr>
<th>Period</th>
<th>Epoch</th>
<th>Time Scale (Millions of Years Ago)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quaternary</td>
<td>Holocene</td>
<td>Present – 0.01</td>
</tr>
<tr>
<td>Quaternary</td>
<td>Pleistocene</td>
<td>0.01 – 2.6</td>
</tr>
<tr>
<td>Tertiary (Neogene)</td>
<td>Pliocene</td>
<td>2.6 – 5.3</td>
</tr>
<tr>
<td>Tertiary (Neogene)</td>
<td>Miocene</td>
<td>5.3 – 23</td>
</tr>
<tr>
<td>Tertiary (Paleogene)</td>
<td>Oligocene</td>
<td>23 – 33.9</td>
</tr>
<tr>
<td>Tertiary (Paleogene)</td>
<td>Eocene</td>
<td>33.9 – 55.8</td>
</tr>
<tr>
<td>Tertiary (Paleogene)</td>
<td>Paleocene</td>
<td>55.8 – 65.5</td>
</tr>
</tbody>
</table>


Haffer (1978) first developed the ‘forest refuge hypothesis’ to explain the development of the Brazilian Amazon tropical rain forest; his study of Amazon forest bird speciation led him to conclude that the existing geographic distribution patterns of bird species required some sort of forest refugia, which is the name he gave to extensive reservoirs of rain forest in the Amazon Basin surrounded by savanna grasslands. The forest refugia would have developed, he suggested, during periods of aridity in the late Pleistocene so great that the rain forest trees could not survive, with the result that the zoological populations then became isolated from one another (Hooghiemstra 153).

Colinvaux and De Oliveira (2001) have stated that the plant communities of the Amazon basin include more than 80,000 taxa of vascular plants and that the region’s tree diversity reaches 300 species per hectare (Colinvaux 51, citing Gentry 156). As part of their research, Colinvaux and de Oliveira asked the question: What conditions could have produced such extensive biodiversity in the tropical forests of the Amazon lowlands?

Colinvaux and de Oliveira (2001) compiled data to produce the Amazon Pollen Manual and Atlas and used these data to refute Haffer’s widely accepted theory of climatically induced aridity and forest refugia (56). Specifically, they examined the grass pollen records of the Amazon lowlands to see if there was evidence of grassy savannas having replaced tropical forests during the Pleistocene. As can be seen in Table 2 below, they relied heavily upon the evidence of pollen samples from the Amazon fan and continental shelf, assuming that pollen from all areas of the Amazon region would have drained through the Amazon fan region.
Their most important conclusion was that Amazon forests were never fragmented by periods of aridity, at least not in the Pleistocene. To the extent that isolated areas of endemicty did or do exist in parts of the rain forest, these areas need to be explained in a way that does not involve abolishing the forest to create variance in species. It may be that the enormous size of the Amazon basin produces its own isolation and vicariance of populations (Colinvaux 61). Vicariance is defined as the separation of a group of organisms by a geologic barrier such as a mountain or a river.

They reviewed the available palynological evidence from three sites, (see Table 2 below) chosen because they represent Amazon farmland and continental shelf regions where most pollen samples could be thought to have accumulated, and they concluded that plant diversity resulted from an extensive period of relative stability that permitted species origination and evolution but limited the rates of extinction. In opting for the ‘steady-state hypothesis’ for Amazon Basin development and evolution on the basis of the available pollen data, Colinvaux and de Oliveira rejected the then widely held theory of ‘forest refugia’ as an explanation for the development of plant diversity in the region.

Table 2. Amazon plant community sites analyzed for grass pollen content
Source: Colinvaux and De Oliveira (2001).

<table>
<thead>
<tr>
<th>Site</th>
<th>Location</th>
<th>Grass Content in Pollen Record</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake Pata</td>
<td>west central Brazil</td>
<td>never more than 3% in both Pleistocene and Holocene sections</td>
<td>the region was covered by closed forest throughout; there were no savannas replacing tropical forests</td>
</tr>
<tr>
<td>Amazon fan and continental shelf</td>
<td>Eastern Brazil (but draining the entire Amazon region)</td>
<td>small % of grass pollen, never more than 10%, unchanged between glacial and interglacial deposits</td>
<td>permanent forest; tropical forests were never replaced by savanna</td>
</tr>
<tr>
<td>Carajas Plateau</td>
<td>eastern Amazonia, about 300 km south of the Amazon mouth</td>
<td>grass pollen % fluctuates widely throughout the entire period; furthermore, there</td>
<td>the Carajas pollen shows a history of overrepresentation in the local area of grasses growing on the shore of a</td>
</tr>
</tbody>
</table>
is no pollen from lowland tropical forests in the Carajas lake sediments at any time

The available evidence led Colinvaux and de Oliveira to conclude that the Amazon lowlands have supported tropical forest since the beginning of the uplift of the Andes mountains in the mid-Cenozoic, 30 million years ago, meaning that the rain forest would have covered much of the Amazon Basin before the start of the Miocene. They further suggested that, by the Pleistocene, the whole of the Amazon lowlands would have been “under closed-canopy forest throughout all stages of a glacial cycle” (60-61).

Colinvaux and de Oliveira (2001) concluded that the Amazon lowland rain forest is ancient and that diversity in the forest derives from “prolonged environmental constancy to minimize extinction rates” (61). There has been an enormous area of forest for a very long time (61). They saw no reason to think that the composition of the forest in the Amazon Basin would have varied more because of changes in other factors such as “length of growing season, CO₂ concentration, (or) seed predation” than it (the forest composition) had varied because of changes in temperature or precipitation (61).

In effect, Colinvaux and De Oliveira’s (2001) ‘steady-state hypothesis’ of Amazon development was much closer to the ‘time-stability hypothesis’ of diversity in the deep seas than to Haffer’s proposal. Sanders (1968) had suggested that deep-sea environments were physically stable, with relatively little disturbance, and that it was this stability over time that allowed marine organisms to evolve toward specialization in narrow niches (Sanders 253-254). His hypothesis was supported by photography of the mud seafloor showing a lack of oceanic disturbance.

Furthermore, given the general consensus among paleo-climatologists of approximately 6 °C of equatorial cooling during glacial maxima (58), Colinvaux and de Oliveira chose to regard the glacial age communities of trees in the Amazon Basin as the base-line or “normal” communities. What happened during interglacial intervals, they said, was that there was “significant environmental stress” to these forest communities, the kind of stress that was devastating for the types of trees that had adapted to the more cool climate. The end result was that these tree species populations that had adapted to the cooler climate were forced to retreat to higher elevations, which is where these montane forest types are found today (59).

To the logical question, resulting from the work on diversity done by Haffer and by Colinvaux and his colleagues, as to whether there are necessarily differences in the development of diversity among plants species and bird species, Gentry (1988) has
answered that the data suggests that patterns of tree species diversity parallel similar patterns in diversity among birds, butterflies, reptiles and amphibians, and mammals (158).

Salo (1987) also tackled the problem of accounting for the extensive biodiversity in the Amazon Basin. He evaluated the biostratigraphic, lithostratigraphic, and geomorphologic data for the Amazon Basin and concluded that the evidence is not sufficient to support the forest-refuge theory. He found limited evidence supporting forest shrinkage but no evidence of forest fragmentation (209). According to Salo, there is little chance of reconstructing the late Pleistocene history of the Brazilian Amazon region since no Last Glacial Maximum (LGM) radiometric dating is available from the region (209).

Salo stated that the available studies that do suggest that climatic change is responsible for the past biological differentiation (leading to much biodiversity) are studies that neglect the evidence of the influence of river channel migration and floodplains on the development of biodiversity (209). Salo favored an edaphic explanation for the development of so much diversity in species in the region.

Hooghiemstra and Thomas Van der Hammen (1998) did a similar study of the pollen data from the Amazon Basin and came to a somewhat different conclusion. They also started with the observation that tropical rain forests are well known for their high biodiversity, and they asked the question: “Which conditions in the past have permitted the evolution of such high degree of diversity and, apparently, also such an effective conservation of species?” (147).

Was the high degree of biodiversity due to the stability of the rain forest ecosystem during the Quaternary or to the formation of forest refugia in parts of the tropical rain forest because of precipitation change, temperature change, and river dynamics (148)? Hooghiemstra and Van der Hammen (1998) concluded that the hypothesis claiming a continuous rain forest cover in the Amazon basin and the forest refugia hypothesis “do not exclude each other but reflect two extremes out of a spectrum of different regional paleo-ecological histories” (154).

Similar to Colinvaux and de Oliveira, Hooghiemstra and Van der Hammen (1998) suggest that the origin of the Amazon tropical rain forest initiated with the onset of substantial uplift of the northern Andes in the mid-Miocene, which was a very significant geological event for the river migrations and drainage patterns of the Amazon Basin. They also pointed to the possible stimulation of floral evolution and biodiversity in some areas and the possible extinction of species in other areas because of time and space differences between salt water and fresh water ecosystems.

These alterations could have caused a “dynamic and diverse history for different geographical areas” within the Amazon Basin, the alterations resulting from sea-level change influenced by various climate events. The rise and fall of sea level led to alterations
in salt and fresh water eco-systems, which, in turn, led to the evolution and extinction of various fauna and flora.

In fact, these researchers concluded that extinction of plant taxa was possibly a more common phenomenon in the Quaternary than previously thought. In their conclusion, they said that the enormous modern phyto-diversity should perhaps be regarded as a legacy of the Tertiary rather than as a product of the Quaternary (Hooghiemstra 158).

Among the environmental stresses that were possible factors on the development of diversity in the Amazonian rain forest eco-system, Hooghiemstra and Van der Hammen also listed “precession-related changes” in the geographical position of the caloric equator, river dynamics “as the result of small tectonic movements,” and changes in temperature related to the series of ice ages (158). Precession refers to the movement of the axis of the Earth in which the axis traces out the figure of a cone during one complete precessional cycle over a period of approximately 26,000 years. The precessional cycle results in the alternating north-south displacement of the caloric equator (caloric: producing thermal energy).

Hooghiemstra and Van der Hammen’s position is a conciliatory one. In their conclusion, they emphasize that both of the competing scenarios could have occurred and did, in their opinion, occur in a region as extensive as the Amazon Basin (153).

Burnham (1999) did research that showed that the available pollen evidence from Amazonia does provide a useful inventory of many “canopy trees, shrubs, and understory herbaceous plants, identifiable mostly to genus” whereas the macrofossil evidence provides an inventory of these critical floral components (549).

The pollen evidence from the Amazon Basin showed that there was a mix of tropical rainforest and various tropical woodlands in the lowlands of northern South America in the latest Miocene Epoch and through the Quaternary (546). Possible temperature fluctuations of up to 6 °C in the late Tertiary and Quaternary Periods and rainfall fluctuations probably resulted in “a mosaic of habitats controlled by river migration, sea level fluctuations, local dryness, and local uplift” (546).
Burnham emphasized four major events that structured the neo-tropical vegetation in northern South America:

1. the rifting of South America from Africa in the Cretaceous Period (550)
2. the uplift and physiographic changes caused by the formation of the Andes mountain range during the Miocene (553)
3. the fluctuating closure and opening of the Isthmus of Panama and the resulting land connection between Central America and South America in the Miocene and the Pliocene (557)
4. the Quaternary climate fluctuations with their effects on temperature and sea level (566)

Burnham found that the formation of land connections between Central and South America had profound climatic and biogeographic consequences for the flora and fauna of both continents, and, generally speaking, she found more evidence for a southward migration of northern biotic components rather than the reverse (557). Moreover, she found that the establishment of the land connection seemed to be more significant for the evolutionary formation of new biological species of mammals than of angiosperms in South America (557).

Burnham’s analysis revealed that paleobotanical evidence shows predominantly tropical forest throughout the Cenozoic with the “establishment of the land bridge” having resulted in significant changes in the composition of South American upland forests (563).

In summary, the extensive biodiversity that characterizes the Amazon Basin is one of two major reasons why concerned scientists want to see a reduction in forest-clearing activities in the region. The other major reason is, as mentioned previously, that reductions in deforestation in the region will result in reductions in heat-trapping emissions.

In question is the benefit of the biodiversity of the Amazon Basin. Can a case be made for a preservation of the Amazon lowlands rain forest strictly on the basis of the benefits that can be expected to accrue from the flora and fauna of the region, a region in which it is estimated that one-third of the world’s tropical forests are found in Brazil (Lomborg 114)?
Cultural responses to environmental problems

Diamond’s book *Collapse*, sub-titled *How Societies Choose to Fail or Succeed*, is a comparative study of several civilizations that disappeared because the people who lived in them responded to environmental problems in ways that did not make sense and continued to respond in the same way long after it should have been obvious to them that the things they were doing no longer made sense, if, in fact, they had ever made sense.

In his book, Diamond (2005) wonders what the person on Easter Island who cut down the last palm tree standing on the island must have said to himself in order to justify cutting down the tree. If the effects of deforestation on Easter Island were not so tragic, the question would be funny.

Diamond asks whether, like modern-day loggers, the Easter Islander shouted: “Jobs, not trees!” And he wonders if the Easter Islander perhaps said to himself that there is no proof that there are no palms somewhere else on Easter Island, perhaps he said to himself that there needs to be more research, or perhaps he said to himself that a ban on logging is premature and driven by fear-mongering (Diamond 114).

Diamond suggests that the Easter Island society collapsed primarily because of environmental damage in the form of deforestation. Had the Easter Islanders lived elsewhere, perhaps they could have survived the severe deforestation that they practiced, but the Easter Island environment was too fragile; it had a colder climate, less rainfall, and slower plant re-generation than was the case on other Pacific islands. It could not sustain a civilization following so much environmental damage.

The important thing to take from the experience of the Easter Islands is that the people who continued to chop down the trees as the trees became increasingly scarce were, in fact, acting in a way that was *rational* when perceived from their individual short-term perspectives/gains. It was only in the long-term perspective of the collective group of Easter Islanders that continuing to chop down trees was irrational.

An example of this obstinate clinging to cultural activities that were inappropriate given the environmental conditions is the Greenland Norse people, about whom Diamond concludes that the Norse society’s social structure caused tension between the short-term interests of the people in power and the long-term interests of the Norse society as a whole (276). The Norse persisted in trying to raise cattle in Greenland so that they could eat beef in an environment that could not sustain cattle growing; they acted as though Greenland could sustain pasturelands in the same way that southern Norway had done. They made things worse for themselves by cutting trees and shrubs for firewood and by digging up hard-to-replace turf to insulate their homes.

Instead, the Norse could have imitated the Inuit people in Greenland who survived on a diet based on fish and burned seal blubber to provide heat and light. It was the unwillingness of the Norse to adapt to their environment that caused the failure of their
society in Greenland while the Inuit civilization survived. In the end, the cultural pretensions of the Greenland Norse led to their failure in Greenland. They would not survive by eating fish because eating fish was a way of life associated, in their mind, with a lower class of people. Thinking themselves to be people of quality, they wanted to eat beef rather than fish as much as possible.

Similarly, according to Diamond, the civilizations of the Polynesians of Pitcairn Island, the Anasazi of southwestern North America, and the Maya of Central America all failed primarily because of these societies’ choices about responses to various forms of environmental damage and climate change. Diamond shows how deforestation led to consequences much more severe in Haiti, on the western end of the island of Hispaniola, than in the Dominican Republic, on the eastern end of the island.

Diamond also shows how the environmentally unsound activities of modern-day, multinational corporations involved in oil extraction, mining, and timber activities have been rational choices when viewed from their corporate goals and aims. In fact, given the lack of governmental regulation and oversight, not to act as they have done would have been irrational as seen from the point of view of the corporations’ managers, and might even have been grounds for a charge of failure to fulfill a fiduciary duty to their shareholders. A popular mostly unchallenged assumption is that corporate managers owe nothing to society or the environment. Their only obligation is to the shareholders.

Clearly, the primary idea in Diamond’s book about the collapse of civilizations is the idea that our present-day modern industrial world’s cultural practices could lead to the same type of collapse experienced by earlier societies because of a failure to adapt to environmental conditions. Diamond’s focus on the interplay between the society (and the culture), on the one hand, and the environment, on the other hand, is especially relevant to the topic of deforestation in the Brazilian Amazon.

The Tragedy-of-the-Commons thesis

Addressing the issue of the rationality of the acts of individuals and the irrationality of aggregate actions, the ecologist Hardin (1968) formulated the concept of ‘the tragedy-of-the-commons’, the notion that individuals as well as individual organizations and societies, acting independently of one another and choosing rationally to further their own short-term self-interests, will end up destroying, in the longer term, the finite common resources available globally, thereby producing a result that is in no one’s best interest. This hypothesis, however, was never able to win widespread acceptance, possibly because it was not in the short-term interest of individuals to pay attention to it.

Hardin’s hypothesis, combined with Diamond’s observations about the folly of clinging to cultural values and activities that are not appropriate given the environmental context of the civilization, points up the need to take the dangers of deforestation in Brazil and in other tropical areas seriously. If we are going to deal with the dangers of anthropogenic degradation of the environment, we will need to understand the root causes
of deforestation and the choices that will need to be made, many of which are embedded in our cultural understanding of the world. At issue is how to analyze the dangers of anthropogenic degradation of the environment.

**Cost-benefit analysis and the precautionary principle**

Cost-benefit analysis seems to be one of those paradigms in the way many economists evaluate the efficacy of various approaches that is seldom questioned or challenged. The results derived from this paradigm are assumed to be true, and its universal applicability is taken for granted. This is not surprising.

At face value, cost-benefit analysis *does* seem useful and logical and even scientific. Most people would agree that decisions about any proposed activity should be made *only after* a calculation of the advantages and disadvantages; furthermore, they would agree that projects should be approved *only if* the benefits clearly are greater than the costs. In their private lives, people constantly apply a version of cost-benefits analysis to their decision-making process. They ask themselves: is the potential reward of this action worth the risk involved?

Ackerman and Heinzerling’s (2004) book on cost-benefit analysis, *Priceless: On Knowing the Price of Everything and the Value of Nothing* (2004) points out that whenever cost-benefit analysis, however useful it may seem in theory, is applied to health and safety and environmental protection issues, it has deficiencies that cannot be overcome (35). Their objections to the use (and misuse) of cost-benefit analysis to decide environmental policy are especially relevant to the topic of deforestation in the tropical rain forest. One objection is that, even though it is possible to measure, to some extent, the costs of not clearing forest, there is no realistic way of measuring all the benefits of not clearing forest, particularly the benefits that extend far into the future, into the lives of the children and grandchildren of people who are making decisions today (Rind 718).

A second objection is that there is no unbiased, scientific way of assigning monetary value to life itself and to individual lives. Life for most people is “priceless” and should be protected without a regard for cost or, at least, without cost’s being the most important factor in the decision to protect life or not (Rind 718).

Rind (2005) has summarized the objections to the use of cost-benefit analysis in deciding environmental policy questions into a catalog of larger issues (718-19):

- Costs of environmental protection are usually over-estimated.
- Benefits have been consistently under-estimated or neglected.
- Benefits are “mostly made-up, using ridiculous analogies, polls of how people think they would act in a given situation, or other completely indefensible measures” (see examples in Ackerman and Heinzerling [2004]).
- Risks, other than death risks, are often ignored.
• The needs and wants of the elderly and of everyone in future generations are devalued.

Rind says that cost-benefit analysis works well in physical sciences in which inputs and outputs are measurable and quantifiable. If a researcher knows, for example, how much energy is added to a system and what the heat capacity of the system is, the researcher can calculate the change in temperature. In such situations, cost-benefit analysis is independent of researcher subjectivity. The researcher evaluates the different terms in the equation, calculates the net result, and arrives at “the truth” (Rind 717).

In practice, however, when applied to health and environmental problems, cost-benefit analysis is anything but scientific (Rind 718). Rind says that cost-benefit analysis becomes the antithesis of science when it is applied to equations in which one of the two major terms, the benefits term, is “basically unknown, and becomes subject to personal biases, held captive to the intentions of the individuals making the assessment. Under the guise of the scientific method, cost-benefit analysis is employed to carry out a specific agenda” (719). What Rind calls personal biases are often ideological biases.

In their book, Ackerman and Heinzerling (2004) provide thought-provoking examples of decision-making in the areas of health and safety and environmental policy that involve one or more of the above deficiencies of cost-benefit analysis. Moreover, Ackerman (2005) states that the seldom-challenged economic practice of “discounting” in calculating the monetary value of future benefits “distorts and trivializes future health and environmental outcomes” (Ackerman, “Priceless Benefits”).

It is not surprising that the practice of discounting is as infrequently called into question as is the practice of cost-benefit analysis. On its face, discounting makes sense and seems scientific to the layperson. Most people know that a dollar will buy more today than it will in the future due to inflation. For calculating short- and medium-term financial gains, discounting is a useful tool. What is puzzling is that academics, who are supposed to be concerned with exposing and challenging fallacious ideas, do not see the problems caused by the inappropriate application of discounting to environmental problems and are willing to “discount” the value of rain forests to future generations.

Ackerman (2005) states that a conceptual error is made when discounting is used to do cost-benefit analysis of issues such as global warming and climate change. Discounting is useful whenever an individual or a corporation is weighing the present costs with later benefits and then accepts the trade-off: endure costs now for benefits to be enjoyed later. However, in the case of deforestation, there is no individual or corporation who will have “personal experience of both the costs of climate change mitigation today and the benefits that will be enjoyed one hundred years from now” (Ackerman, 2005). What is needed, says Ackerman, is a different method for decision-making, one that will take future generations into consideration in a meaningful way.
Rind (2005) shows how the costs of not opening federal forest land to development can be calculated and shows that most of the benefits can be seen to be invaluable but are either unimaginable or incalculable or both, given present levels of knowledge (720). He then goes on to illustrate the inappropriateness of cost-benefit analysis when applied to decision-making about global warming.

Rind (2005) acknowledges that the costs of keeping CO$_2$ levels from doubling are considerable, but then he explains many of the expected consequences of not slowing down the rate of global warming – impacts on human health, especially mosquito- and water-borne diseases; impacts on agriculture and food production and nutrition; impacts on fishing and marine ecosystems, including coral reef systems; impacts on power generation; impacts on sea level; and impacts on biodiversity. He cites a study that estimates a reduction of between 15% and 37% in biodiversity by the year 2050 (724). Rind shows that the monetary value of these changes due to global warming will also be enormous and can only be calculated with very wide confidence intervals because some things simply cannot be measured and others require funds and information that just aren’t available (726).

Ackerman and Heinzerling (2004) do offer an alternative to the use of cost-benefit analysis for the approval or denial of health and safety as well as environmental protection policies. Their preferred approach would be based on the “precautionary principle” (223-29). This principle is predicated on the notion that, if a proposed policy or practice is suspected of causing harm, and even if consensus that the policy or practice would be harmful is lacking, do not go ahead with the policy or practice until those who think the policy or practice is not harmful have demonstrated its safety. Cost-benefit analysis, if applicable, should be one factor among many in the decision-making process; the “inestimable values of life, health, the potential for suffering, and the preservation of our natural environment must be considered as well” (Rind 731-732).

The precautionary principle is not without its critics. They claim that it is too vague or that it is too rigid (O’Brien 2003). They also point out that, in many cases, both sides of a decision entail risk (Sunstein 2008). Both taking or not taking action can be risky. Furthermore, they suggest that the precautionary approach does not give decision-makers a precise method for calculating the relative risks of no action versus action (Powell 2010).

To some critics, the argument about the relative merits of the cost-benefit analysis method and the precautionary principle approach is an argument with a basis in psychology. How much risk are decision-makers willing to take? Adherents of the precautionary principle are risk averse (Sunstein 2008). Adherents of cost-benefit analysis method are willing to take risks. They use cost-benefit analysis to do a risk assessment that can be used to legitimize the taking of the risk that they want to take.

The precautionary principle is just a principle; it is not a method. In essence, it says: do not require that there be decisive, unambiguous proof of risk or harm before prohibiting or limiting an action (Sunstein, 2008). In the case of actions that may cause
delayed risks or irreversible risks, if there is doubt about the safety of an action, it is better to limit or prohibit the taking of the action.

In the case of environmental degradation caused by the deforestation of the tropical rain forest, the risks involved in reducing the extent of carbon sequestration and involved in reducing the diversity of species on Earth may still be debated, but it is clear that there may be delayed and irreversible damage caused by clearing forests.

The precautionary approach says that we should limit the clearing of forests to sustainable levels so that the impacts are reduced to a low level. Advocates of the cost-benefit analysis approach may argue that no or limited deforestation will have severe impacts on local, regional, and global economies; however, it can be seen that their arguments are generally self-serving and should be regarded with skepticism.

In the argument about deforestation, the precautionary approach is intended to serve the common good and the good of future generations, and the cost-benefit analysis method has been used to serve special interests and/or short-term gain.

Rind (2005) points out that American decision-makers did not use cost-benefit analysis when they decided to wage a war on terrorism after 9/11. Nor did they use cost-benefit analysis when they decided to wage a cold war against the Soviet Union and its allies. Had they done so, they might well have decided that the costs were exceedingly high compared to the probability of successful terrorist strikes or the probability of the Soviet Union’s actually attacking Western Europe or the United States. They might well have procrastinated and ordered more studies and waited for increased scientific certainty before authorizing big expenditures, just as they have done when faced with predictions of the consequences of global warming. Instead, in these instances, they used the precautionary approach that Ackerman and Heinzerling (2004) would like to replace cost-benefit analysis with in situations involving health and safety and environmental protection (Rind 729).

The same logic applies to decision-making about global warming, which has, says Rind, all of the elements of risk that Americans are unwilling to accept. The hazards posed by global warming are “unfamiliar, uncontrollable, involuntary, inequitable, dangerous to future generations, irreversible, man-made, and potentially catastrophic” (731). A precautionary course of action is necessary to minimize the risks of global warming. But, as will be seen in chapter four, a cost-benefit analysis, such as that advocated by the Danish statistician Lomborg (2001), concludes that we should wait, do nothing expensive about global warming, and spend the money on other problems instead.

The bias of cost-benefit analysis, when it is applied to topics such as deforestation, tends to “equate ever-present uncertainty with zero cost” (Rind 728). Cost-benefit analysis becomes, then, a “prescription for doing nothing to ward off almost any future environmental catastrophe. It values economic considerations above all others, including human health and the health of the flora and fauna on this planet” (Rind 728).
In such areas as health and safety and environmental protection, good choices can be made without the “benefit” of cost-benefit analysis (Ackerman and Heinzerling, 2004); the Clean Air Act of 1970 is an example. The precautionary principle is a better choice than the cost-benefit analysis model. Ackerman and Heinzerling (2004) ask: if we know that atrazine causes abnormalities in frogs, should we continue to use it until it is proven to harm humans, or should we stop using it until it proven safe? (224).

Diamond answers that biologists “should not bear the burden of proof to convince economists … [overly optimistic economists] … that the extinction crisis is real. Instead, … those economists … [should] … fund research in the jungles that would positively support their implausible claim of a healthy biological world” (as quoted in Lomborg [2001], p. 256).

As will be seen, one of the big choices that will need to made is the choice between the use of cost-benefit analysis or the precautionary principle for decision-making and prioritization of environmental projects.

The extent of deforestation in the Brazilian Amazon

An understanding of the relationship between acre, hectare, and square kilometers is necessary to appreciate the extent of the deforestation in the Amazon Basin. For Americans, it is probably easiest to visualize the area of an acre and the area of a hectare in terms of the area of an American football field, i.e. the area of the field inside the out-of-bounds lines (see Table 3).

**Table 3**
Comparison of acres, hectares, and square kilometers.

<table>
<thead>
<tr>
<th>Field</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>American football field</strong></td>
<td><strong>5,333 square yards</strong></td>
</tr>
<tr>
<td></td>
<td>(100 yards long × 53.33 yards wide)</td>
</tr>
<tr>
<td><strong>Acre (= 0.4 hectare)</strong></td>
<td><strong>4,840 square yards</strong></td>
</tr>
<tr>
<td><strong>Hectare (= 2.47 acres)</strong></td>
<td><strong>11,955 square yards</strong></td>
</tr>
<tr>
<td><strong>Square kilometer</strong></td>
<td><strong>1,195,990 square yards</strong></td>
</tr>
</tbody>
</table>

(= 100 hectares and 247 acres)
From this table, it can be seen that the area of an acre is approximately 90% of the area of an American football field, and the area of a hectare is approximately 225% the area of an American football field. The area of a square kilometer, on the other hand, is equivalent to the area of approximately 225 American football fields.

Most forest clearings are reported in hectares or in square kilometers. One hundred hectares is equivalent to 1 km²; one thousand hectares of forest covers the same area as 10 km². Similarly, one thousand hectares of forest covers 2470 acres.

With these relationships in mind, it is time to look at the data related to forest area in Brazil in the period from 1990 to 2010 (see Table 4).

Table 4
Change in forest area in Brazil, 1990 – 2010.

<table>
<thead>
<tr>
<th>Year</th>
<th>Forest Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>569,855,000 hectares</td>
</tr>
<tr>
<td>2000</td>
<td>540,767,000 hectares</td>
</tr>
<tr>
<td>2005</td>
<td>524,729,000 hectares</td>
</tr>
<tr>
<td>2010</td>
<td>512,104,000 hectares</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Change</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990-2000</td>
<td>-5.1%</td>
</tr>
<tr>
<td>2000-2010</td>
<td>-5.3%</td>
</tr>
<tr>
<td>2005-2010</td>
<td>-2.4%</td>
</tr>
</tbody>
</table>


The positive development is that the rate of loss of forest has declined in the period from 2005 to 2010. Whereas the rate of loss for the last decade of the 20th century and for the first decade of the 21st century was above five percent, the rate of loss was reduced to less than half of five percent during the five years from 2005 to 2010.

The reduction in the rate of loss of forest was necessary if significant portions of the rain forest were not to be degraded by the end of the 21st century. A rate of five percent loss per decade would have resulted in a loss of nearly half of the forest by the end of the 21st century, with consequences that are difficult to predict and assess accurately and that are even more difficult to weight properly. Even at the 2005-2010 rate of loss, a very considerable area of forest will be lost by the end of the 21st century, and some college students completing their degrees in 2010 will have children who will be alive at the end of the 21st century, so the question of how much to discount the loss of the benefits of the Brazilian rain forest for that succeeding generation is not an abstract question.

In the 2005-2010 period alone, at the lower rate of loss, 12,625,000 hectares were lost. That loss corresponds to a loss of 126,250 square kilometers of forest. For Americans, that loss translates to a loss, in a span of five years, of 28,406,250 football fields, a number so large that it is difficult, if not impossible, to visualize.
Chapter 2

The rationale for the study

To get a picture of the size of the problem of deforestation in the world today, Geist and Lambin (2002) investigated and analyzed case studies (n = 152) on the net loss of tropical forest cover in an effort to find patterns in the causes and underlying driving forces of deforestation in the tropics. Their data show that the primary causes of deforestation were agricultural expansion, wood extraction, and infrastructure expansion, all of which correlate positively with population growth and population expansion into regions not previously inhabited, or only sparsely inhabited, by humans as an independent cause. 81% of the case studies (55 in Asia, 19 in Africa, and 78 in Latin America) showed that the underlying forces behind the deforestation were economic factors (146).

Among these factors were the increasing international demand for timber, the need for agricultural exports (cash crops, e.g. beef and soybeans), the exploitation of low local costs for land, labor, and fuel, and the availability of international capital for investment. Institutional factors (pro-deforestation policies) were present in 78% of the case studies, technological factors (wasteful logging practices, new agricultural advances) were noted in 70% of the case studies, cultural factors (lack of environmental consciousness or concern) were seen in 68% of the case studies, and demographic factors (in-migration of colonizing settlers) were seen in 61% of the case studies (146-148).

Mann and Kump (2009) pointed out that the best estimate of greenhouse gas emissions by type of economic activity for the year 2004 shows that forestry activities accounted for over 17% of the total (159) as shown in Figure 2. The forestry emissions came primarily from the combustion of timber and from the gradual decay of lumber used in construction, both of which release CO₂ into the atmosphere (174).

From 1990 to the present, the developing world has been aggressively cutting down and burning trees in South and Southeast Asia, in Africa, and in South America (Mann, 2009). Every year, in the period between 2000 and 2005, a forest area equivalent to the size of Ireland has been lost to deforestation. As a result of the large-scale deforestation, the world-wide emission of greenhouse gases from forestry, primarily from the burning of trees and the decomposition of trees, increased by nearly a half (Mann, 2009).

Figure 2 below illustrates greenhouse gas emissions by type of economic activity. The forestry sector accounts for more emissions than the transport sector, which is the sector of cars and trucks. Forestry also releases more greenhouse gases than either agriculture or maintenance of buildings around the world. Forestry ranks third behind the energy producing sector and the industrial production sector.
Coe et al investigated the causes and driving forces of deforestation in Brazil, and they found that the primary causes were and are the development of market economies and the expansion of permanently agricultural land for food, by which they mean decision-making based largely on national and global economic opportunities and/or policies. The economic opportunities referred to are the opportunities to make short-term private profits by agricultural expansion, wood extraction, and infrastructure expansion (149-150).

Table 5. Relative % of causes of tropical deforestation. Source: Coe et al. (2009)

<table>
<thead>
<tr>
<th>Causes</th>
<th>All cases</th>
<th>Asia</th>
<th>Africa</th>
<th>Latin America</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Single-factor causation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agricultural expansion</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Wood extraction</td>
<td>1</td>
<td>-</td>
<td>11</td>
<td>-</td>
</tr>
<tr>
<td>Infrastructure expansion</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Two-factor causation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agro-wood</td>
<td>15</td>
<td>22</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Agro-infra</td>
<td>20</td>
<td>6</td>
<td>11</td>
<td>32</td>
</tr>
<tr>
<td>Agro-other</td>
<td>3</td>
<td>2</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>Wood-infra</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Wood-other</td>
<td>1</td>
<td>-</td>
<td>6</td>
<td>-</td>
</tr>
<tr>
<td><strong>Three-factor causation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agro-wood-infra</td>
<td>25</td>
<td>38</td>
<td>11</td>
<td>19</td>
</tr>
<tr>
<td>Category</td>
<td>4</td>
<td>7</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Agro-wood-other</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agro-infra-other</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>Wood-infra-other</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Four-factor causation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All four-factors</td>
<td>20</td>
<td>22</td>
<td>26</td>
<td>18</td>
</tr>
</tbody>
</table>

Fearnside et al (2009) supplemented Coe’s data by showing that Brazil’s Amazon forests stayed more or less intact until the expansion into the interior of the country with the Trans-Amazon Highway in 1970. Especially since 1991, deforestation rates have shown an upward trend, with the clearing of forests maintaining a rapid pace (680). Cattle ranching is the predominate cause identified by Fearnside and his colleagues.

Large and medium-sized ranches account for about 70% of the clearing activity in the Amazonian rain forest (Fearnside 2009). Other important causes of deforestation are the logging industry and the ground fires that are facilitated by logging. Fearnside et al pointed to the loss of biodiversity, to reduced water cycling (and rainfall), and to contributions to global warming as major acts of degradation of the environment.

Ferraz et al (2005) then added detail to the data of Coe (2009) and Fearnside (2009) by using Landsat images of the central region of the state of Rondonia, Brazil, one of the hardest hit states in terms of deforestation, spanning the period 1984-2002, to assess landscape and land-use changes. They monitored the historical change in three major land cover types: mature forest, secondary forest (which is forest that has re-grown after logging, clearing, or burning), and pasture.

In the 1984-2002 period, the researchers noticed a systematic change in use from forest to pasture and computed an annual average rate of deforestation through logging and clear-cutting of about two percent. The most extensive land-use change, which was between secondary forest and pasture, was caused by the practice of slash-and-burn (Ferraz et al., 2005).

Roughly speaking, the researchers saw a decline in the relative percentage of mature forest area in Rondonia from approximately 66% before 1984 to a little less than 25% in 2002 and a corresponding increase in pasture area from approximately 19% in 1984 to approximately 66% in 2002. Ferraz et al (2005) noted that the critical point seems to be 35% mature forest.

Maintaining this threshold, they say, should be an important target for conservationists in Rondonia. At present rates, they predict complete deforestation in the region within 15 years (Ferraz et al., 2005).
Figure 3 below shows the dynamics of the landscape change in the region over the nearly 20-year period. The rates of change shown in the figure are the annual average rates of change that Ferraz and his team calculated.

![Diagram](image)

Figure 3. Mean annual land use dynamic rates 1984-2002.
Source: Ferraz. “Landscape Dynamics.”

In a second study, Ferraz et al (2009) identified and used four indicators to determine which areas in the central region of Amazonian Brazil require priority for conservation activities and which areas require different conservation strategies. The four indicators that they applied to the data for the period 1984 to 2002 in order to analyze major land-use changes are:

- Annual deforestation rate
- Secondary forest mean proportion
- Mean time since deforestation
- Deforestation profile curvature

Especially of note in this research is the report on the expansion of commercial soybean production in Brazil. The researchers say that soybean fields (which involve intensive agriculture) bring with them a different set of dynamics than do pasture fields for the feeding and fattening of beef cattle (Ferraz et al., 2009). This is most likely due to the fact that grasses prevent soil erosion in a way that soybeans do not.

Jha and Bawa’s data come not just from Brazil but from the study of 30 countries in Asia, Africa, and Latin America, which have within their borders one or more of the so-called biodiversity hotspots. These hotspots take up only 2.3% of Earth’s land surface but contain an estimated 50% of the world’s vascular plants species and 42% of the world’s species in four vertebrate groups.

Not surprisingly, 16 of the biodiversity hotspots are in the tropics (Jha 907-908). Conservation of biodiversity thus joins the prevention of greenhouse gas emissions as a compelling reason for limiting the extent of deforestation in the Brazilian Amazon.
Jha and Bawa (2006) compared the average rates of three indicators for 30 countries: population growth, human development index (which includes income level, education level, and public health level), and deforestation. Then they computed the correlation coefficients among these variables. They found that high population and low human development, in the form of advancement in scientific and technological knowledge among other things, may cause high rates of deforestation, but they also found that an increase in human development may reduce deforestation despite high population growth due to the effect of scientific understanding and more knowledge of patterns and relationships being brought to bear on the problems caused by deforestation. They noted that the decrease in deforestation related to increases in human development may vary from country to country because of the economic policies of the individual countries. Policy-induced deforestation should be the target for conservationists.

Jorgenson (2006) tested the hypothesis that less-developed countries with higher levels of exports as compared to more developed countries will have higher rates of deforestation. His analysis showed that the evidence warrants accepting this hypothesis after all other variables that might influence deforestation have been controlled for. He used a weighted index that quantified the relative extent to which less-developed countries sent exports to more developed countries, and then he applied the weighted index to a series of cross-national analyses of deforestation. Moreover, there was also evidence to support the claim that increased agricultural export intensity causes more deforestation in less developed countries (707). The next step is to apply the weighted index to analyses of the effects of exports on greenhouse gas emissions, loss of biodiversity, and organic water pollution (707).

Strassburg et al (2009) developed a compensatory mechanism to provide combined incentives to developing countries to reduce emissions from land-use change. Then the researchers simulated the operation of the compensatory mechanism in the top 20 developing countries ranked by forest area to see what sort of reduction in emissions could be realized.

Their results show that REDD (Reducing Emissions from Deforestation and Degradation) can be a very cost effective option for mitigating climate change. They estimated that cash or credit incentives, to get people and nations to stop or slow the clearing of forests, on the order of 20 billion American dollars per year, could stop or reduce 90% of the global emissions from deforestation. They also found that the total cost of about eight US dollars per ton of CO$_2$ is very low as compared with estimates of the costs of other options for reducing CO$_2$ emissions (Strassburg et al., 2009).

Warren et al (2009) set out to investigate how future trends in tropical deforestation could inhibit or enhance the ability of humans to meet the atmospheric CO$_2$ stabilization levels that will be necessary to limit the rise of the average global temperature $\leq 2$ °C above the average global temperature in pre-industrial times.
The researchers analyzed four different scenarios involving differing future rates of deforestation, and they concluded that unless strong policies for stopping deforestation are implemented, the probability of achieving the 2 °C target is very low, regardless of how forcefully humans take action on controlling fossil-fuel emissions (Warren et al., 2009).

Summary of the journal literature

The work of the authors of the peer-reviewed journal articles summarized above has pointed to agricultural expansion, timber extraction, and infrastructure expansion as the immediate causes of deforestation in the Brazilian Amazon and to population growth and expansion, not just in Brazil but globally, as an underlying cause. Agricultural expansion on medium-sized and large ranches developed for the purpose of producing cash crops such as beef cattle and non-genetically modified soybeans for export has played a major role in the deforestation in the region.

Specifically, the journal literature shows that the development of mostly unregulated national and global market economies, combined with corporate decision-making to make short-term private profits whenever and wherever possible, has contributed considerably to deforestation in the region. Individuals and corporations acting rationally in the pursuit of their own short-term private advantages have contributed to the partial destruction of a vast public good, the rain forests of the Brazilian Amazon; an irrational outcome that is not in the best interest of current or future generations.

The consequences of deforestation have been increased emissions of greenhouse gases and the irreversible loss of biodiversity in one of the world’s most diverse regions. The extent of the contribution of deforestation to global greenhouse gas emissions is so great that slowing or stopping the anthropogenic degradation caused by deforestation must be included in the overall effort to influence global warming and climate change.

Given the importance of the issue of deforestation, it is critical to investigate what the authors of recently published monographs on the subject have had to say (and have failed to say) about the causes and consequences of deforestation in the Brazilian Amazon.
Chapter 3

Methodology

The methodology applied in this honors thesis is a qualitative research methodology; it is a variation on the traditional content-analysis methodology in which texts are analyzed for authenticity and meaning. The books analyzed have been selected because they represent diverse perspectives on the topic of deforestation. Specifically, the content of the books has been examined and analyzed to see if the texts show evidence of ideological bias. A two-pronged test has been applied to each text:

1. The *cui bono* test. Does the presentation of the ideas about deforestation benefit particular groups in the world community and harm or neglect other groups?

2. The *unquestioned assumptions* test. Does the presentation of the ideas about deforestation take certain positions for granted and does not question their veracity?

Stakeholders’ rubric

To do a study of who benefits from and who is harmed or neglected by specific presentations of facts and assumptions, it is necessary to have in mind a list of the stakeholders in society. For the purpose of many studies, the stakeholders in society can be identified as belonging to one of the following social groups:

- Members of the privileged class
  - Corporate investors
  - Corporate managers
  - Owners of considerable tracts of land and property
- Members of the middle class
  - Professionals
  - Businessmen
  - Middle managers
- Members of the working class
  - Wage-earners
- Members of the poor class
  - Unemployed people
  - People not earning a livable wage
- Members of the prison class
- Children
- Members of unborn future generations
For the purpose of this thesis, however, it is more meaningful to use a rubric that focuses on the following stakeholders who have, in one way or another, a vested interest in the form and content of the information about deforestation:

- Leaders of developed countries and leaders of developing countries
- Economists/developmentalists and environmentalists/conservationists
- Free market advocates and advocates of market regulation
- Cost-benefit-analysis advocates and precautionary principle advocates

It is frequently the case that some stakeholders will benefit from, and others will be harmed by, the manner in which information is included or excluded, the way in which information is presented, and the way in which some information is given more emphasis than other information. To a very real extent, the bias thus revealed may be an unconscious reflection on the part of the author (and the publishing house), and of the social, political, and economic circles in which he or she moves.

Reading to identify taken-for-granted assumptions and unquestioned assertions is important if ideas are to be important in a democratic society. Some assumptions may be seen, upon examination, to be relatively harmless and unimportant; nevertheless, unquestioned assumptions need to be challenged. For example, the idea that the news media that are totally dependent on corporate advertising for their existence can present comprehensive and objective news reporting is a largely unquestioned and unchallenged assumption in contemporary American society.

The purpose of this thesis is to evaluate whether the various stakeholders listed above benefit from or are harmed by the presentation of the information in the books about deforestation in the Brazilian Amazon between 2000 and 2010. It is not the purpose of this thesis to evaluate whether any one or more than one stakeholder has a more legitimate claim about deforestation than the other stakeholders do.

Books to be examined

The books selected for analysis in this honors thesis are:


The books have been chosen for analysis because they present different perspectives. The following points of view are represented in these books:

- an academic researcher specializing in international forest politics (Humphreys)
- an environmental economist working for the World Bank (Margulis)
- an economist directing an environmental think tank in South America (Andersen)
- an economist directing an environmental organization in Brazil (Campari)
- an environmentalist and United Nations researcher (Barraclough)
- a statistician and author of cost-benefit analyses of world problems (Lomborg)
Chapter 4

In this chapter, the analysis and findings chapter, the focus is on who the researcher is, what his or her main points are, and which groups of stakeholders benefit or are harmed or neglected by the way in which the issue of deforestation is presented. The first author to be considered is the academic researcher, Dr. David Humphreys.

*Logjam: Deforestation and the Crisis of Global Governance* by David Humphreys. 2006.

**Who the author is:**

At the time of the publication of his book, David Humphreys was a senior lecturer in Environmental Policy at the Open University in Great Britain and the director of the Open University’s Geography department. He holds a Ph.D. in international forest politics from City University (London).

**What the author says:**

Humphreys’ basic position is that deforestation in the tropical forests of the world is a serious “systemic” problem that needs to be addressed. He refers his readers to a major study published in *Nature* in April 2006 that found that “current trends of agricultural expansion and deforestation in the Amazon indicate that, by 2050, 40 percent of the Amazon forests will be lost, with one quarter of the 382 mammalian species examined losing two-fifths of their Amazon forest ranges.” Humphreys says that “global environmental degradation” is the most critical public welfare issue of our age (xv).

When Humphreys says that “the global loss of forest cover is a systemic problem” and that an “exclusive focus on the details of policy will … lead only to incremental improvements in forest quality while ignoring the deep driving forces of deforestation” (xvi), he is implying that the problem of deforestation is both a symptom and a characteristic of the dominant social system in the world today: the neoliberal global economic system that “promotes private sector investment in forests, international trade of forest products, and the voluntary regulation of the private sector” (xvii).

Neo-liberalism’s core assumptions, says Humphreys, are: “privatization, reduced state regulation, voluntary governance, and market solutions … Neoliberal policies have failed to halt deforestation as they have both failed to address its root causes and, by supporting the expansion of global capital, have promoted further deforestation.” In particular, “neoliberal principles, such as promoting international trade in forest products and enhancing private sector forest investments” explain the deeper penetration of forests (216).

The dominance of the neoliberal global economic system has “enabled corporations to gain ownership of previously public forests while deregulation has freed corporations from public oversight. The combination of these two processes has fuelled deforestation,
which is a symptom of a broader pattern of commons enclosure, both of land, and, through patents, of biological resources … [in which] … corporations are penetrating a range of formerly public spaces, including common water resources in developing countries, publicly funded academic research, mineral resources on public lands, and public sector broadcasting” (218).

Enormous economic power is now concentrated in transnational corporations. They have attained a position of equality with nation states. “The per capita consumption of forest products in the developed countries far exceeds that in the developing world (emphasis added)” (217). Particularly in the United States, “the aims of the corporation and the state have become fused” (219, emphasis added), so there is little hope of effective public regulation of the use of formerly public spaces, such as forests.

Nor is there much hope for regulation by international agencies. Humphreys says that the International Monetary Fund and World Bank have put through structural adjustment policies that emphasize debt repayment by developing countries in the world with the consequence that “the costs of economic adjustment fall on nature and the poor” (217). Moreover, “the increased influence of corporations in international negotiations has led to what may be termed the ‘privatization’ of the United Nations, in which international agreements reflect the preferences of the business sector” (218).

Humphreys says that international trade law and international investment law have more strength than international law on the environment and on human rights. Furthermore, he says, the conditions that the World Bank policy has imposed on developing countries with regard to their macroeconomic adjustment are more important to Bank shareholders and managers than any conditions that the World Bank might impose on developing countries with regard to the safeguarding of environment and human rights (220).

Humphreys borrows from Hardin’s (1968) paper on the tragedy of the commons for his analysis of the causes and consequences of deforestation. He points out that “each individual user of a local common has a short-term interest in over-exploiting the resource.” This type of analysis is relevant both for “open access resources that belong to no one” and for resources where the owner is absent or not paying attention, and it applies to “well-managed commons that have been undermined by outside groups that are powerful enough to ignore the traditional rights of commoners and treat the resource as open access” (4-6).

Forest degradation in the 20th and 21st centuries has been “the result of the enclosure of commons by state and private interests, who overexploit the forests for economic gain and who have a totally different relationship to the forest than the commoners whom they displaced” (7). For Humphreys, forest degradation is the tragedy of “uncontrolled access to the forest by interests that ignore traditional land claims” and treat forestland as nobody’s property” (7).
The problem of deforestation is exacerbated by the willingness of the state to aid in the “encroachment by outsiders” through government-led “development programmes, international aid for forest-based industries, and forest conversion … Often, the state legitimizes interests from outside the forest by providing them with legal title to forestland, particularly when such interests may engage in economic activities that can be levied or taxed” (8). “The conflict between communal ownership of local commons regimes and the legal title that is granted by the state remains central to forest politics” (8). “Now most of the world’s forests are controlled by a government agency on behalf of the state, which … has tended to adopt a utilitarian approach to forests as revenue sources” (9).

Who benefits/who is harmed by the author’s presentation of information?

In accordance with the stakeholders’ rubric outlined above, it can be seen that environmentalists and conservationists stand to benefit from Humphreys’ analysis as they gain a deeper understanding of the underlying systemic causes of deforestation. Leaders of developing countries stand to benefit more from the analysis than do leaders of developed countries. Advocates of a relatively unregulated free market system in which transnational corporations can operate as they please would seem to be harmed by the presentation of this information as it calls into question the basic tenets of the neoliberal global economic system that benefits the transnational corporations. Humphreys is clearly more in favor of the precautionary principle than the cost-benefit-analysis approach.

What assumptions are taken for granted and not questioned by the author?

Humphreys appears to assume that adequate reform is not possible within the parameters of a global economic system that is based on short-term profit and that secures its profit through the government initiatives of privatization, deregulation, voluntary compliance with environmental protection measures, and market solutions. Additionally, he suggests that corporate investors and managers benefit more from the neoliberal global economic system than do those people who are not able to be investors in or managers of transnational companies.

Humphreys seems to assume, furthermore, that the solution to the problems of environmental degradation caused by corporate excesses can be found in a synthesis of the following two positions:

- Accepting globalization, but establishing global regulatory institutions to hold corporations accountable for their actions
- Replacing globalization with localization

By synthesis, Humphreys favors enabling much more local control but within a context of global regulation of public goods, such as forests.
The Economics of Deforestation in the Amazon: Dispelling the Myths by Joao Campari. 2005.

Who the author is:

Campari is the director of the Brazilian chapter of the Nature Conservancy, a leading conservation organization, founded in 1951, that works around the world to call attention to and find solutions for conservation threats. Its goal is to find what it calls “non-confrontational, pragmatic solutions” to conservation challenges by partnering with indigenous communities, businesses, governments, multilateral institutions, individual landowners, and other non-profits.

Campari has earned a master’s degree and a Ph.D. in environmental economics and natural resources management from the University of Texas - Austin. His book was published by Edward Elgar Publishing, which was founded in 1986 as a family-owned publishing house with offices in Cheltenham, England, and in Northampton, Massachusetts. Edward Elgar specializes in the fields of economics, law, business and management, public and social policy, and the environment. It publishes research monographs, reference books, and upper-level textbooks.

What the author says:

In line with the philosophy of the Nature Conservancy, Campari is much less explicit than Humphreys about the relationship of the dominant global economic system and the environmental degradation of the Brazilian rain forest. Campari’s big point is that deforestation in the Amazon is a “source of private economic gains, frequently substantial, at the same time as it imposes negative externalities, or social (environmental) costs associated with deforestation.” An externality is a positive or negative economic outcome that affects a person or group not involved in the economic transaction that causes the externality.

The message to potential investors in forest lands that would need to be cleared for agriculture or ranching is that “deforestation leads to a win-lose situation” (Campari 2) with the wins coming from profits from successful agriculture or ranching or speculation in land markets and the losses coming from the damage to the environment and to future generations who will receive a much depleted rain forest region.

Campari says that, since at least 1991, most of the deforested land is held by large farmers and ranchers and that most clearing takes place on large farms and large ranches (146-7). A major focus of his book is the rejection of the turnover thesis of deforestation, a thesis that holds that small itinerant farmers, who buy forest land, clear and burn the forest area, and then sell the cleared land after a few years of not very successful farming or ranching, are the ones who cause the most deforestation (3). In fact, says Campari, the productivity of the cleared rain forest areas has been underestimated.
Campari can demonstrate that, in most places, deforestation is the “outcome of high productivity farming and is not associated with turnover” (186). Therefore, while improved farming and ranching techniques do reduce turnover, they accelerate deforestation (4).

What Campari neglects to research is the extent to which rain forest land has been cleared to enable agriculture and ranching for foreign export as opposed to cleared to enable agriculture and ranching for local consumption. Moreover, his study makes no attempt to assess how much agriculture and ranching in the Brazilian Amazon benefit the local standard of living and how much each costs the world in social and environmental costs.

Campari is more concerned with the question of whether the original colonist settlers or the buyer newcomers have caused the most deforestation. He should perhaps be more concerned about the influence of growing domestic populations and growing foreign markets.

Taking his lead from Hardin, Campari points out that the behavior of farmers in deforesting rain forest lands has been “not irrational” given the influence of “specific government policies that promote deforestation and penalize conservation” (56).

The current law in Brazil does seem to require that 80% of Amazonian land on each individual property has to be set aside for conservation, leaving only 20% that can be cleared. However, as Campari points out, even though Brazil has seemingly good legislation that regulates forest use, the governmental agencies that exist are not “sufficiently strong and resourceful to enforce the law” on each property (207). The result is “excessive total deforestation” (207).

Who benefits/who is harmed by this presentation of information?

Using the stakeholders’ rubric to evaluate Campari’s positions shows that he is more on the side of the environmentalists/conservationists, as might be expected of the director of the Nature Conservancy in Brazil, that he is more concerned for the welfare of the developing countries, that he recognizes the social and environmental need for regulation of the free market system, and that he is more inclined to the precautionary principle with respect to deforestation than to the cost-benefit analysis.

What assumptions are taken for granted and not questioned by the author?

Campari seems to assume that there is little to be gained by challenging the dominant global economic system. Instead, he seems to assume that it is best to work within the existing economic system to convince corporate and governmental partners to take the issue of deforestation seriously. After all, it is also their climate and their environment that may be irreversibly altered.
The Dynamics of Deforestation and Economic Growth in the Brazilian Amazon by Lykke E. Andersen. 2002.

Who the author is:

Andersen is the director of the Institute for Advanced Development Studies in Bolivia. She holds a Ph. D. in Economics from Aarhus University in Denmark. She has worked on development projects for more than 10 years, living and working in Denmark, the United Kingdom, Kazakhstan, the U.S.A., Brazil, Nicaragua and Bolivia. She speaks English, Spanish and Danish fluently, and reads German, Portuguese and French.

According to information on the Grupo Integral S. R. L. website, Andersen has worked as a consultant for the World Bank, for the Inter-American Development Bank, for the Andean Development Bank, and for various United Nations Organization agencies. She has also worked as Chief Economist at the Institute for Socio-Economic Research at the Bolivian Catholic University, and she has served as editor for the Latin American Journal of Economic Development.

Based on her educational and employment record, Andersen seems better qualified than any of the other authors in this study to combine the perspectives of an economist with the perspectives of an environmentalist. Like Bjørn Lomborg, she is a Dane by birth.

What the author says:

Andersen starts out by acknowledging that opinions vary considerably along a continuum of points of view, along a continuum that has as its two poles “the school of defenders of global ecological services (‘conservationists’) and the school of development interests (‘developmentalists’)”(1). Developmentalists, generally, try to defend the position that developing countries such as Brazil should have the same sovereign right to cut down their own forests and benefit economically, here and now, from the exploitation of the forest areas in the same way that the developed countries did during past centuries.

Conservationists, on the other hand, worry that, at present rates of deforestation, the forests may be “irreparably depleted long before a full scientific understanding of the implications of that loss is achieved” (Andersen 2). Moreover, conservationists defend the position that the “long-run value of an intact forest is much higher than the value of alternative land uses” (Andersen 2). For conservationists, the costs of deforestation, especially in rain forest regions and especially in terms of “economic, social, cultural, and aesthetic” considerations” far outweigh any benefits of deforestation (Andersen 2).

Developmentalists disagree and defend the position that “the tangible benefits of current deforestation and the land uses that replace the forest outweigh the potential future benefits of standing forests”; moreover, developmentalists tend to have more faith than conservationists in the development of new technologies to deal with the problems that will
be caused by global climate change. Consequently, developmentalists are not inclined to see
the necessity of limiting deforestation as a counter-measure to potentially destructive
climate change (Andersen 2-3).

In summarizing the differences in the perspectives of the developmentalists and the
conservationists, Andersen goes to the heart of the matter. How does one value, accurately
and objectively, and without ideological bias, the costs and the benefits of clearing forests?
There is most likely little or no chance that the conservationists will ever agree to leaving
the deforestation valuation process to the mechanisms of the relatively unregulated “free
market.” Andersen herself calls the task of creating “well-functioning markets for forest
services and monitoring their maintenance over time” daunting, which is, in itself, an
acknowledgement that unregulated markets do not work well (3).

**Who benefits/who is harmed by this presentation of information?**

Rated on the stakeholders’ rubric, Andersen, herself both an economist and an
environmentalist, comes down more strongly on the side of the environmentalists and
conservationists as opposed to the type of economists who prioritize development more
highly than conservation. She is committed to the cause of the developing countries. She
recognizes the need for intervention and regulation in matters of forest management.

Andersen must be considered more of an adherent of the precautionary principle
than of the cost-benefit analysis group although it must be said that economists such as
Andersen and, below, Margulis and Chomitz of the World Bank, do seem to base their
conclusions and recommendations on their estimates that a true and objective cost-benefit
analysis of the deforestation issue, if such a study were possible to achieve, would show
many more benefits of halting deforestation of the Brazilian rain forest than costs thereof.

**What assumptions are taken for granted and not questioned by the author?**

Andersen seems to assume that there are methodological and substantive problems
associated with cost-benefit analysis that make cost-benefit analysis inappropriate for use
in questions involving deforestation. She seems to assume that the long-term public
benefits of keeping rain forests intact far outweigh the short-term private gains of
deforestation activities and far exceed the opportunity costs and external costs associated
with a moratorium on clearing rain forests.

Opportunity costs are the benefits of the next best choice, benefits that have to be
foregone, when an economic choice has been made. For example, cutting forests down for
timber yields an economic gain but involves opportunity costs in terms of lost carbon sinks
and lost biodiversity. External costs are costs incurred by parties not involved in the
original economic transaction. Increased carbon emissions are external costs resulting
from individual or corporate decisions to cut down rain tree forests.

Who the author is:

Margulis is an environmental economist for the World Bank. From 2007 to 2009, he served as the coordinator of the Brazil Economics of Climate Change Study project. He holds a Ph.D. in environmental economics from the University of London.

What the author says:

Margulis’ primary thesis is that “cattle ranching in Amazonia is a potentially profitable activity for producers and that profitability is the basic driving force behind the deforestation process in the region” (62, emphasis in the original). He claims that deforestation in the Brazilian Amazon from the 1990’s forward has been “basically caused by medium- and large-scale cattle ranching,” and he goes on to say that the fact that cattle ranching is a profitable undertaking for private individuals and private groups “does not mean that the activity is socially desirable or environmentally sustainable” (Margulis xi).

In his book, which was published by the World Bank, Margulis states that “private gain needs to be contrasted with the environmental (social) costs associated with cattle ranching and deforestation” (xi). He points out that the private benefits from large-scale cattle ranching have contributed little to alleviate social and economic inequalities in Brazil, and he suggests that when sufficient evidence has been compiled, the costs of deforestation may be seen to be extremely high and may well exceed the private benefits from cattle ranching, “particularly when the uncertainties of irreversible losses of genetic heritage (not yet fully understood) are incorporated” (Margulis xi). By losses of genetic heritage, Margulis means irreversible losses to future generations due to loss of biodiversity.

Margulis suggests that World Bank teams with experience in the region understand that “the social and economic gains … [of deforestation in Brazil] … are smaller than the environmental losses” (xi). He says that World Bank teams expect that “the trend towards accelerating growth of cattle stock and of the area under pasture will continue” (Margulis 45, emphasis in the original).

He states that the private profit generated by cattle ranching (and, by extension, by soybean farming) does not yield appreciable social benefits. In his view, “the negative environmental, social, and cultural effects of clearing and ranching” must be measured and factored in as social costs (Margulis 47).

Margulis goes so far as to claim that even if the private gains of cattle ranching (and soybean farming) should exceed the various environmental and social costs as well as the opportunity costs of ranching and agriculture, it will still be “necessary to examine alternative activities to ranching that may be able to compete on the same scale as ranching, such as forest management” … [and] … “it will be necessary to compare the net
social benefits of the two activities and not accept cattle ranching simply on account of its viability in terms of its potential to generate private profit” (47, emphasis in the original).

Because cattle ranching in Amazonia is a low-risk and profitable undertaking, ranchers and farmers will seek constantly to expand their business activities (producing beef or soybeans) in order to maximize the ranchers’ and the farmers’ profits (47). Whenever the cost-benefit analysis of deforestation is limited to a comparison of the private returns of logging, ranching, and farming with the social returns of sustainable forest management, then it is almost impossible for the alternative of sustainable forest management to appear favorable as it does not yield short-term profit (Margulis 57).

Margulis’ World Bank team did do a limited environmental valuation using data from 2000 as a benchmark in an attempt “to measure the total economic value related to deforestation in Amazonia” (51). The team focused on the following values:

- Use values associated with timber extraction, non-timber extraction, and ecotourism
- Indirect use values linked to carbon sequestration
- Option values associated with bio-prospection (also called bio-prospecting; bio-prospection is the collecting and processing of plants, animals, and micro-organisms in the hope of discovering genetic or biochemical resources for economic gain)
- Existence value associated with biodiversity conservation (52)

The Margulis team estimated that the total value of these four categories of benefits to the world community to be “US$108 per hectare per year” (54). If the ranchers and the farmers in the region would accept this amount, the deal would make “sustainable use of the greater part of the Amazon region viable” (Margulis 54). This calculation seems to show the World Bank team trying to get as much as it can for the ranchers and farmers, who would get an annual payment plus permission to continue with so-called sustainable use.

The proposed deal would seem to reward people who acquired deeds to land, even if the land was acquired through less than scrupulous means, such as buying from small farmers who had taken the land from the indigenous peoples. The proposed deal would seem to be rewarding the very people who have been clearing more forest than is defensible. As Margulis admits, because cattle ranching (and now soybean farming) have remained competitive and economically profitable, ranchers and farmers have been willing “to continue purchasing land from the earlier occupants of the speculative frontier” (29). The proposal begs the question: why should such anti-social behavior be rewarded?

The alternative approach would be to place a tax on ranchers and farmers who clear forest areas. Margulis is dubious about using taxation to discourage deforestation, fearing that ranchers and farmers would change to a different and more risky but potentially more lucrative mix of crops and products rather than reduce the amount of
Margulis says that the difference between the compensation approach and the taxation approach is the question of who should bear the costs of deforestation (xx).

Presumably the ranchers and farmers, if taxed to discourage deforestation, would pass on these costs to their customers, the middle men who purchase beef and soybeans on behalf of end consumers in Brazil, North America, and Europe. At some level, though, the added expense of taxes should make the Brazilian beef less competitive in North America and Europe, and Brazilian governments are not likely to alienate constituents by making exports less viable.

Consequently, Margulis is very much convinced that it is important to “work with cattle ranchers … [and soybean producers] …, not against them.” His preferred method would be to find the means to “change the incentives perceived by the cattle ranchers” (xxi).

Who benefits/who is harmed by this presentation of information?

To a certain extent, it is the defenders of the status quo and those who benefit from the current property arrangements who benefit from Margulis’ approach. He wants to compensate land owners who, in many cases, acquired their property through the use of fraud or coercion, for not doing something (deforestation) that they should not be doing to begin with.

Cattle ranching, soybean farming, and illegal logging are alternatives to sustainable forest management, which is clearly the environmentally preferred form of land use. Margulis’ refusal to recommend more forceful action by the Brazilian government and by the World Bank begs the question of why the forest areas cannot be zoned to exclude agricultural use, forcing owners to manage their forests sustainably. There would be, of course, big associated costs of enforcement of such a policy.

The questions to be decided are how to get the world community to make available the money needed to protect the rain forests and whether the world community’s costs should be employed in the enforcement of zoning requirements or in offering farmers financial incentives not to clear forests. Given the size of the Brazilian Amazon and the lack of cooperation from so many of the players in the region, the costs of greater surveillance and enforcement will be considerable.

In terms of the rubric used in this study, Margulis’ recommendations tilt somewhat more towards the environmentalist/conservationist approach than the economist/developmentalist approach, somewhat more toward the interests of the developing countries than the developed countries, and somewhat more toward the precautionary principle than the cost-benefit analysis approach. Moreover, Margulis’ position seems to be that intervention into the market is necessary although not without
considerable compensation for the current land owners; deforestation is too important an issue to be left to the mechanisms of the mostly unregulated free market.

What assumptions are taken for granted and not questioned by the author?

Margulis appears to assume that a cost-benefit analysis of deforestation in the Brazilian Amazon, done properly, will show greater costs than benefits; at the very least, he seems to assume that evaluating activities such as deforestation solely on their ability to generate private profit is an unacceptable way to proceed.

In his executive summary, Margulis suggests that there are serious, possibly insurmountable deficiencies in the cost-benefit analysis approach when applied to deforestation and that the precautionary approach is a better choice than the cost-benefit analysis approach. He states that so much misinformation and uncertainty exists about deforestation in the region that the “risks involved suggest adopting conservative strategies.” He warns against “irreversible decisions involving potentially high social, economic, and environmental costs” that need to be avoided, and he writes, addressing himself to World Bank decision-makers: “In this sense, conservation initiatives should be encouraged” (Margulis xxi).

Not all authors, see Bjørn Lomborg’s position below, share these assumptions.

Margulis, himself an environmental economist, goes out of his way to emphasize the “limitations of environmental valuation methodologies and data availability” relative to the deforestation in the Brazilian rain forest region (xx). In addition to the very real difficulties involved in measurement and in monetary valuation, Margulis sees further complicating factors in the externalities (see glossary) in the deforestation process that have a global dimension and a dimension that clearly affects future generations in both developed and the developing countries and further complicating factors in the large size and extreme diversity of the Amazonia region. Measurements and valuations from one part of the region will not necessarily hold for other parts of the region (Margulis xix).

Margulis believes that the only approaches to discouraging deforestation are compensation or taxation. He does not mention the possibility of imposing a North American and European embargo on the purchase of beef and soybeans from forest-cleared areas of former rain forest. As Humphreys stated (see above): international trade law and international investment law always seem to trump international law on the environment and on human rights (Humphreys 220). In the case of Margulis, the primacy of international trade law seems to be unquestioned and taken for granted.

Who the author is:

Chomitz is a lead economist in the World Bank’s Research Department. He graduated from the Massachusetts Institute of Technology with a major in mathematics, and he earned a Ph.D. in economics from the University of California at Irvine. During his tenure at the World Bank, he has done research on the causes and consequences of land use change and on climate change.

What the author says:

At loggerheads, in Chomitz’ formulation of the deforestation argument, are the local needs of poor people on the one hand and global needs for environmental services on the other hand. Chomitz has two broad concerns in his book, which has been published by the World Bank in English, Spanish, French, and Indonesian and which has been made available for free download at www.worldbank.org/tropicalforestreport.

One big concern is that tropical forests are disappearing at a rate of “about 5% a decade,” a decline that can be seen in satellite imagery and that will undoubtedly have severe consequences. Among the consequences are the release of “three billion tons of CO₂ into the atmosphere each year,” loss of species and eco-systems, changes in “water flow, … [and changes in] … microclimates, pests, and pollinators” (Chomitz 1-2).

A second big concern is that tropical forests are home to many of the world’s poorest people; perhaps as many as 70 million people, many of whom are indigenous peoples living in remote areas of the tropical forests world-wide, and an additional 735 million people live in or near tropical forests and savannahs (Chomitz 2).

Chomitz says that the World Bank’s Forest Strategy recognizes that “forests are undervalued because their environmental services fall outside markets … [and] … are not factored in in market price-setting” (4). According to Chomitz, the World Bank’s Forest Strategy concedes that using tropical forests for the purpose of poverty reduction and sustainable economic development will require “politically complex trade-offs between different groups interested in conservation and production” (5).

Chomitz acknowledges that the playing field on which the basic problems of deforestation have to be sorted out is a very uneven one. On the one side are the privileged people in both developed and developing countries, the people who have more and better “information, power, and organization.” On the other side are the governments who own, at least in name, most of the forests and who might want to use the forests to reduce poverty in the country but which lack the resources to realize and enforce their programs (Chomitz 10).
Chomitz states that “if societies are to fairly allocate and defend rights to forest resources, they must prevent powerful elites from seizing them” (150), and he acknowledges that managing forests is difficult because it “requires balancing weak and powerful interests, concentrated and diffuse interests, and today’s certainties and tomorrow’s possibilities” (193). He says that placing forests under “clear and guaranteed stewardship” of indigenous populations, other local populations, area managers, and regulated concessions is necessary but insufficient; moreover, he says that attempts to regulate tree and forest management totally are unworkable due to the size of the region and the prohibitive expenses to enforce a “totally” proper forest management (193).

In addition, the “diffuse interest groups favoring forest conservation” have difficulty combating the already well-organized and well-funded agents of the beneficiaries of deforestation. All in all, the “beneficiaries of deforestation have the advantage over people who bear the burden of deforestation” (Chomitz 10).

Only two of the many environmental problems caused by deforestation in the Brazilian rain forest rise to the level of global concern: carbon storage and conservation of species and bio-diverse eco-systems. Chomitz cites as an example the deforesters who destroy a carbon storage asset “theoretically worth $1500 - $10,000 to create a pasture worth $200 - $500 (per hectare),” but, as he points out, one of the regrettable omissions from the Kyoto Protocol and the European Union Emissions Trading Scheme is the failure to provide for any financial incentives not to clear forests even though Chomitz estimates that “1/5 of global CO₂ emissions come from tropical deforestation” (14-15).

In the Frequently Asked Questions section appended to the on-line version of Chomitz’ book, the World Bank economists estimate that the global emissions from deforestation “exceed by 23% those from the heat and electricity used by all residential and commercial buildings … [and] … are about 14% below the total emissions from global industry.”

Chomitz is thus clear about the need for a global commitment to the mitigation of climate change, and he lists reduced deforestation along with lowered industrial and transportation emissions and development of clean energy sources as high priorities; to achieve the desired decrease in deforestation, he strongly favors a system of financial incentives, paid from the industrial countries of the world to the developing countries, a form of “payments tied to measured reductions in deforestation below some agreed level” (15).

Chomitz comes down strongly on the side of having the global beneficiaries of forest conservation “compensate those who bear its costs” (131). He calls for assigning and enforcing “property rights equitably” (17), but he says nothing about what assignment of property rights in the Brazilian Amazon would be “equitable,” where these so-called “property rights” originate, or what should be done whenever the “property rights” infringe on environmental rights.
Who benefits/who is harmed by this presentation of information?

It is interesting to contrast the World Bank books of Margulis and Chomitz with the Earthscan book by Humphreys in terms of which issues get emphasized and which do not. Whereas Humphreys sees the root problem in the neo-liberal economic system itself, the World Bank economists tend to see the problem as one of finding a mechanism to ameliorate the detrimental effects of unregulated free market activity.

Using the rubric developed for this thesis, Chomitz channels his fellow World Bank economist and author Margulis in seeming to favor the environmentalist/conservationist approach more than the economist/developmentalist approach, the interests of the developing countries more than the developed countries, and the precautionary principle more than the cost-benefit analysis approach. Chomitz presents his information about deforestation in the Brazilian Amazon in a way that includes the needs of the rural poor.

Moreover, both Margulis and Chomitz seem to indicate that intervention into the market is necessary; deforestation is too important an issue to be left to the mechanisms of the free market. This is perhaps a perspective not commonly associated with World Bank economists.

What assumptions are taken for granted and not questioned by the author?

It is clear that Chomitz, like Margulis before him, assumes that private gains from deforestation are usually exclusive (accruing only to the few and the select) and ephemeral (short-term profits only) whereas the public losses (the effect on global warming and the loss of biodiversity) are long-term and enduring. Both World Bank economists assume that the solution is finding a system or mechanism for funding forest conservation through contributions from the developed countries.

It is also clear that Chomitz, like Margulis earlier, assumes that the global beneficiaries of putting a halt to deforestation should pay for the benefits thereof. Both of them seem to assume that, in the case of deforestation, perpetrators of damage should not be (or cannot be) forced to cease and desist without compensation.

Chomitz assumes, based on the data available (211), that poverty and deforestation are not closely linked at the local level and that mitigating against the one does not result in effects on the other. Chomitz focuses too much, it seems, on the actions of elites at national, regional, and local levels and focuses too little on the deforestation-driving forces from export markets abroad.

He neglects the influence of international commercial interests (logging, beef, soybeans) driving deforestation in Brazil. He provides no statistics on this aspect of the problem. He does acknowledge the difficulty involved in organizing Brazilian constituencies for forest conservation (Chomitz 193), and he is aware of the way in which democracy limits the actions of the politicians who might want to do something for the
environment while the big corporations can act in their own short-term economic interests unhindered by public scrutiny.

Chomitz assumes that society and governments should not intervene if one group’s land-use decisions cause loss for other groups. All in all, there is too much assumption that that action on deforestation needs to be taken at the national level and not at the international level (Chomitz 11, 211).

Who the author is:


Barraclough’s book was published by Earthscan, which also published the Logjam book written by Humphreys. Earthscan has been described as the world’s leading publisher on climate change, sustainable development, and environmental technology. Earthscan promotes itself as a carbon-neutral company that seeks to eliminate or reduce waste and to increase the use of renewable materials in its publishing activities. Earthscan is working with its suppliers “towards a closed-loop material and energy cycle.”

What the author says:

Barraclough directly states that deforestation is ultimately caused by the needs of people and that the remedy for anthropogenic deforestation is to “halt or reverse population growth” and thus eliminate activities that stimulate tropical deforestation. Writing in the year 2000, he foresees that, absent some sort of massive demographic catastrophe, the world population will “increase by between one-fourth to one-half by the year 2025, with a majority of this population growth taking place in poor countries” (Barraclough 1). The costs of increasing standards of living in many parts of the world will be inflated to compensate for this population increase.

So, Barraclough is very clear about the root cause of tropical deforestation: increases in population as well as the increase in trade and consumption associated with it. Consequently, he regards tropical deforestation as a “systemic problem that requires deep policy and institutional reforms at all levels” (Barraclough 3). For him, deforestation is a central international environmental issue because deforestation:

- Endangers the continued existence of millions of forest dwellers, many of whom are members of indigenous tribes
- Causes extinction of many species of flora and fauna
- Causes irreversible destruction of eco-systems through increased soil erosion, salinization of the soil, flooding, and depletion of water resources in underground aquifers, lakes, and reservoirs
- Adds to the build-up of greenhouse gases that may cause global climate change
- Depletes food, fuel, and timber resources that should be preserved for future generations (Barraclough 4)
Already in 2000, it was clear to Barraclough that the “conflicts of interest between transnational corporations mostly based in the North and those … [interests] … of many rural poor in developing countries” were becoming more and more intense as were the “conflicts between rich and poor country governments about the proper management of the heritage of all mankind” (4). Barraclough decries the “lucrative short-term profits … reaped by powerful elites in both industrialized and developing countries … [and] … Northern investors and consumers” who “benefit disproportionately from cash crop and timber exports from the tropics at the expense of forest-dependent poor people in the South and … [at the expense of] … a sustainable environment” (4).

Barraclough notes that “the World Bank seems to have rediscovered the central importance of the nation state in guiding economic and social development after two decades of preaching that these issues could largely be better left for private agents and market forces to resolve” (127). Barraclough holds “the rich industrial states, together with the international financial institutions that they control” responsible for not having supported and financed the adoption of strategies of sustainable development in poor countries.

He states that the rich industrial countries have insisted on “rigid monetary, fiscal, trade, and privatization policies that conform with neo-liberal criteria” that have often discouraged developing countries from adopting socially and environmentally friendly strategies (Barraclough 135). The North’s insistence on trade liberalization in the South and on the South’s granting unrestricted access to northern investors has had many detrimental social and environmental consequences (Barraclough 135).

Barraclough concludes that, given the effects of the globalization of trade and the increasing immunity to national regulation of transnational corporations, “greater international regulation of transnational trade, investment and financial markets” is now imperative. Otherwise, the danger is great “that the rules will be made by the transnationals themselves, in cooperation with rich country governments, for their own-short-term gains” (Barraclough 136).

Barraclough proposes a few international reforms that would help the world economy onto a path of sustainable development. Some of the proposals sound rather idealistic and naïve from the perspective of 2011 as they probably also did when Barraclough first wrote them.
• A more democratic world system
• A strong and democratic United Nations system
• International codes or agreements setting minimum social and environment standards for transnational corporations and investors
• Minimum standards for worker wages and security and for environmental protection to keep the poor countries from engaging in “cut-throat competition among themselves to offer the transnational investors the best possible terms even if these mean overexploitation of both their people and their natural resources” (Barraclough 135).

Who benefits/who is harmed by the author’s presentation of information?

Barraclough’s rating on the stakeholder rubric used in this thesis more closely resembles Humphrey’s rating than it does those of Margulis and Chomitz although it could be said that the difference between the Earthscan authors Humphreys and Barraclough, on the one hand, and the World Bank authors Margulis and Chomitz, on the other hand, is more a difference of degree than of kind.

Barraclough is squarely on the side of environmentalists and conservationists. He understands the underlying systemic causes of deforestation. He has the interests of developing countries at heart. He is, himself, an advocate of government regulation of what has been and continues to be a relatively unregulated free market system in which transnational corporations can operate as they please in the interests of their own private short-term profits regardless of the damage done to the interests of other current and future stakeholders. Barraclough is clearly more in favor of the precautionary principle than the cost-benefit analysis approach.

What assumptions are taken for granted and not questioned by the author?

Barraclough assumes that the problems caused by ever-increasing populations, trade, and consumption on a planet with finite resources and habitable space are problems that need to be dealt with by the present generation of decision-makers and not deferred to the decision-makers of future generations. He suggests that deforestation is a concrete manifestation of the problems caused by the relatively unchallenged assumption in the United States that economic growth is always good regardless of whether the growth in question is socially responsible or environmentally sustainable.


Smart Solutions to Climate Change: Comparing Costs and Benefits. 2010.

All four of the above books are by Bjørn Lomborg. The first two books, The Skeptical Environmentalist and Cool It!, have been written by Lomborg. The second two books have been edited by Lomborg who has written the introduction and the conclusion. The articles in these two latter books have been written by various economists, likely chosen by Lomborg. All four books have been published by Cambridge University Press.

Who the author is:

According to the biographical information on his website, www.lomborg.com, Lomborg earned a Master’s degree and a Ph.D. in government and political science (statskundskab) at Århus University, where he worked as an associate professor from 1997 to 2005. Lomborg has been an adjunct professor at the Copenhagen School of Business since 2005 and has been the director of the Copenhagen Consensus Center, a think-tank based in Denmark, since 2006.

From February, 2002, until July, 2004, Lomborg served as the director of the Danish government's Environmental Assessment Institute. In 2004, he started the "Copenhagen Consensus," a project that has brought together selected economists from various countries in the world for the stated purpose of prioritizing the “best” possible solutions to the world’s biggest problems with the finite resources that might be available.

Lomborg’s books have resembled the kind of films that receive much popular attention and praise but that generally fail to impress the critics. The news magazines Time and The Economist and the newspapers The Guardian, The New York Times, and The Wall Street Journal have all, at one time or another, sung Lomborg’s praises as an influential young man. The promotion and media hype for his books have made Lomborg into a minor celebrity (Friel 183-4). He appears to be more of a popularizer and a polemicist than a scientist.

The flaws, errors, and misrepresentations in Lomborg’s first very popular book, The Skeptical Environmentalist, were documented in Scientific American in April 2002. In addition, the Union of Concerned Scientists wrote on its website that “Lomborg’s book is seriously flawed and fails to meet basic standards of credible scientific analysis” (Union). The Union of Concerned Scientists accused Lomborg of misusing, of misrepresenting or misinterpreting data, of using flawed logic, of using statistics inappropriately, and of hiding value judgments in what purported to be scientific analysis. Furthermore, the scientists said: Lomborg “uncritically and selectively cites literature -- often not peer-reviewed -- that
supports his assertions, while ignoring or misinterpreting scientific evidence that does not” (Union).

The flimsy nature of the documentation in Lomborg’s book *Cool It! The Skeptical Environmentalist’s Guide to Global Warming* was exposed by the journalist Howard Friel in the 2010 book *The Lomborg Deception*, a book that was published by the Yale University Press. Sharon Begley quoted Friel in her *Newsweek* book review of *The Lomborg Deception*: “This pattern of non-existent footnoted support for assertions in the text was quite common. … [Lomborg makes a] … “highly substantive claim that, when you go to the footnotes, is not supported” (Begley).

The online magazine *Grist*, which offers environmental news, commentary, and advice, has published a series of negative reviews on the politics behind Lomborg’s “science” over the years, on his hidden agenda, and on his misuse of statistics (Schulz, Hammond).

Moreover, environmental scientists in Denmark filed charges of academic dishonesty against Lomborg in 2002, and the Danish Committees on Scientific Dishonesty ruled in early 2003 that Lomborg was guilty, in his book *The Skeptical Environmentalist*, of fabricating data, selectively discarding data he did not want to use, deliberately using misleading statistical methods, drawing inappropriate conclusions from the data, and deliberately misinterpreting the data presented by other scientists (“Bjørn Lomborg”).

Subsequently, in 2003, Lomborg appealed to the Danish Ministry of Science, Technology, and Innovation, the ministry that has oversight over the Danish Committees on Scientific Dishonesty, and, using what seem to be specious arguments, the ministry annulled the decision of the committee’s decision, stating that the committees had:

- Not taken a position on how and why the charges brought against Lomborg were justified
- Not used a precise standard for defining "good scientific practice" in the social sciences
- Not specified whether Lomborg’s "distortion of statistical data" had to be deliberate for scientific dishonesty to have occurred
- Not documented that *The Skeptical Environmentalist* was a scientific publication in which “scientific dishonesty” could be practiced (“Bjørn Lomborg”)

The ministry’s decision left doubt as to whether the ministry considered Lomborg’s much promoted book *The Skeptical Environmentalist* to be bad science but not dishonest science or to be not science at all. One of the unfortunate things about the ministry’s becoming involved in the question of academic dishonesty at all was that the Danish elections had replaced a social democratic government with a neo-liberal government the year before. Lomborg had been creating doubt in his readers’ minds about the science.
behind the theory of global warming, and that doubt was thought to be welcomed by the new government.

As such, the ministry’s annulling of the academic dishonesty findings on the part of Bjørn Lomborg raises the question of whether ideology rather than science was at stake. In the same vein, it is possible to ask whether Lomborg’s appointment to the position of director of the Danish Environmental Assessment Institute has had ideology as its basis rather than science.

The same question applies to the Danish government’s continued funding of the Copenhagen Consensus Center. In 2009, the right-wing populist Danish political party, the Dansk Folkeparti, made special appropriations to Lomborg and his Center a condition for the party’s support of the present neo-liberal Danish government’s proposed finance law (Djursing). At the insistence of the Dansk Folkeparti, the Copenhagen Consensus Center will be getting roughly one million dollars every year though 2014 and, above and beyond the annual appropriation, will be getting 1.6 million dollars for a conference to be held in 2012.

As has been reported in Ingenioren, the online magazine of Ingeniørforeningen i Danmark, the Engineers’ Association in Denmark, the government will be funding Lomborg and the Copenhagen Consensus Center staff members even though Lomborg and the Center do not do research themselves and do not undertake projects to improve environmental conditions but, instead, attempt to control the agenda for the discussion of social and environmental problems in the world (Djursing).

Who the author is, in the case of Bjørn Lomborg, is a complicated and controversial question. His situation points up the need to examine the presentation of ideas by authors and publishers critically with an eye to who benefits from the particular form of presentation of ideas and with an eye to which underlying assumptions are presented as though they are beyond dispute. It is because his books have been so much more vigorously promoted than the books of the other authors in this study that Lomborg’s presentation of ideas on tropical deforestation has been included.
Lomborg’s position on global warming seems to have changed somewhat in the period since the publication of the first book in English, *The Skeptical Environmentalist*, and the publication of the second and subsequent books although he is at pains to deny such a change (Jowit). For example, in his first book in 2001, Lomborg took the position that the projected climate change was not a serious problem for humankind, that the projected climate change would bring more benefits than damages, and that projects to reduce anthropogenic contributions to global warming, such as projects to reduce deforestation, were bad investments. There were, he said, more pressing, more urgent problems to be dealt with (Lomborg *Skeptical Environmentalist* 351).

In his latest work, *Smart Solutions to Climate Change* (2010), Lomborg says something different: “Climate change is undoubtedly one of the chief concerns facing the world today” (2). The articles in the 2010 book are written by people whom Lomborg calls “some of the top climate economists working in the field today” (395), and the various approaches these economists, who are not environmental scientists, propose are then ranked by an “Expert Panel” (Lomborg’s appellation).

In this 2010 book, Lomborg concludes that investing one hundred billion dollars annually would mean that “we could essentially resolve the climate change problem by the end of this century” (*Smart Solutions* 396). Interestingly, in the 2010 Cancun Agreements, the developed countries of the world are obligated to contribute $30 billion between 2010 and 2012 to a Green Climate Fund to help developing countries to reduce greenhouse emissions and to provide protections in developing countries against other climate change impacts such as protections against flooding and droughts. The annual contributions to the Green Climate Fund are intended to grow to $100 billion annually by the year 2020 (Hertsgaard 4). The Cancun Agreements thus recognize the need to make “deep cuts in greenhouse gas emissions … to hold the increase in global average temperature below two degrees Celsius above pre-industrial levels” (Hertsgaard 4). The World Bank will administer the Green Climate Fund, which will give the World Bank a chance to be as sensitive to the needs of the environment and of poor people as Chomitz and Margulis would have it be.

In other words, the Cancun Agreements demonstrate a commitment to the very sort of investment that Lomborg, in his much acclaimed *The Skeptical Environmentalist*, thought unwise: there his analysis showed that “it will be far more expensive to cut CO2 emissions radically than to pay the costs of adaptation to the increased temperatures” (*Skeptical Environmentalist* 318).

What sorts of strategies should the world use, according to Lomborg and his panel, if the world is prepared to invest $100 billion annually to resolve the climate change problem?
Lomborg’s panel ranks “climate engineering strategies” such as research into marine cloud whitening to increase cloud reflectivity and research into stratospheric aerosol insertion (spraying the stratosphere with sulfur gases, which will disperse and oxidize and then scatter back into space some of the sunlight) as very good. The panel ranks research into carbon air capture technologies (to remove CO\textsubscript{2} directly from the atmosphere) as good (381-2).

The proposed forestry solutions to climate change, namely afforestation (planting areas with trees), deforestation reduction, and existing forest management, are ranked as fair and do not receive a higher ranking from Lomborg’s Expert Panel “because it would be a relatively costly way of cutting carbon, and there are regulatory challenges relating to implementation and leakage to be overcome” (383, emphasis added).

Nowhere does Lomborg mention that the more highly ranked strategies are strategies that have commercial applications whereas the proposed forestry solutions, deforestation reduction in particular, would involve what would be perceived as governmental interference in the commercial process. Lomborg’s neglect of this aspect of the decision-making process is an example of why and how the presentation of ideas is important. Controlling which ideas are considered valid for discussion and which ideas are not worth discussing is a form of power.

Lomborg has not changed his opinion about cost-benefit analysis. In the earlier book, the emphasis was on the need to prioritize projects and on the need to use cost-benefit analysis as the tool for prioritizing the social and environmental projects that need doing. In this first English-language book, Lomborg is hostile to the idea of the precautionary principle; it must be, he says, “strictly circumscribed” (Skeptical Environmentalist 348). A couple of pages later, Lomborg goes on to say that the “precautionary principle should not be used to tip the scales a bit more in favor of the environment, because the distribution … [of available resources] … would by definition no longer be the best possible” (Skeptical Environmentalist 350, emphasis added).

By whose definition the distribution would no longer be optimal seems a legitimate question. Lomborg does provide an endnote reference, to endnote number 2922 on page 434, but the endnote turns out to be anecdotal with no reference to any sort of scientific evidence or objective discussion. The irrelevance of so many of Lomborg’s endnotes is an often cited problem with his books and will be addressed in more detail below.

In the 2010 book, Smart Solutions to Climate Change, Lomborg does admit, in his introduction, that cost-benefit analysis is “much maligned by some”(2), but he does not take the time to address the flaws and shortcomings of the cost-benefit analysis process. Brent Sohngen, a professor in the Department of Agricultural, Environmental, and Developmental Economics at The Ohio State University and the author of the chapter on “Forestry Carbon Sequestration” in Lomborg’s 2010 book, admits that there are “tricky issues” involved in calculating the present value of benefits and costs in the study, but neither Lomborg nor Sohngen makes any attempt to explain why the inadequacies of the
cost-benefit analysis method do not disqualify it for use in matters of public health and environmental protection. Their attitude seems to be that the cost-benefit analysis method is better than no method.

Strangely enough, in the 2010 book, forest carbon sequestration becomes worthy of discussion, but the preservation of biodiversity drops out of sight entirely with no explanation. In the 2001 book, the two topics received more or less equal attention. The emphasis of this honors thesis is on the question of who it is who makes the decision to re-emphasize the reduction of greenhouse gas emissions but to de-emphasize the preservation of biodiversity. What is the basis for this sort of decision, who benefits from this sort of prioritizing of topics for analysis and discussion, and who is harmed?

The insistence of Lomborg and Sohngen on the cost-benefit analysis paradigm begs the question of whether they cling to it because, ideologically, it serves their purpose very well. It gives their work a patina of science (though not the substance of science), and it allows them to weight costs and benefits and to discount costs and benefits in ways that give them the outcomes they hope to see. It gives them numbers to crunch, and that quantitative approach gives their work the appearance of science and objectivity. Their seemingly steadfast faith in their numbers reminds strongly of the emperor’s faith in his new clothes, in a story by the Dane Hans Christian Andersen that Lomborg must know very well.

Basically, then, Lomborg’s two big points over the past decade have been the need, given finite resources for the job, to prioritize the funding of projects to make the world a better and safer place for humans and the need to use cost-benefit analysis to achieve the needed prioritization. Both points, on their face, can seem reasonable to the uncritical reader. In reality, though, the use of the cost-benefit analysis method in the context of deforestation and the way in which the cost-benefit method is used demonstrate the message of this honors thesis: students and citizens need to learn to analyze texts in terms of who benefits from the particular presentation of ideas and what assumptions are presented as factual.

Who benefits/who is harmed by the author’s presentation of information?

It is perhaps a bit difficult to fit Lomborg and his books into the rubric developed for use in this honors thesis. Definitely, Lomborg and his panel of economists are farther to the economist/developmentalist end of the continuum than they are to the environmentalist/conservationist end. Lomborg selects economists for membership on his panels, not environmentalists or environmental scientists. Particularly in the first book, *The Skeptical Environmentalist*, Lomborg’s text and tone become polemical and even hostile when he addresses issues raised by environmentalists.

To a very real extent, Lomborg sets up a straw man in *The Skeptical Environmentalist*, and then he uses much of the book to attack this straw man, which he calls the Litany of the environmentalists. Lomborg claims to know the motives of the
environmentalists. They will do everything they can to make the state of the world’s environment seem bleak and gloomy, he says, because “the worse they can make this state appear, the easier it is for them to convince us we need to spend more money on the environment rather than on hospitals, kindergartens, etc.” (The Skeptical Environmentalist 331).

In the 2009 book on Latin American Development Priorities, for which Lomborg is listed as the editor, he does acknowledge that there are difficulties inherent in estimating true costs and placing true values on benefits, but then he goes on to assert, without any documentation, that “economics provides us with a powerful intellectual framework to compare choices” (2).

Equally clearly, Lomborg is hostile to the application of the precautionary principle. His point, baldly stated, is that the precautionary principle is “actually all about making worse decisions than we need to (The Skeptical Environmentalist 350). He presents no evidence for this contention; in this context, he provides no endnotes. Why the critical reader should accept Lomborg’s opinion on this matter is a valid question. Lomborg embraces the cost-benefit analysis approach with an apparently unwavering faith in the efficacy of the principle. There is no doubt that the method has much, in theory, to recommend it, but, in the hands of people with a specific purpose in mind, the method can be manipulated and abused so that it retains the appearance but not the substance of objectivity.

Moreover, Lomborg and his Copenhagen Consensus panels seem to favor the workings of “market forces” (Smart Solutions 125) and to want to protect the beneficiaries of a system driven by fossil fuel energy sources (Smart Solutions 124). Transnational corporations benefit from, or, at the very least, are not harmed by or put on the defensive by the presentation of ideas in Lomborg’s books.

To the same extent that Lomborg’s presentation of the issues aids or at least spares transnational corporations, the way in which he frames the issues is to the advantage of the leaders of the developed countries rather than to the advantage of the leaders of the developing countries. In the end, the Copenhagen Consensus process is a way in which to control the agenda of ideas for discussion. The process is a way of influencing which information and ideas are taken seriously and which are dismissed from the discussion.

Lomborg’s presentation of ideas is distinctly different from the presentations of all of the other authors on the four aspects of the rubric used in this honors thesis:
• Leaders of developed countries and leaders of developing countries
• Economists/developmentalists and environments/conservationists
• Free market advocates and advocates of market regulation
• Cost-benefit analysis advocates and advocates of the precautionary principle

For whatever reasons, Lomborg’s ideas are the ideas that have received the most media attention and acclaim. His publisher has promoted his books much more vigorously than the other publishers have promoted the other books reviewed in this study. The BBC reviewer of *The Skeptical Environmentalist* said: “Do read the book. On each page, you will find something that you agree with and something that makes you want to bite the carpet. That is good value for money these days” (Quoted in Harrison 359).

**What assumptions are taken for granted and not questioned by the author?**

As Tufts University professor Frank Ackerman says: “Lomborg systematically misrepresents economic and scientific research, announcing unsubstantiated, undocumented opinions as fact” (Ackerman “No laughing matter”). For Ackerman, the underlying issue is that climate change cannot be “both a fundamental threat to the conditions that support human life, according to scientists, and a mid-sized policy puzzle that can be solved by an adjustment in tax rates, according to economists. One profession or the other must be wrong about the magnitude of the problem — and the total failure of climate skeptics’ attempts … [such as Lomborg’s attempts] … to cast doubt on the science suggests that it’s not the scientists who are in error. That’s why it’s time to create a new economics of climate change” (Ackerman “No laughing matter”).

It may also be time to question Lomborg’s assumption that cost-benefit analysis is an appropriate method for deciding questions of environmental protection. Perhaps it would be appropriate to do a cost-benefit analysis of the use of the cost-benefit analysis method in matters involving public health and environmental protection. It may be time to see whether the economist’s new clothes really are as beautiful as the economist believes them to be.

Lomborg assumes that only economic development can bring about environmental development; what environmentalists fail to realize, he says, is that it is only when we are sufficiently rich that we can afford to worry about environmental problems (*The Skeptical Environmentalist* 33). What Lomborg does here is attempt to create fear about the dangers to the economy of addressing very real environmental concerns. He also fails to see that environmental protection need not bring the economy to a standstill; he fails to acknowledge that green technologies can provide economic stimulus.

Lomborg seems to assume that most readers will not notice the irrelevance of so many of his endnotes; however, Friel (2010) did notice and did check. Friel says, “As an experiment, I looked up one of his footnotes, found that it didn’t support what he said, and
then did another, and kept going, finding the same pattern” (quoted in Begley). Ackerman has noted identical problems with endnotes.

Lomborg seems to assume that the critical reader will not notice the ways in which he obscures facts about deforestation in the tropics. However, as Emily Matthews (2001) has pointed out, he seems not to see many of the important aspects of the global warming argument. In *The Skeptical Environmentalist*, Lomborg skillfully guides his readers away from the topic of the value of the tropical forests as carbon sinks and as repositories of disproportionate amounts of biodiversity by writing at length about global forest stands in the temperate zones of the planet and by reiterating the reporting of the impact of forest fires in Indonesia (Matthews).

Lomborg also assumes that the critical reader will not notice the projects that are left out of the Copenhagen Consensus process: what about a project intended to limit severe national expenditures on war and the military? As Ackerman points out, in ”The Economic Case for Slashing Carbon Emissions,” we know that we can afford to spend 2.5% of Gross Domestic Product (GDP) on a much publicized threat because we already do: year after year, 68 countries in the world spend more than 2.5% on war and military preparations. The USA and China each spend more than 4% of their GDP on the military (Ackerman “Economic”). Ackerman thinks the people of both countries would be more secure in the long run if their leaders were to spend half of the defense budget on combating climate change.

The pertinent question is: how did Lomborg and his eight hand-picked economists miss this particular aspect of the environmental problem? Basically, he and his economists set out to investigate possible projects, such as those to counter disease (AIDS, malaria, etc.) and malnutrition, which would make more sense, economically, according to Lomborg and his Copenhagen Consensus experts, than projects to protect the environment such as avoiding deforestation. But, somehow, as Ackerman notes, reducing barriers to free trade does make it onto the list of desirable projects (“Hot”) whereas Lomborg and his economists completely ignore, without any explanation, projects such as:

- cutting military spending (possibly by putting military spending on a not-for-profit basis)
- putting into place and enforcing a settlement of the continuing problems in Palestine
- eliminating tax breaks for the wealthy
- devising and enforcing a global system of taxation and regulation of commerce that would put the corporations of all nations on a level field of competition with one another

Lomborg’s books illustrate very well one of the major concerns of this honors thesis: that the ideas that are assumed to be true and never challenged and the ideas that are assumed to be worthless and are neglected are the ideas that need to be examined by critical students. The forum for the analysis of ideas for improving the world set forth by
Lomborg seems to be a rigged forum. There is a need for more transparency regarding who funds Lomborg and the Copenhagen Consensus, regarding who selects the economists who participate in the process, and regarding the basis for the selection of both participants and issues.

Summing up, then, some of Lomborg’s basic assumptions, for which he does not offer documentation of their veracity, are:

- Cost-benefit analysis is a better method than the precautionary principle for prioritizing environmental protections projects.
- Economists are better qualified than natural scientists to determine priorities in matters of the global environment.
- Projects that promise to yield benefits in the short-term are better than projects that have the potential benefits in the more distant long-term benefits (justifying the use of discount rates).
- Willingness-to-pay surveys are good indicators of “public good value.”
Summary of the main points of the books

All authors reviewed in this chapter with the exception of Lomborg seemed very aware of the shortcomings of the cost-benefit analysis method, and all of the authors except Lomborg seemed very wary of trying to apply it to the issue of deforestation. Cost-benefit analysis is impossible to do scientifically, in sense of testing hypotheses, in matters involving public health and environmental protection; any serious attempts to do cost-benefit analysis in these fields can be seen to be prohibitively expensive to do well, and they would almost certainly place people in such danger as to be unethical. To use cost-benefit analysis in the context of deforestation and represent it as a scientific or objective method or both is surely misleading.

Even Lomborg, in his later books, acknowledges the criticisms of cost-benefit analysis in the area of environmental protection, but Lomborg continues to push for the use of cost-benefit analysis, essentially saying: CBA may not be done well, but CBA is better than nothing. But here Lomborg is wrong. There is a viable alternative to cost-benefit analysis. It is called the precautionary principle. Lomborg and the economists who work under the aegis of the Copenhagen Consensus are aware of the precautionary principle but reject its application without any sort of study that specifies its inappropriateness for use in making policy recommendations regarding deforestation in the tropical rainforests.

There is also a big divide between the authors who present the problem of deforestation as a problem inherent in the dominant economic system (Humphreys, Barraclough) and the authors who present the problem of deforestation as a problem of getting the remedy right (Margulis, Chomitz). Lomborg has tried, especially in his earlier books but also in the later books, to deflate the importance of the issue of deforestation in the tropics and the resulting emission of greenhouse gases and the loss of biodiversity associated with forest clearing.

There is, moreover, a considerable gap between those authors who see transnational corporations as culprits in the degradation of the environment caused by deforestation in the Brazilian Amazon (again, Humphreys, Barraclough) and those who fail to discuss in any detail the role of the transnational corporations in the region (Margulis, Chomitz). Humphreys, in particular, points out that the transnationals are now so big and so strong that national governments cannot effectively restrain them. According to Humphreys, politicians representing the people in national, regional, and local governments have neither the will (thanks to the political campaign contributions of the transnationals) nor the means (thanks to the ideology of limited government) to protect the environment against the admittedly rational short-term activities of the transnationals, activities that are rational from the point of view of the transnationals’ management but irrational from the point of view of the greater world society and from the point of view of future generations.

It is interesting to note that even the World Bank authors, Margulis and Chomitz, see the apparent necessity for regulation of forest clearing activities rather than leaving
decision-making about deforestation to market forces (whatever that means). For Margulis and Chomitz, increased regulation is a remedy that stops short of the proposed move away from the neo-liberal ideology that Humphreys and Barraclough blame for the degradation of the environment.

In the final analysis, the biggest issues driving deforestation in the Brazilian Amazon and beyond are, it seem, population growth and the concomitant rising standards of living. More people entail a higher demand for timber products, for beef products, for soybean products, for employment, and for profits. If all of the authors can be faulted for a common failing, it is the failure to emphasize strongly enough the relationship between the growth of populations and the destructions of environments whose benefits to present and future generations have not been sufficiently appreciated.

For the most part, the authors reviewed in this chapter might have done more with the question of ideology and the ways in which ideology conditions our consciousness of environmental problems such as deforestation. All of the authors could have focused more on the question of which groups in society benefit and which groups in society are harmed by specific ways of collecting and analyzing information about deforestation. All of the authors could have investigated which assumptions about deforestation are accepted as truth and are not questioned in the studies of deforestation.

There may seem to be a clearly defined debate about deforestation with economists (developmentalists) on one side and environmentalalist scientists (conservationists) on the other side, with leaders of the developed world and the developing world on opposing sides, with advocates of a relatively unregulated free market system and advocates of a necessarily more regulated social market system opposing one another, and with advocates of the cost-benefit analysis method and advocates of precautionary principle disagreeing with one another, but there may also be aspects to the problem of deforestation in the Brazilian Amazon that get lost in the debate of the aforementioned parties.

Diamond’s (2005) ideas about how cultural ideas influence a people’s perceptions of environmental danger and Hardin’s (1968) thought experiments about the tragedy of the commons suggest good ways to think about the problem of deforestation without getting bogged down in the debates of the short-term stakeholders in the issue.
Chapter 5

Conclusions

The method employed in this honors thesis has been a literature review, one of the many methods of qualitative research. Qualitative research methods are typically used whenever it is important for researchers to focus on and observe, describe, and understand the behaviors and motives of a particular group of human beings and to find reasons for the behaviors and motives observed. In the case of this honors thesis, the group being observed includes a number of authors, both economists and environmental scientists, who have published monographs on the topic of deforestation in the Brazilian Amazon.

Literature reviews typically result in an analysis or evaluation of the substance (the actual content) of the literature being examined. The literature review normally draws attention to what is correct and what is false or incomplete in the literature surveyed. In this honors thesis, however, attention has shifted somewhat to focus on the manner of the presentation of the information about deforestation in the Brazilian Amazon. The guiding questions have been: a) how has the available information about deforestation been organized and presented? and b) to what extent does the manner of the presentation of the information reflect possible bias?

To undertake this study, a two-pronged test has been applied to the writing of diverse authors on the topic of deforestation.

The first prong has involved an attempt to evaluate the writing in terms of which groups in society have benefited from the way in which the topic was presented and which groups in society have been harmed or neglected by the way in which the topic was presented. At its most basic, this honors thesis has been a test to see whether the manner of presentation of the current writing on the topic of deforestation benefits a) free-market economists more than environmental scientists; b) developmentalists more than conservationists; and c) decision-makers in the developed world more than decision-makers in the developing world.

The second prong of the test has involved an attempt to read critically to discern which assumptions the authors have accepted as fact and have not questioned or challenged in their writing on deforestation. A good example of the value of this second prong of the critical approach to reading the monographic literature on deforestation is the extent to which certain authors accept and use the method of cost-benefit analysis uncritically and, in some cases, seemingly unreservedly, to evaluate the various issues of environmental degradation.

A basic supposition underlying this honors thesis is the idea that, in a society of people committed to winning and to making profit at the expense of others in the society, not all scholars and scientists will use ideas and information to search for truth. Rather, ideas and information will be used as the bases from which to advance positions that favor
the interests of particular groups and that result in payoffs for the proponents of the ideas and information, most notably in the form of grants awarded and appointments to prestigious positions and in the form of promotions and tenure.

This is the essence of the concept of ideology, the concept that ideas and information will be presented in particular ways not to advance the individual’s or society’s search for truths but more to advance the material and affective well-being of individuals and social groups. Humphreys (2006) has written at some length about the increasing control not only of material assets but also the increasing control of the flow of information by specific groups in the society (16, 218, 234).

The two-pronged critical approach to the examination of the literature of deforestation in the Brazilian Amazon can, of course, be applied to other topics in the sciences as well as the social sciences and humanities. It would be a mistake to assume that, somehow, scientific writing is exempt from subjectivity and bias in the authors’ manner of organizing and presenting their information. Scientists also have to decide what to emphasize and what to relegate to less prominent sections of their writing, have to decide what to include and what to exclude from their written reports. These decisions are especially vulnerable to (perhaps unconscious) perceptions of self-interest in a society that promotes individualism and competition and greed as motivating forces.

In the field of economics, researchers seem to be especially influenced by the paradigm that favors market competition over government planning as the decision-maker and prioritizer in environmental matters, and researchers seem to be influenced by the paradigm that favors cost-benefit analysis over precautionary principle. Cassidy, a staff writer for The New Yorker and the author of a blog called “Rational Irrationalities,” has written that it is time to re-examine the until now relatively unchallenged assumptions, in policy circles and in the general public, about the free market and private enterprise, which continue to dominate. Cassidy says, this is “what comes of forgetting the critical role that states have played in nurturing, protecting, and financing their industries, as well as in taxing and taming them. The greatest danger that Western prosperity now faces isn’t posed by any Beijing consensus; it’s posed by the myth of the free market” (Cassidy 101). In much the same way, if free markets will not protect tropical rain forests, then governments will have to step forward to do so.

In their recent book entitled Merchants of Doubt: How A Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming, Oreskes and Conway (2010) illustrate how many economists, and Bjørn Lomborg and Robert Samuelson in particular, have attempted to spread the idea that global warming is either not important or is not something that we can effectively respond to (Oreskes 258-59, 265), and, that being the case, there is no pressing reason to do anything about deforestation in the Brazilian Amazon either.

The doubts spread by Lomborg in his books and by Samuelson in The Wall Street Journal and in Newsweek magazine have benefited from a superficial examination and
acceptance; they have not been exposed to a critical examination that might reveal which
groups in society actually benefit from the proliferation of publications and
pronouncements that sow confusion and doubt in the minds of scholars and scientists and
laypeople alike.

Lost in all of the sowing of confusion and doubt about global warming are the points
made by Prince Charles, in an Oct. 25, 2007, speech made at a World Wildlife Fund gala
dinner at Hampton Court Palace:

- The tropical forests are “giant global utilities, providing essential public
  services to humanity on a vast scale.”
  - They store carbon.
  - They clean the atmosphere of pollutants and feed it with moisture.
  - They act as a “natural thermostat,” regulating our climate.
  - They “sustain the lives of 1.4 billion of the poorest people” on
    Earth.
- The destruction of the world’s forests continues “at a terrifying pace.”
  - The proportion of greenhouse gas emissions from forest clearing is
    second only to the proportion of greenhouse gas emissions from
    the energy generation sector of the world economy.
- Combating deforestation seems to be “one of the quickest and most cost-
  effective means of reducing carbon dioxide emissions.”
  - The report of Sir Nicholas Stern suggests that the “expenditure of
    $10 to $15 billion a year could reduce deforestation by half by
    2030.”
  - That figure ($10-to-15 billion a year) is “less than half of 1 percent
    of the $3,500 billion the world spends on insurance every year.”

It should be clear that negotiating climate control treaties necessarily involves the
transformation of the world’s economic system to one that emits considerably less CO₂,
necessarily involves a transfer of decision-making from relatively unregulated markets to
the provisions of the climate control treaties, and necessarily involves the re-direction of
billions and billions of dollars and Euros. It is not surprising that these changes, however
commendable their intended purpose may be, will be fought by some groups in society, and
fought, in particular, by the groups in society that control not only material assets but also
the means of the communication of ideas and information.

While the US Congress oscillates between an attitude of do-nothing-at-all-ever on
the issue of climate change and an attitude of do-nothing-for-at-least-two-more-years-
because-of-the-economy, former Vice-President and Nobel Peace Prize winner Al Gore, his
book entitled An Inconvenient Truth: The Planetary Emergence of Global Warming and
What We Can Do About It, has attempted to emphasize that doing something about global
warming does not have to mean that we “have to choose between a healthy economy and a
healthy environment” (316); Gore thinks it is entirely possible that market capitalism can
be an ally of environmentalists in the attempt to re-direct and re-structure the world economy.

Attention needs to be paid to the ways in which systemic arrangements either result in or fail to bring about short-term economic gains that appear rational for the individual or the group when, in the longer term, these decisions are decidedly not rational and not in the best interests of the greater world society.

Ideas and information are important in and of themselves, perhaps every bit as important in history as are economic relations, material assets, and technological developments. It is important to recognize which ideas and information are taken for granted and never questioned and to recognize which ideas and information are ignored or neglected. There is a constant struggle to control the presentation of ideas and information to decision-makers and the public.

There is nothing wrong with assumptions *per se*. Without assumptions, it would not be possible to formulate hypotheses. The problem lies in accepting assumptions, e.g. about the validity of the cost-benefit analysis method, without sufficient questioning and sufficient challenging of the assumptions. Scientists are human beings who will never be capable of being totally objective. There will always be an element of subjectivity in their prioritizing of ideas and information. The danger of misleading arises whenever scientists use numbers and data, as Lomborg does, to try to create an illusion of objectivity.
Recommendations

It is the contention of the author of this honors thesis that there is a need for some form of this two-pronged critical approach in the sciences. The controversy surrounding the presentation of information about global warming and climate change has clearly demonstrated the need for critical examinations not just of what is valid in what is being said but also the need for critical examinations of which groups in society are benefiting and are being harmed by what is being said and the need for critical examinations of what is being accepted as fact and not being challenged. Such a critical approach should produce more transparency with regard to both motives and consequences.

Moreover, superficiality in analysis needs to be exposed as much as subjectivity in analysis needs to be exposed. Attempts to skew research efforts to sow confusion and doubt and to spread propaganda must be exposed. The Climategate controversy in 2009-2010 resulted from the release of e-mails and documents from the University of East Anglia’s Climatic Research Unit that allegedly revealed attempts to manipulate, withhold, and delete data in ways that made the case for global warming seem stronger than it otherwise would have. Opponents of global warming used the climate scientists’ lack of organization and lack of transparency as evidence of a lack of proof of global warming. In fact, the climate scientists were not shown to be guilty of having used fraudulent methods, and the scientific assessment of the dangers of global warming remains unchanged by the Climategate controversy.

There seems to be a need for new paradigms, in particular for new paradigms to improve or replace the established paradigms of free market decision-making and cost-benefit analysis. There seems to be a need for a shift toward policy planning and decision-making based primarily on the precautionary principle. An important question raised by Humphreys and Barraclough is the question of whether increased regulation is a sufficient condition for dealing with the environmental problems caused by deforestation in the tropics or whether a change in the economic system is necessary. The power, money, and influence of the sectors that benefit from a greenhouse-gas-producing economic system should not be underestimated.

Specifically, with regard to the question of deforestation in the Brazilian Amazon, and the protection of the biodiversity in the region, there will be a need for increased surveillance. Saatchi et al (1997) showed that combining Landsat satellite imagery and space shuttle radar imagery provides “complementary information about land use and forest fragmentation” (201). At this time, however, how much longer space shuttle missions will be available for surveillance of the Brazilian Amazon forests is a valid question; monitoring of activity in the region via Landsat satellite imagery thus becomes even more important.
Works Cited


Appendix A

Pictures of the Amazonian Rain Forest and Deforested Areas

From: Worldculturepictorial.com

From: cosmosmagazine.com
Appendix B

FAO Gross Deforestation Estimates for the Legal Amazon Region

<table>
<thead>
<tr>
<th>Year</th>
<th>Deforested area in square kilometers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1988</td>
<td>21,050</td>
</tr>
<tr>
<td>1989</td>
<td>17,770</td>
</tr>
<tr>
<td>1990</td>
<td>13,730</td>
</tr>
<tr>
<td>1991</td>
<td>11,030</td>
</tr>
<tr>
<td>1992</td>
<td>13,786</td>
</tr>
<tr>
<td>1993</td>
<td>14,896</td>
</tr>
<tr>
<td>1994</td>
<td>14,896</td>
</tr>
<tr>
<td>1995</td>
<td>29,059</td>
</tr>
<tr>
<td>1996</td>
<td>18,161</td>
</tr>
<tr>
<td>1997</td>
<td>13,227</td>
</tr>
<tr>
<td>1998</td>
<td>17,383</td>
</tr>
<tr>
<td>1999</td>
<td>17,259</td>
</tr>
<tr>
<td>2000</td>
<td>18,226</td>
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<tr>
<td>2001</td>
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<tr>
<td>2003</td>
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<tr>
<td>2004</td>
<td>27,772</td>
</tr>
<tr>
<td>2005</td>
<td>19,014</td>
</tr>
<tr>
<td>2006</td>
<td>14,196</td>
</tr>
<tr>
<td>2007</td>
<td>11,633</td>
</tr>
<tr>
<td>2008</td>
<td>12,911</td>
</tr>
</tbody>
</table>

Appendix C

Glossary

Discounting  
In cost-benefit analysis, a discount rate is applied to the present dollar amounts of the known costs and benefits in order to calculate the future value of these same costs and benefits. The higher the discount rate, the lower the perceived value of the future cost or benefit. There is, unfortunately, considerable room for subjectivity on the part of the analyst in the assignment of discount rates.

Externalities  
External costs and benefits are those costs and benefits that accrue to an individual or a corporation that is not a party to the action that has caused the cost or benefit. Farmers and ranchers who clear forest do not, generally, bear the costs of the damage they do to the environment at the present and in the future.

Ideology  
A set of beliefs and values held by individuals more for the personal advantages that the use of the ideas confers on the individual than for any objective appreciation of the truth or goodness or beauty of the ideas. Privatization of natural resources such as forests is a tenet of just such an ideology.

Marginal costs  
The change in total cost whenever the output is increased by one unit. There are, for example, unresolved disputes among analysts regarding the extent of the marginal costs of the sequestration of carbon in Amazonian forests.

Neoliberalism  
The dominant ideology in the post-Cold War world. It is the ideology of privatization, deregulation, and reduced social spending -- in the belief that individualism and competition and greed will produce a better and more efficient use of the Earth’s resources than central planning, cooperation, and sharing will.

Opportunity costs  
The cost of the next best choice available to an individual or corporation that has chosen one option among several possible choices. In the context of deforestation in the Brazilian Amazon, cattle ranching is an opportunity cost for everyone who foregoes clearing of the forest area and chooses environmentally sound forest management.
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option value</td>
<td>Term from economics. It is used for contrast to use value. For instance, preservation is/has an option value. Logging is/has a use value.</td>
</tr>
<tr>
<td>Paradigm</td>
<td>Refers to the set of practices that define a scientific discipline in a particular period. The paradigm is a model or an example of what is regarded as “normal” in the particular field of science at the given time. The paradigm establishes the parameters for what can be questioned and what should be accepted without being questioned, for what can be assumed to be true without needing further investigation.</td>
</tr>
<tr>
<td>REDD</td>
<td>Acronym for Reducing Emissions from Deforestation and Forest Degradation. REDD is a United Nations initiative to offer financial incentives to developing countries to reduce greenhouse gas emissions caused by forest clearing. The REDD+ initiative attempts to create incentives for the conservation of forests and forest carbon stocks and incentives for the sustainable management of forests.</td>
</tr>
<tr>
<td>Science</td>
<td>A method of acquiring knowledge that is the antithesis of ideology, science involves, as a minimum, the use of observations, hypotheses, predictions, experiments, and conclusions.</td>
</tr>
</tbody>
</table>
Appendix D

Credentials of the Researchers

Frank Ackerman  The Director of the Global Development and Environment Institute at Tufts University.

Lykke E. Andersen  The director of the Institute for Advanced Development Studies in Bolivia; holds a Ph.D. in Economics from Aarhus University in Denmark; has worked on development projects for more than 10 years, living and working in Denmark, the United Kingdom, Kazakhstan, the U.S.A., Brazil, Nicaragua and Bolivia; speaks English, Spanish and Danish fluently, and reads German, Portuguese and French.


Robyn J. Burnham  The Professor of Ecology and Evolutionary Biology at the University of Michigan.

Joao Campari  The director of the Brazilian chapter of The Nature Conservancy, a leading conservation organization, founded in 1951, that works around the world to call attention to and find solutions for conservation threats. Its goal is to find what it calls “non-confrontational, pragmatic solutions” to conservation challenges by partnering with indigenous communities, businesses, governments, multilateral institutions, and other non-profits.

Kenneth M. Chomitz  A lead economist in the World Bank’s Research Department; a graduate from the Massachusetts Institute of Technology with a major in mathematics, he earned a Ph.D. in economics from the University of California at Irvine; a researcher on the causes and consequences of land use change and on climate change.

Paul Colinvaux  An ecologist, professor emeritus at Ohio State University, and a researcher with the Marine Biological Laboratories in Woods Hole, Massachusetts.
Jared Diamond  The UCLA geography professor and author of *Guns, Germs, and Steel: The Fates of Human Societies* and *Collapse: How Societies Choose to Fail or Succeed.*

Alwyn H. Gentry  An American botanist and plant collector; earned a master’s degree at the University of Wisconsin–Madison and a doctorate from the Washington University in St. Louis, Missouri; spent his entire working career at the Missouri Botanical Garden; credited with having collected over 80,000 plant specimens, hundreds of them species new to science; author of the *Field Guide to the Families and Genera of Woody Plants of Northwest South America.*

Jürgen Haffer  A German ornithologist, bio-geographer, and geologist; author of the theory of Amazonian forest refugia during the Pleistocene, the idea that scattered refuges of forests surrounded by surviving savannah resulted in the speciation and diversification of plants and animals in the Amazon.

Garrett Hardin  Educated as a zoologist and a micro-biologist; a Professor of Human Ecology at the University of California at Santa Barbara for many years in the 1960s and 1970s.

Lisa Heinzerling  A Harvard Law School professor.

Henry Hooghiemstra  The University of Amsterdam professor of Palynology and Quaternary Ecology.

David Humphreys  A senior lecturer in Environmental Policy at the Open University in Great Britain and the director of the Open University’s Geography department; holds a Ph.D. in international forest politics from City University (London).

Bjørn Lomborg  Earned a Master’s degree and a Ph.D. in government and political science (*statskundskab*) at Århus University; worked as an associate professor from 1997 to 2005; an adjunct professor at a Danish business college, the Copenhagen School of Business, since 2005 and the director of the Copenhagen Consensus Center, a think-tank based in Denmark, since 2006; more of a popularizer and a polemicist than a scientist.
Sergio Margulis  An environmental economist for the World Bank; from 2007 to 2009, served as the coordinator of the Brazil Economics of Climate Change Study project. He holds a Ph.D. in environmental economics from the University of London.

P. E. De Oliveira  A professor and researcher from the Instituto de Geociências at the Universidade de São Paul.

David Rind  Earned a Ph.D. at Columbia and is a researcher at the NASA Goddard Institute for Space Studies.

Jukka Salo  A professor in the Department of Quaternary Geology at the University of Turku in Finland.

Thomas Van der Hammen  A leading expert on biodiversity in Colombia (1998); the predecessor and colleague of Hooghiemstra.