

Pepperdine University
Graduate School of Education and Psychology

ASSESSMENT OF EDUCATION FOR SUSTAINABLE DEVELOPMENT IN
UNIVERSITIES IN COSTA RICA: IMPLICATIONS FOR LATIN AMERICA AND
THE CARIBBEAN

A dissertation submitted in partial satisfaction
of the requirements for the degree of
Doctor of Education in Educational Technology

by

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January, 2010

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TABLE OF CONTENTS

	Page
LIST OF TABLES.....	viii
LIST OF FIGURES.....	ix
DEDICATION.....	x
VITA.....	xi
ABSTRACT.....	xii
Chapter 1. Introduction and Problem Statement.....	1
Introduction.....	1
Education for Sustainable Development.....	1
Decade of education for SD.....	2
Higher education as a significant factor to achieve SD.....	2
The Earth Charter.....	3
Statement of the Problem.....	3
Purpose of the Study.....	4
Significance of the Study.....	5
Research Questions.....	5
Methodology.....	6
Limitations of the Study.....	6
Chapter 2. Literature Review.....	8
Introduction.....	8
First Pillar of SD: Ecology and the Environment.....	10
Human activities on the environment.....	10
The value of biodiversity and ecosystems.....	22
Second Pillar of SD: Socio-Economics.....	23
Third Pillar of SD: Equity.....	27
Ethical perspective of inter and intra generational equity.....	27
Inter and intra generational equity for SD.....	28
Evolution of SD as a Concept.....	30
Pioneers of SD.....	30
Overpopulation: Malthusians versus Cornucopians.....	32
The Tragedy of the Commons.....	34
The birth of SD.....	35
The Brundtland Report.....	36
Concerns and Criticisms.....	37
Vagueness of the definition.....	38

Hypocrisy: Greenwashing.....	43
Delusion: SD as an oxymoron.....	44
Other criticisms.....	44
The Precautionary Principle.....	47
A Solid Base to Achieve SD: Education.....	48
Education for Sustainable Development.....	48
The Stockholm Conference.....	48
The Belgrade Charter.....	49
The Tbilisi Declaration.....	49
The Earth Summit.....	49
ESD in Higher Education.....	50
Influence of higher education in human behavior change.....	51
Relationship between higher education and social change.....	51
Higher education as a significant factor to achieve SD.....	53
International Agreements to include ESD in Higher Education.....	55
The Talloires Declaration.....	56
The Halifax Declaration.....	57
The Kyoto Declaration.....	58
The Swansea Declaration.....	58
The CRE-COPERNICUS Charter.....	59
The Thessaloniki Declaration.....	59
The Lüneburg Declaration.....	59
The Ubuntu Declaration.....	60
The Decade for ESD.....	60
The International Implementation Scheme.....	61
ESD in the LAC Region.....	61
Costa Rica as a pioneer of ESD in the LAC region.....	62
Conclusions.....	63
 Chapter 3. Methodology.....	 65
Introduction.....	65
Importance of Qualitative Studies for Educational Research Developing Countries... ..	65
Research Design.....	66
Population.....	67
Instrument.....	67
Criteria for the Selection of the SAQ.....	69
Description of the Questionnaire.....	69
Administering the Survey and Data Collection.....	72
Data Coding and Analysis.....	73
 Chapter 4. Results.....	 75
Introduction.....	75
Brief History and Structure of the Higher Education System in CR.....	75
Population.....	79

Results to Introductory Questions Regarding the Framework UNESCO-DESD	81
Results to Research Questions One and Two: Inclusion of ESD in Curriculums	84
Results to Research Question Three: ESD required for Undergraduate Students	85
Results to Research Question Four: Research and Scholarship in SD	85
Results to Research Question Five: ESD as a Factor for Faculty and Staff Hiring and Promotion.....	86
Results to Research Question Six: SD Initiatives for the Community	87
Results to Research Question Seven: Student Opportunities for SD Initiatives.....	88
Results to Research Question Eight: Commitment for Sustainability	91
 Chapter 5. Discussions of Results, Conclusions, and Recommendations	 97
Introduction.....	97
Summary of the Problem and the Purpose.....	97
Discussions about the Methodology	98
Discussions to Results of Research Questions.....	100
Discussions to results of introductory questions.....	100
Discussions to results of research questions one and two.....	101
Discussions to results of research question three.....	102
Discussions to results of research question four.....	103
Discussions to results of research question five.....	103
Discussions to results of research question six.....	104
Discussions to results for research question seven.....	104
Discussions to results of research question eight.....	105
Implications for the LAC Region	106
Implications in the LAC region to achieve SD.....	107
Role of Costa Rica’s universities to promote regional ESD.....	108
Regional higher education accreditation.....	109
Implications in the advance of regional research.....	110
Economic Implications	110
Debt-for-Nature swaps.....	110
Economic competitiveness and SD.....	111
Sustainable Tourism.....	111
Conclusions of the Study	112
Purpose and significance of the study.....	112
Conclusions regarding the methodology applied and the instrument.....	114
Conclusions regarding the results of the study.....	114
Final conclusions.....	116
Recommendations for Further Studies.....	116
 REFERENCES	 118
 APPENDIX A: Presentation Page	 130
 APPENDIX B: Introduction Page	 132

APPENDIX C: Questionnaire..... 134

APPENDIX D: The Earth Charter..... 141

LIST OF TABLES

	Page
Table 1. List of Public Universities	80
Table 2. List of Private Universities	80
Table 3. Percentage of Responses to Introductory Questions.....	82
Table 4. Significant Statements to Clarifying SD Definition	83
Table 5. Percentages of Inclusion of Sustainability in Curriculums.....	84
Table 6. Requirement of ESD for Undergraduates.....	85
Table 7. Extent of Research or Scholarship in SD.....	86
Table 8. ESD as a Factor for Faculty and Staff Hiring and Promotion	87
Table 9. SD Initiatives for the Community.....	87
Table 10. Organizations for Student Opportunities in SD Initiatives.....	89
Table 11. Events to Encourage Students Participation in SD Initiatives.....	90
Table 12. Student Groups Involvement in Sustainability.....	90
Table 13. Extent of Formal Written Compromises to Sustainability.....	91
Table 14. Positions, Committees, or Practices to Sustainability.....	93
Table 15. Activities to Give Visibility to Sustainability.....	93
Table 16. Strengths Implementing ESD	94
Table 17. Weaknesses Implementing ESD.....	94
Table 18. Next Steps Planned to Strengthen Commitment to ESD	95

LIST OF FIGURES

	Page
Figure 1. Pillars of Sustainable Development.....	9
Figure 2. Role Higher Education for Sustainable Development.....	54
Figure 3. Structure of the Higher Education System in CR.....	78
Figure 4. Significance of the Study at University Level.....	113

DEDICATION

In memory of my grand-father Dario Carrillo, from whom I inherited my passion for education and a deep respect and love for our fellow species.

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ABSTRACT

Higher Education is a key factor for social change influencing future decision-makers in business, education, politics and science. As such, sustainable development requires creating awareness amongst these decision-makers of their responsibilities and opportunities in this area. Higher education for sustainable development is championed in developed countries, but in developing countries it is just beginning to become an element of interest for the international community.

The purpose of this study was to perform an assessment of the extent to which universities in Costa Rica are including education for sustainable development in their programs and curriculum, research and scholarship, faculty and staff development and rewards, outreach and service at the local, regional, national, and international level, student opportunities, and institutional mission and planning. The focus of this research is on universities in Costa Rica for being this country a pioneer in the region for introducing education for sustainable development in their national public education system. The study will be concluded describing some of the implications in the rest of the Latin America and the Caribbean region of the commitment of Costa Rica to ESD, specifically in higher education.

The type of research selected for this study was quantitative-qualitative exploratory cross-sectional. The instrument selected was based on *The Sustainability Assessment Questionnaire* developed by the *University Leaders for a Sustainable Future* and supplemented with six additional questions based on the framework of UNESCO-DESD.

Results of this study might provide relevant information to national and international organizations regarding the status of the inclusion of education for sustainable development in universities in Costa Rica. The study might also create awareness in universities in which sustainability is currently not being addressed. This study might promote actions or plans of action adopted by higher education institutes in the Latin America and the Caribbean region to meet the goal of UNESCO. The results of this research might be used as a baseline for future studies to perform full assessments of sustainability in institutes of higher education. These results also might motivate scholars to generate new theories and hypotheses from the data that emerged.

Chapter 1: Introduction and Problem Statement

Introduction

It is widely accepted that the ultimate goal of development is to improve people's lifestyle by eliminating poverty, unemployment, and inequality (Seers, 1969); however, until the end of the last century development was associated with economic growth, conceived as the increase in production and consumption by a society (Arndt, 1987). This association between development and economic growth created an alarming increase in overexploitation and consumption of resources, leading the planet to an unprecedented scale of pollution and environment deterioration (Daly, 1996).

In order to address the problem of the deterioration of the environment caused by economic growth, the United Nations (UN) established in 1983 the World Commission on Environment and Development (WCED). In its final report published in 1987 titled *Our Common Future* (also known as *The Brundtland Report* after the chairman of the committee), the commission suggested the creation of a new approach for development. This new approach was called *Sustainable Development* (SD), and it was defined as a "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (UN-WCED, 1987, chapter 2, part I).

Sustainability, a more generic concept which covers all the relationships between the environment and human activities (Dovers & Handmer, 1993), will be used interchangeably with SD for the purpose of this study.

Education for Sustainable Development

Education for Sustainable Development (ESD) is considered as a multidisciplinary area of knowledge which must include environmental awareness of

ecosystems and natural resources, their importance and limitations, the threats that human activities present to them, and build the skills necessary for monitoring, analysis and intervention (Geiser, 2006). ESD must also include principles of social-economic and environmental values and ethics, a commitment for life and its preservation, and an “attachment to qualities of health, harmony, balance, diversity, peace, participation, and justice” (Orr, 1992, p.145).

Decade of education for SD. In 2002, the UN declared the years 2005 through 2014 as the Decade of Education for Sustainable Development (DESD). The goal of DESD is to integrate the values and practices of SD into all aspects of education. The UN Educational, Scientific, and Cultural Organization (UNESCO) was required to lead the DESD and develop the International Implementation Scheme (IIS) to describe the goals and objectives of the Decade and identify key milestones. One of the key milestones is the collection of indicators of progress about the inclusion of SD in all areas of education.

Higher education as a significant factor to achieve SD. In The Brundtland report, the UN Commission stated that a development that is sustainable requires a progressive transformation of economy and society (UN-WCED, 1987, chapter 3, part IV). Numerous studies indicate that education, specifically higher education, plays a significant role to produce social and economical change (e.g., Bowen, 1977; O’Neal and Trent, 2005; Shoben, 1971). Because of the important role that universities play to produce social and economic change, higher education has been considered as a significant factor to achieve SD (Geiser, 2006). A more detailed description about the link between higher education and SD is described in Chapter 2.

Since the 1990s universities began to participate and sign international agreements and declarations in which they acquire the compromise to introduce ESD in their curriculums, as well as to implement sustainable practices in their regular operations. A short review of the most important of these declarations will be covered in Chapter 2 as well.

The Earth Charter. Contributors to the WCED made a call for the creation of a *Universal Declaration* to set norms for SD. A draft of the *UN Earth Charter* was developed during the Earth Summit in Rio de Janeiro in 1992.

In 1994 Maurice Strog, Secretary-General of the Rio Summit, and Mikhail Gorbachev, director of the Earth Council Organization, ex-president of the USSR, and director of Green Cross International, decided to join efforts and create the Earth Charter as a civil society initiative with the initial support from the government of the Netherlands. In 2000, after numerous drafts, the Earth Charter Commission came to a consensus and the Earth Charter was formally launched at the UNESCO meeting in Paris. The UNESCO 32nd General Conference in October of 2003 adopted a resolution recognizing the Earth Charter (see Appendix D) as an important tool to achieve SD and made the commitment to use it as an educational instrument and framework for the DESD.

Statement of the Problem

In developed countries, private and public organizations have performed studies assessing the status of ESD in their institutes of higher education. For example, the College Sustainability Report Card 2008 (Sustainable Endowments, 2007), and Progress

Toward Sustainability in Higher Education (Calder & Clugston, 2003b), describe the status of sustainability in universities and colleges in The United States of America.

In Europe, organizations such as the Dutch Network for Higher Education and Sustainable Development and the Foundation for Sustainability in Higher Education, have endorsed studies of sustainability in institutes of higher education mainly in Dutch universities. In Germany, the Hamburg Technical University leads projects funded by the European Union (EU) that incorporate SD in universities in Germany, Holland, Spain, and Sweden. The United Kingdom's Higher Education Partnership for Sustainability (HEPS) has the mission of transforming UK institutions of higher education toward sustainability (Calder & Clugston, 2003a).

Studies of this type are scarce in developing countries (W. Calder, personal communication, October 26, 2007). Some countries in the Latin America and the Caribbean (LAC) region, such as Costa Rica, have created national policies to include ESD at all levels of education (Mendoza, Quesada, & Solis, 1995). However, there is not a comprehensive study of progress's indicators of the inclusion of ESD in higher education institutions.

Purpose of the Study

The purpose of this study is to perform an assessment that measures the extent to which universities in Costa Rica are including ESD in programs and curriculum, research and scholarship, faculty and staff development and rewards, outreach and service at the local, regional, national, and international level, student opportunities, and institutional mission and planning. The study will be concluded with the description of some of the

implications for the rest of the LAC region of the commitment of Costa Rica to include ESD in their national education system, specifically in its universities.

Significance of the Study

Results of this study might be used for multiple purposes such as providing relevant information to national and international organizations regarding the status of the inclusion of ESD in universities in Costa Rica. The study might also create awareness about ESD in universities in which this topic is currently not being addressed. This study might help to promote actions or plans of action adopted by higher education institutes in the LAC region to meet the goal of the DESD consisting of integrating principles, values, and practices of SD in all aspects of education and learning by the year 2014. The results of this research might be used as a baseline for future studies to perform full assessments of sustainability in the institutions of higher education in the LAC region. Finally, the results of this study might motivate scholars to generate new theories and hypotheses from the data that will emerge.

Research Questions

1. To what extent have universities in Costa Rica included ESD in their curriculums?
2. In what curriculums has ESD been included?
3. Are universities in Costa Rica requiring undergraduates to take courses in sustainability?
4. To what extent are universities in Costa Rica addressing research and scholarships in sustainability?
5. To what extent is ESD recognized as a factor for faculty and staff hiring and promotion?

6. To what extent are these universities participating in SD initiatives for the community at the local, regional, national or international level?
7. To what extent are these institutions providing opportunities for students to participate in SD initiatives?
8. To what extent are universities in Costa Rica committed to ESD?

Methodology

The type of research selected for this study was quantitative-qualitative exploratory cross-sectional. The instrument selected was based on The Sustainability Assessment Questionnaire (SAQ) developed by the University Leaders for a Sustainable Future (ULSF) (see Appendix C). The survey was supplemented with six additional questions based on the framework of UNESCO's DESD (UNESCO, 2002).

Participants were selected from a list of universities from the Costa Rica's minister of education web site (see Table 1 and Table 2). Academic Deans for each of the universities were contacted via telephone and via email asking them to participate in the study. A final email was sent to participants with a link to the survey (see Appendix A for letter of presentation and Appendix B for letter of introduction).

Results of the survey are described in detail in Chapter 4 and discussions about the results, conclusions, and recommendations are presented in Chapter 5.

Limitations of the Study

This study was intended to assess exclusively ESD practices. For a full assessment of sustainability in universities, a deeper analysis of practices in installations and utilization of resources in campuses is necessary. To create a systematic comparison

of sustainability among institutes of higher education, it is necessary a full assessment and it requires the verification of independent evaluators.

Although this study might provide some directions to improve practices towards ESD in universities, it is not intended to provide a full path towards sustainability.

Academic deans were contacted by phone and email to participate in the research and some of them answered the survey personally. Some of them delegated this task to subordinates. Since there was not field verification to validate the responses, the validity of this research is based on the assumption that participants knew well enough their university in order to respond accurately to the survey.

Chapter 2: Literature Review

Introduction

The objective of this chapter is to build a framework for this study by assessing the body of literature based on each of the multiple pillars of SD. This assessment will provide a rationale for the adoption of the Brundtland's definition as well as a rationale about the importance of ESD as the solid foundation by which SD can be achieved.

The first section of the chapter describes the negative impact of Homo sapiens on the environment and the value of biodiversity. Environmental problems have been attributed to two vicious cycles: the vicious cycle of poverty and the vicious cycle of economic development (Rogers, Jalal, & Boyd, 2008). The vicious cycle of poverty is created when people with minimum resources for existence cause depletion of resources and environmental degradation as a necessity for survival. This negative impact on the environment further entrench poverty. The vicious cycle of poverty can be broken by providing the poor with basic necessities such as health, education, shelter, productive employment, and population control.

The second vicious cycle is created when economic growth leads to the depletion of resources and environmental degradation. The negative impact on the environment caused by unlimited economic growth retards or even stops development, requiring more resources, which causes more depletion and environmental degradation.

According to Rogers et al. (2008), the vicious cycle of economic growth that causes resources depletion and environmental degradation can be broken by integrating policies and plans that assess the impact of projects on the environment, reduce the rural-

urban migrations, use technology for development, use renewable energy, and promote international cooperation between developed and developing countries.

In the UN 2005 World Summit Outcome document it was stated that economic development, social development, and environmental protection, are three “interdependent and mutually reinforcing pillars” of SD (p. 12). Figure 1 shows these three pillars and how ESD can be considered as the foundation for SD. The rationality will be discussed further in this chapter.



Figure 1. Pillars of Sustainable Development. Original graphic produced by the author.

The second section of the chapter addresses the economic development pillar of SD from its historical perspective to clarify the distinction between economic growth and development; the third section addresses the social equity pillar of SD from an ethical perspective, which for some is the most significant pillar of SD (Rogers et al., 2008); the

fourth section of the chapter describes the pioneers of SD, the evolution of the concept of SD, the concerns and criticisms, and the reason for the generalized adoption of the Brundtland's definition; and the fifth section discusses ESD, specifically higher education, as the solid foundation by which SD can be achieved.

Concluding the chapter, I argue that SD is a response to the current ecological-environmental and socio-economical crisis created by thousands of years of pollution, depletion of natural resources, and inequity. These crises are threatening not only the survival of other species around us, but the survival of the *Homo sapiens* specie itself.

First Pillar of SD: Ecology and the Environment

Human activities on the environment. In recent years, the scientific community has come to the realization that the evolution of *Homo sapiens* has imprinted a ruinous signature on the rest of the natural world (e.g., Goudie, 1994; Leakey & Lewin, 1995; Mannion, 1991). It is well known in the scientific community the negative impact that some invasive species have over territories where they are able to adapt (Leakey & Lewin). Human colonization of pristine lands is an example of an invading species; "*Homo sapiens* is no ordinary species, and its attempts at invasion are almost always successful and almost always devastating for the existing communities" (p. 173).

The oldest records of tools created by human ancestors, consisting of crude stone tools, have been found in sediments from the Rift Valleys of East Africa dating back three million years (Goudie, 1994); since that time, humans have spread over virtually the entire surface of the planet, first into Southeast Asia between 1.5 and 1.0 million years ago, then to the north zone expanding almost to the Arctic region between 300,000 and

40,000 years ago, and then to the rest of Europe, Asia, Australia and the Americas in the recent thousands of years (Mannion, 1991).

As the Stone or Paleolithic Age progressed, tools became more sophisticated and more effective, allowing the construction of complex shelters and the exploitation of plants and animals (Goudie, 1994). Hand-axes found at Olorgesailie in Kenya in conjunction with an abundance of bones of *Theropithecus Oswaldi*, an extinct giant baboon, might indicate that human ancestors were able to hunt them and dismembered them; also there is convincing evidence of animal exploitation from the painted caves of southwest France (Mannion, 1991).

Evidence of the use of fire, a major agent by which humans have been able to change the environment, have been found in deposits of Choukoutien, China dating back between 600,000 and 700,000 years (Goudie, 1994). Other evidences from Choukoutien suggest that human ancestors were active hunters (Mannion, 1991). The effect of fire, hunting, and the diffusion of seeds and nuts by human ancestors migrations might have had some effect on animal extinction in what is called the “Pleistocene overkill” (Goudie, p. 15).

The Mesolithic period, between 10,000 and 5,000 years ago, was a transition between the old stone ages (Paleolithic) and the new stone ages (Neolithic), which impacted primarily Europe (Mannion, 1991). This period coincides with the Protocratic and Mesocratic phases of the interglacial cycle, in which moderate forest replaced vast tracts of tundra; this phenomenon did not occur elsewhere in the world. Mannion suggests that the cause for this replacement might have been ecological pressures of Paleolithic human groups in the region.

This period also witnesses massive extinction of fauna (Goudie, 1994). In the British Islands, many mammals including the woolly rhinoceros, woolly mammoth, bison, cave lion, spotted hyena, and the giant deer so prolific in deposits in Ireland, disappeared during this period (Mannion, 1991). Similar extinctions have been registered in North America where 35 mega faunal species disappeared, and in South America 46 species went into extinction during exactly the same period (Leakey & Lewin, 1995).

Currently there is much speculation about the causes of these massive extinctions. Some scientists argue that such extinctions were due to drops in temperatures, although there is clear evidence that humans did hunt some of these animals (Mannion, 1991). Martin and Klein (1984) suggest that humans were responsible for these extinctions, at least in North America, based on the fact that such animals survived earlier colder periods, including ice ages, and many of these extinctions coincided with the arrival of humans.

Leakey and Lewin (1995) argue that in America hunters were easily able to kill large number of prey probably because animals were unused to the new predator with no fear to humans, and that similar circumstances occurred in other places of the world such as in the pacific islands, where animals evolved in the absence of humans and were vulnerable to efficient hunters; however, something contrary happened in Africa, where animals evolved with the presence of humans and learned to fear them; a reason that might explain why the biodiversity of animals in Africa is higher than in any other continent.

According to Mannion (1991), at the end of the Paleolithic, mobility of humans was reduced due to the fact that hunting territories were compacted, population was

growing, and pressure on natural resources stimulated plants and animals domestication to ensure adequate food supply, creating a more sedentary living in what is called the Neolithic period between 8,500 and 5,300 years ago; environmental changes were evident due to agriculture development in the need of cleaning of natural vegetation to make space for arable fields resulting in the decreasing diversity of species. Although there is evidence that fire caused deforestations in the British Islands and in some other regions of northern Europe, what is controversial is the source of such fires which could have been either caused by humans or by natural sources; however, the notion that humans might have been the culprit is based on the fact that humans were able to manipulate fire during such periods of deforestation.

The use of metals enhanced the ability of humans to manipulate and bring changes to their environment during the Bronze and Iron ages between 3,200 and 2,800 years ago (Mannion, 1991). During this period, there is evidence of the creation of irrigation systems for agriculture purposes such as in Egypt and Mesopotamia, and evidence of forest cleaning and extensive soil deterioration in certain areas of Britain and Europe.

Wagstaff (1985) states that problems of over-irrigation in lower Mesopotamia caused higher level of salinisation which might have contributed to the decline of the *Ur* civilization by the year 4,000 BP. Mannion (1991) states that problems associated with an overstretched agricultural systems, such as poor harvest and droughts, may have caused the collapse of the Mycenaean civilization, and that there is also evidence of environmental problems associated with poor agriculture practices in some regions of the Balkans due to excessive upland grazing.

As agricultural practices improved population increased, trade grew, and civilizations such as the Greeks and the Romans emerged. Archeologists estimate that the city of Nineveh may have a population of 700,000, Augustan Rome one million, and Carthage 700,000 (Thirgood, 1981). There is plenty of evidence that these civilizations impacted negatively their environment cutting and burning forests as agriculture intensified to plant olive trees, grapes, and cereals, and population expanded to create villas and farms (Mannion, 1991).

There is no doubt about the technological ability of the Romans to transform the landscape: construction of large-scale drainage, irrigation and communication networks, large pottery-producing centers, and the development of iron-extracting industries which required enormous amounts of wood for charcoal, created deforestation and stress on the environment (Mannion, 1991). With the collapse of the Roman Empire and the surge of the dark ages, forests regenerated in certain parts of Europe as the extent of pasture and arable land declined; regardless of this short period of recovery, when the Normans arrived in Britain in 1066, only 15% of the land was wooded (Rackham, 1985). The emerging of monarchies in Medieval Europe created new changes in the landscape because of the creation of villages and towns, in contrast to the dispersed groups that characterized the post-roman period, with the need of more land for pastures and agriculture to support the increase of population placing once again more pressure on the land (Mannion).

Many European metallurgy industries were developed during the XV and XVI century. Charcoal, as a source of energy, became scarce due to the high levels of deforestation perpetrated during the preceding millenniums and eventually was replaced

by coal (Mannion, 1991). The Industrial Revolution of the XVIII, IX, and XX century would have not been possible without coal-mining, an activity which has had the greatest impact on the environment.

By the time of the Industrial Revolution many European nations had already become well established in other parts of the world, especially in America, Africa, and Australia, introducing agricultural systems and exploiting the wealth of their colonies, and transforming the landscape to generate revenue for Europe. The introduction of non-indigenous animals and crops, many unsuited for the new environment, resulted in a large scale of degradation of the land which has had continuing repercussions until today (Mannion, 1991).

In Africa, land degradation is one of the major present problems. This land degradation has been a direct outcome of colonialism, which created large-scale social disruptions and massive migrations with catastrophic environmental consequences (Mannion, 1991). In America and Australia, the environmental consequences of European colonialism has been devastating for the environment, due to the radical changes in social structures, the imposition of European traditions in agrarian techniques and mining, and forcing the mobilization of natives from remote to urban areas.

According to Mann (2005), native population declined in alarming numbers due to diseases such as viral hepatitis and smallpox carried by the Europeans which natives did not have any defenses. In just three years, 90% of the native population along the coast of New England died as a consequence of viral hepatitis carried by the English. As a response to this decline in population, Europeans imported African slaves to substitute native labor in activities such mining and crop production.

Extensive deforestation and erosion occurred in North America due to technological innovations capable of modifying the environment on a grand scale to satisfy the necessities of the large population growth, resulting in massive migrations from Europe and high birth-rates of established settlements (Mannion, 1991). By 1880, the red pine became exhausted, and by 1920 most of the merchantable pine, hemlock, and smaller hardwoods were chopped by the lumber industry. According to Goudie (1994), from the 170 million hectares of tress before European colonialism, less than 0.01% actually remain.

Hawaii is perhaps one of the most isolated groups of islands in the world; however, it suffered enormous devastation as a result of human occupation. According to Leakey and Lewin (1995), from the 135 bird species existing in Hawaii only 11 are in acceptable numbers, a dozen are so rare that there is little hope of saving them, and a dozen are legally classified as endangered. In another remote island in the pacific ocean, the Easter Island, inhabitants might have sown their own demise due to deforestation (Goudie, 1994).

Numerous scientists argue that the decline of wildlife in the Americas due to human interference has been large (e.g., Goudie, 1994; Leakey & Lewin, 1995; Mannion, 1991). For example the passenger pigeon, one of the most common birds in America, were counted by the billions according to publications from the time, which describes the birds “so numerous than when they traversed the forest they were able to intercept the rays of the sun, sometimes lasting up to three hours” (Leakey & Lewin, p. 193). By the 1900s, the passenger pigeon became extinct in the wild due to massive hunting; the last bird name Martha died on September 1, 1914 (Mann, 2005).

According to Conacher (1986) there is no other area on Earth that has been so rapidly cleared by humans of its native species than Australia. In 80 years, 15 million hectares have been cleared in Western Australia, and as a consequence, surface water is unsuitable for human consumption, turning land degradation, due to erosion and salinisation, into the most significant Australian environmental problem (Mannion, 1991). Saunders and Hobbs (1989) report that some 104 species of plants have become extinct and 13 native mammals have disappeared from the region, nine of them are now extinct; the major culprit of this catastrophic ecological disaster has been the introduction of non-native species such as rabbits, goats, buffalos, blackberries, pampas grass, and others, which has depleted native species of valuable resources.

Leakey and Lewin (1995) qualifies modern times as a “massive extinction perpetrated by humans” (p. 243). A few examples of this massive extinction cited by Leakey and Lewin are the following: In lake Victoria more than 2000 species of fish disappeared in the 1980s; in little more than a decade, 90 species of plants became extinct when the forested ridge in the Ecuador Andes was cleared for agriculture; in Malaysia, half of the freshwater fish of the peninsular recently became extinct, while ten bird species of Cebu in the Philippines have vanished; in recent years, half of the 41 tree snails in Oahu and 44 of the 68 shallow-water mussels of the Tennessee River have been declared extinct.

Deforestation and destruction of habitats is one of the reasons of this massive extinction (Goudie, 1994). By 1990, the annual deforestation of 62 countries, which represented 78% of the tropical forest, was 60,000 square miles (Lanly, Singh, & Janz, 1991). Richards (1991) argues than since the 1700s, about 19% of the world’s forest and

woodlands have been removed. Leakey and Lewin (1995) cited two independent reports of the early 1990s, one by the World Resources Institute and the second by the United Nations Food and Agriculture Organization, in which it was declared that a range of 80,000 square miles of forest are being lost each year.

Industrial fumes dumped on the air kill vegetation. In Canada, two million of noxious gases per year has affected an area of 1900 square kilometers, killing White pine and reducing it to only 7% of the productive area; in Swansea Valley, Wales, a century of coal-burning fumes completely destroyed the vegetation and produced soil erosion turning the area into a desert; The Ponderosa pines in the San Bernardino mountains in California, has been extensively damaged by the smog produced in Los Angeles area, which has affected up to 129 kilometers around that area (Goudie, 1994).

There is plenty of evidence which demonstrates that industries have polluted water and soil: Moran, Morgan, and Wierma (1986) state that more than 60% of acid drainage in the USA derives from runoff from coal-mine spoils. Industrial waste, in the form of detergents and heavy metals such as mercury, have negatively impacted the environment affecting the food chain and poisoning humans themselves; such was the case in Japan, where the disposal of 20 years of methyl mercury resulted in approximately 100 deaths and disabling up to 1000 people (Mannion, 1991).

Industrial pollution has had an adverse effect on animals as well. Arsenic emissions from silver foundries are known to have killed deer and wild rabbits in Germany; sulphur emissions from a pulp mill in Canada are known to have killed many song-birds; industrial fluorosis has been found in deer in the USA and Canada; asbestosis has been found in baboons and rodents in the vicinity of asbestos mines in South Africa;

and oxidants from air pollution are known to cause blindness in bighorn sheep in the San Bernardino Mountains near Los Angeles (Goudie, 1994).

One of the major man-made pollutants has been carbon dioxide. Siegenthaler and Oeschger (1987) state that before the Industrial Revolution the concentration of carbon dioxide was approximately 270 ppm (parts per million), but by 1953 it had increased to 312 ppm. New measures in the Hawaii islands have shown current levels of 350 ppm. This number will tend to increase as fossil fuel burning and deforestation increases (Mannion, 1991). Gribbin (1988) stated that between 1850 and 1950 approximately 60 giga-tons of carbon has been burnt and dumped in the environment, mainly by coal plants, and a similar amount is being burned every 12 years since then. Detwiler and Hall (1988) have calculated that in the 1980s, between 0.4 and 1.6 giga-tons of carbon is being disposed into the environment every year.

Carbon dioxide is being trapped in the atmosphere creating a greenhouse effect which leads to increases of temperature at large scale producing a phenomenon called *global warming* (Mannion, 1991). Computer models indicate that if this trend continues, rainfall patterns would change producing droughts in some areas of the world, as it has been observed in northeast Brazil, Australia, southern and eastern Africa, and the Midwestern of USA, while in some other areas precipitation would increase producing floods as reported in Peru, Bolivia, and Colombia. Global warming can also affect currents in the oceans creating abnormal weather patterns as it has been observed by the increase and intensity of cyclones in the Pacific Ocean.

Another significant impact of humans on the environment has been the use of fertilizers and pesticides used to increase agriculture production resulting in the

destruction of natural habitats at an unprecedented rate (Mannion, 1991). This destruction of habitats has turned agriculture into one of the most significant sources of pollution (Goudie, 1994). DDT and related insecticides were produced and applied massively after the World War II to control insects; however, a correlation and causality between the use of DDT and the bird population decline was found, especially in sea-birds such as bald eagles, peregrine falcon, and osprey.

In Israel, thallium-sulphate-coated wheat was used to control rodents to increase agriculture productivity impacting birds of prey which lived on the rodents; as a consequence, all the birds found dead were discovered with higher amounts of thallium, and by 1955, breeding and wintering populations of these species which fed mainly on rodents were almost entirely eliminated (Goudie, 1994).

Chesters and Konrad (1971) found that the cease of reproduction of trout were at record levels after DDT levels were built up. Southwick (1976) found that the use of DDD, another type of insecticide, was applied in low concentrations at Clear Lake in California. The result was that 99% of the larvae in the lake died, Western grebes were found dead with higher concentrations of DDD, and commercial fishes were found with concentrations 32,000 higher than the concentrations applied initially to the lake.

According to Myers (1979), between 1600 and 1900 humans were responsible for the demise of one species every four years and during the last century it became one species per day. He calculated that by the beginning of this century the rate of extinction is one species every hour. Leakey & Lewin (1995) states that the range of the number of species extinct each year due to human destruction is big, between 17,000 and 100,000, and although this range is wide and scientist do not agree on the exact number, they agree

on the fact that every effort to estimate the rate of species extinction has produced large numbers, and few dispute that 50% of the species of the planet are destined to disappear if current trends continue; “Homo Sapiens is poised to become the greatest catastrophic agent since a giant asteroid collided with the Earth sixty-five million years ago, wiping out half of the world’s species in a geological instant” (p. 241).

In the year 2000 the UN created the *Millennium Ecosystem Assessment* (MA) with the objective of assessing changes in the ecosystems due to human activities, and to determine what actions are needed to enhance the conservation and sustainable use of these ecosystems. The MA involved the work of more than 1,360 experts worldwide and their findings are contained in five volumes and six reports (Reid, 2005). In 2005, the MA published their findings. Some of these findings are following:

- Over the lap of 50 years, humans have changed the ecosystems more rapidly and extensively than in any comparable period of human history in order to meet the rapidly growing demands for food, fresh water, timber, fiber, and fuel. These changes to the ecosystems have resulted in a substantial irreversible loss of the diversity of life on Earth.
- During the last few decades, approximately 20% of the world’s coral reefs were lost and an additional 20% is degraded.
- During the last few decades 30% of mangrove areas were lost and three to six times more water is held in reservoirs than in natural rivers.
- Flows of phosphorus have tripled since 1960 and the flows of reactive nitrogen in terrestrial ecosystems have doubled.

- During the past few hundred years, humans have increased the species extinction rate by as much as 1,000 times over background rates typical over the planet's history; between 10% and 30% of mammals, birds, and amphibian species are currently threatened with extinction.

In 2004, the International Union for Conservation of Nature (IUCN) published a document about the status of globally threatened species. In their report, the IUCN stated that 12% of known birds, 23% of mammals, 32% of amphibians, 18% of sharks, rays and chimaeras, 27% of freshwater in eastern Africa, 25% of conifers, and 52% of cycads are threatened with extinction (IUCN, 2004). In 2008, the World Watch Institute (2008) reported that the level of carbon dioxide in the atmosphere is at the highest level in the last 650,000 years,

The value of biodiversity and ecosystems. The need to maintain biodiversity has become one of the most important issue which humans must address (Goudie, 1994). Leakey and Lewin (1995) identified three ways of valuing biodiversity: (a) tangible benefits by extracting materials from the environment such as food, raw materials, and medicines; (b) the maintenance of a physical healthy environment in order to allow the circulation of gases, chemicals, and moisture; and (c) the aesthetic pleasure that humans derive from their experience of the diversity of life around them since appreciation of biodiversity is part of the biologically psyche of humans, product of its long evolutionary history. "If biodiversity is depauperated, by artificial or natural agency, so too is a fundamental component of human existence" (p. 127).

In the MA, scientist describe the value of biodiversity in terms of the services that ecosystems provide to humans and how these services are linked to human well-being

(Reid, 2005). According to the report, ecosystems provide services such as food, water, timber, fiber, and genetic resources; ecosystems also provide regulating services such as the regulation of climate, floods, disease, water quality, and waste treatment; ecosystems provide cultural services such as recreation, aesthetic, enjoyment, and spiritual fulfillment; and finally, ecosystems provide supporting services such as soil formation, pollination, and nutrient cycling. According to Randall (1991), there is a positive probability that literally any species, known and unknown, will eventually prove usefulness.

Second Pillar of SD: Socio-Economics

During the XVIII century, classical economist witnessed the problems of mercantilism and the beginning of the Industrial Revolution with the distribution of wealth between laborers and owners of the mediums of production. Smith (1761) stated that an “invisible hand” would control the economy to keep individuals from exploiting each other and would harness self-interest in benefit of the social good. He also stated that “the great system of government is helped by adding new manufacturers” (iv.i.11).

Mill (1848) proposed an economic model based on the notion of a stationary state, defined as a state with zero economic growth. This model was in contrast to the popular economic model of that time centered on the concept of the need to increase industrial productivity. Mill stated that “It is only in the backward countries of the world that increased productivity is still an important object” (p. 515). Mill rejected the belief that a stationary state was undesirable arguing that stationary states are states with considerable improvement because of better distribution of property, a system favoring equality, well-paid and prosperous laborers with no massive fortunes except for those earned during

their own lifetime, and with “sufficient leisure, physical and mental, from mechanical details, to cultivate freely the graces of life” (p. 516).

Mill’s economic theories were “hidden under the twentieth-century rubble of fascism and war” (Hodgson, 2001, p. viii) and the economic theory of Adam Smith prevailed. In the 1950s it was widely believed that through economic growth, conceived as an economic and social objective, the increase in production would generate an increase in income and consumption, which would eliminate social inequalities, and as a result development would be achieved (Rostow, 1960). *Gross National Product* (GNP) growth was considered the “objective and yardstick of development” (Thorbecke, 2007, p. 5).

The economic models of the 1950s suggested then that GNP investment in modern activities was necessary to increase income and consumption as a goal to obtain a constant rise of economic growth for development (Kahn, 1951). The industry was considered the engine for economic growth, while other sectors of the economy such as agriculture were seen as passive; nations that followed this model, minimized what they considered passive sectors such as agriculture, in order to grow active sectors such as the industry, to the point that some policies maintained artificially food prices at lower level in order to enhance industrial price.

In 1969, the International Labor Organization (ILO) launched the World Employment Programme (WEP), in which it was declared that the solution to the problems of underemployment, unemployment, and poverty was not being solved by simply accelerating the economic growth but rather it was necessary to raise the standard

of living and welfare of the poor; the failure of the economic model of the 50s to address the issues mentioned caused a change in mentality in the 1960s (Cobbe, 1976).

In the 1960s, the prevailing doctrine for development was dominated by an economic dualism between agriculture and industry where neither sector was leading or lagging (Nurkse, 1953). Within this doctrine, a flow of resources from industry to the agriculture sector was crucial because of the necessity to increase productivity in the agricultural sector to supply resources back to the industry. This theory named *balance of growth* called for equilibrium between the two sectors. Assistance from industrialized-rich countries to poor-agricultural countries was indispensable in order to achieve this balance. This theory led to the surge of the *two-gap* economic model which is considered as the first attempt to incorporate foreign aid into macroeconomics (Chenery & Strout, 1966).

Except for traditional neoclassic economists, by the 1970s it was generally accepted that development, understood simply as GNP growth, was not able to cope with the increasingly escalating level of unemployment and underemployment, the rise of poverty, and the continuous migration from rural to urban areas even in industrialized-rich countries (Thorbecke, 2007). These problems lead scholars and policy makers to re-evaluate the purpose of economic and social development. One of the most important representatives of this new period of economic theories was Seers (1969), who defined development as an economic process in which the goal is the reduction of poverty, inequalities, and unemployment.

Daly (1973) challenged traditional use of economic growth as the solution for problems of under-development and disproportionate distribution of wealth. According to

Daly, economic growth is constrained by an ultimate scarcity of environmental resources, and limited by thermodynamic laws in the technical efficiencies of use of such resources. Daly reaffirms Mill's (1848) prediction that a steady-state economy (i.e. an economic state with zero economic growth), is not only inevitable but desirable.

Schumacher (1973) argued that the problem with the GNP and the traditional economic model based on economic growth, is that traditional economist consider production and consumption as the sole purpose of all economic activities. He argued that the goal of economic activities should be instead to obtain the maximum of well-being with the minimum of consumption. He also argued that "greed and envy demand continuous and limitless economic growth of material things without any concern for conservation; this type of economic growth can not possibly exist in a finite environment" (p. 11).

By the mid-1970s GNP, once considered as the dominant variable in economic development, was "widely, but by no means universally dethroned" (Thorbecke, 2007, p. 11). Siegel (2006) argued that in industrialized countries like The United States, economic growth is no longer improving human well-being in areas such as education and health, but on the contrary, it is diminishing human well-being at a social and environmental cost. According to Siegel, there is a limit in human needs and when these needs are satisfied, economic growth is not beneficial any more. At this point, the economy will not be inert but there will be new technologies and products that will replace the old ones. What economic planners should promote is freedom instead of consumerism where people could use more free time to improve their well-being, "live wisely and agreeably and well" (p. 40).

Since the 1980s, scholars have disassociated development from the concept of production and consumption (e.g., Daly, 1996; Schumacher, 1973; Siegel, 2006).

Presently, development is understood as a process to improve the standards of living of all groups in society by paying attention to the social consequences of the economy such as impact on the environment, wealth distribution, and human welfare, and able to generate economic, social, cultural progress (Peet, 1999).

Third Pillar of SD: Equity

Ethical perspective of inter and intra generational equity. Classical economists throughout the capitalist world adopted the moral assumptions of *utilitarianism* as the only rational ethical approach (Dresner, 2002). The aim of utilitarianism is to maximize total utility, or, as Jeremy Bentham put it, ‘the greatest good for the greatest number’.

Most philosophers find utilitarianism “morally obnoxious” because it does not consider the sacrifice of minorities, the dignity of the individual, or morality between generations (Dresner, 2002). From an economic perspective, Daly (1996) states that the problem with utilitarianism is that it contains an impossible double maximization since in a limited world we either have more people at a lower per capital good (sufficient good for the greatest number), or a greater per capital good for fewer people (greatest good for sufficient number).

Rawls (1971) objected utilitarianism on the basis of justice and equality. Rawls states that it is unjust for some people to have less so other people can be better off; however, it is not unjust if people who are better off improve the situation of the less fortunate. According to Rawls, moral principles are considered just or fair if they could be chosen by a rational individual behind a veil of ignorance, an *original position*, in

which the individual does not know his or her position in time or space, racial condition, or socio-economical status. These moral conditions are considered fair because the individual cannot construct principles that are designed to further his or her own advantage.

The reasonable individual in the original position does not know his or her economical status or to what generation he or she belongs; therefore, his or her decision most probably would be fair for poor and rich, in the present and in the future. From the perspective of the original position theory, it is plausible to see that inter and intra generational equity is a moral and ethical choice.

Inter and intra generational equity for SD. The third pillar of SD, equity, makes reference to the intra-generational and inter-generational fair distribution of resources. Intra-generational equity is related to the fair distribution of resources among people in the present, while inter-generational equity is related to the fair distribution of resources among generations. Just and equitable resources allocation, at the present and between generations, are not simply ethical approaches but essential for the well-being of humans (Edwards, 2005)

According to Rogers et al. (2008), intra-generational inequity is the most significant socio-economical pillar of SD. Intra-generational inequity is translated into poverty, which encompasses six elements: lack of income, hunger, inaccessibility to basic infrastructures such as shelter, clean water, energy, and transportation, lack of access to education, poor health and illness, and social exclusion.

Brainard and Chollet (2007) state that extreme poverty exhaust governing institutions, depletes resources, weakens leaders, and crushes hopes, leading to violence

and massive migrations, where ungoverned territories become grown for global threats such as terrorism, trafficking, environmental devastation, and diseases. Sachs (2008) states that these ungoverned territories became plagued by problems such as rapid population growth, youth bulge, degraded environment, and lack of economic alternatives. Sachs states that “the population trap , and instability, deepen as the world delays a sensitive response” (p. 248).

Proponents of inter-generational equity emphasizes on the need to think about the impact of our actions on future generations instead of a short-term gain (Edwards, 2005). Rawls’s (1971) original position provides an answer to the morality of inter-generational equity because the observer would chose the most fair ethical choice since he or she does not know to what generation he or she belong. Detractors of inter-generational equality state that it is impossible to know how many generations backwards or how many generations forward our actions will have an impact (Beckerman, 2003).

An alternative ethical approach to the inter-generational equity pillar of SD is the *genetically-based motivation* concept, which is based on the general tendency of humans to show a great deal of concern for their children’s future. Opponents to the genetically-based theory such as Pezzey (1995), states that our children do not mate with each other but with someone else from another family; since parents do not have influence over their children's choices for mates, then parents may well leave less optimal capital and resources to their children. This theory is called *genetic dilution*.

Daly and Cobb (1994) refutes the genetic dilution theory, stating that our great-great grandchildren will also be the great-great grandchildren of 15 other people in the current generation; therefore, our great-great grandchildren will depend upon our

decisions and the decision of 15 more people. According to Daly and Cobb, the further we look into the future, the greater the number of people in the present generation will be their ancestors.

Evolution of SD as a Concept

Pioneers of SD. The birth of SD can be traced back to the Enlightenment Age (Edwards, 2005). Rousseau (1984) stated that human desires beyond food and shelter contributed to unhappiness. According to Rousseau, possessions are the result of the human desire to arise out of comparison with others as they are not essential to happiness. Rousseau stated that people are unhappy, not because they cannot meet their basic needs, but because they cannot fulfill socially created desires; therefore, Rousseau stated that the route to happiness is by abandoning society and returning to life as a natural being in a natural world.

Malthus (1809) stated that geometrical growth of population would outstrip the arithmetical growth of food supply resulting in misery such as shortages of food supply, and vices such as prostitution and contraception. Malthus argued that misery and vices would act as mechanisms that eventually would restrict such population growth.

Mill (1848) proposed an alternative economic model based on the notion of a stationary state with zero economic growth, in which there is a better distribution of property, favoring equality, well-paid and prosperous laborers, with no massive fortunes except those earned and accumulated during a their own lifetime, and with “sufficient free time, physically and mentally, to cultivate freely the graces of life” (p. 516).

The Transcendentalist Movement in North American represented mainly by Emerson (1836) and Thoreau (1854), pointed out the significance of the connection

between humans and nature. Emerson argued about the importance of nature as a source of guidance and described the relationship between humans and nature in seven faces: commodity, beauty, language, discipline, idealism, spirituality, and prospects. Thoreau stated that simple life is more fulfilling based on his experiences living in a small hut in Walden Pond near Concord, Massachusetts.

Muir (1894) described the negative impact of sheep and cattle grazing in wild lands of North American's west. His writings influenced his contemporaneous, including the president of The United States Theodore Roosevelt, to establish conservation programs and to create National Parks. In 1892 Muir created The Sierra Club which has been since then an important organization dedicated to conservation issues in The United States (Edwards, 2005).

Leopold (1949) argued that the earth was an indivisible living being in which each species plays its part of the whole and in which humans is just one part of that organism. Leopold called for a change of the role of man from conqueror of the planet to a plain member and citizen of it.

Carson (1962) described the devastating impact of pesticides such as DDT in wildlife and the environment and how the survival of humans is linked to a healthy ecosystem. One of Carson's most significant contributions to the environment movement was her determination to make public the negative impact of pesticides instead of leaving the topic to scientists and technocrats, which at the time were subjected by the industry influence (Gottlieb, 2005).

The agro-chemical industry at that time tried to stop the publication of Carson's book *Silent Spring*, and even after the publication the attacks turned to Carson herself

accusing her of communist and even making hostile references to the sex of the author (Gottlieb, 2005). Carson was accused of ignorance and biased by writers of important publications such as the reviewer for *Chemical and Engineering News*; She was accused of being a member of a cult by the senior editor of Newsweek magazine, who also accused her of creating paranoia and stirring scare; even some members of the Sierra Club rejected the review of her book. The controversy created by the publication of Carson's book called the attention of the President of United States at that time, John F. Kennedy, who launched a series of federal and state investigations which confirmed the validity of Carlson's claims (Lear, 1997).

Overpopulation: Malthusians versus Cornucopians. Analysis on population growth and crisis of food supply goes back to the XVIII century, when Malthus (1809) argued that the geometrical growth of population would exceed the arithmetical growth of food supply resulting in famine and misery.

In *The Population Bomb*, Ehrlich (1968) stated that by the late 1970s, population growth would exceed food production leading the world to massive famines in Asia and Africa. Although Ehrlich's prediction have not taken place, Ehrlich developed a methodology that economists and environmentalist use to analyze the interaction of factors that impact the environment known as the *Ehrlich Identity*. Ehrlich suggested that environmental impact (I) is equal to the population (P) times the consumption per capita (A) times the technology per capita (T).

$$I = PAT$$

In *Limits to Growth*, Meadows, Meadows, Randers, & Behrens (1972) developed a model to determine the consequences of a rapid growing population over a finite

number of resource. The authors used a mathematical model to simulate the consequence of interactions between the human and earth resources using five variables: world population, industrialization, pollution, food production and resource depletion. Based on their calculations, the authors concluded that the rapid growth of population would deplete the food supply and natural resources in a matter of decades as Malthus and Ehrlich predicted previously.

Authors who follow this train of thought, in which depletion of natural resources by a growing population is imminent producing famines and misery, are called *Malthusians*. A school of thought which dismisses any Malthusian prediction is referred as *Cornucopians* (Rogers et al., 2008)

Cornucopians see the world with an increasing human population enjoying more benefits from the planet based on the premise that an increase in population pressure acts as an incentive to develop new technologies to produce more food (Borserup, 1965). Simon (1981) stated that the future is limited only by human ingenuity. Beckerman (2003) stated that the future will not be limited by resources but by the human's ability to get economic institutions right.

The advocates of demographic transition states that rising population weigh heavily on resources, specially on the ecosystem; therefore, it is necessary to emphasize the need for public efforts to speed voluntary reduction of fertility as a way to achieve stabilization of the world's population (Sachs, 2008). According to Sachs, the case for the need of fertility decline is based on four reasons:

1. Poor families cannot reduce poverty by having more children but the opposite, by having fewer children, because then they can provide more resources for those few children.
2. What is true for a family is also true for a society. A society with less children have more chances to educate them and provide them healthcare.
3. Poor countries are mostly rural, usually within fragile ecologies; pressure on land and other resources is lower when there are fewer people.
4. At a global level, rapid population growth produces massive migration and local conflicts.

The Tragedy of the Commons. Hardin (1968) stated that a finite world can support only a finite population, and that the problem of overpopulation can not be solved by a technical solution. Hardin stated that the problem of overpopulation is like the tick-tack-toe game in which nobody can win if the opponent understands the game; therefore, there is no "technical solution" to the game.

Hardin (1968) rebuts the concept of Smith's (1776) *invisible hand*, which claims for the existence of an invisible power that leads individuals to promote public interest. Hardin argues that this concept has interfered human thought from "positive action based on rational analysis" (p. 1244). Hardin cites an eighteenth century pamphlet in which a mathematician called William Forster Lloyd invalidated the invisible hand theory by studying a pasture opened to all known as *a common*. Regularly in a common pasture each herdsman tries to keep as many cattle as possible; this arrangement may work until there not enough grass on the pasture to support the growing number of cattle. Hardin stated that "Each man is locked into a system that compels him to increase his herd

without limit-in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all” (p. 1244).

According to Hardin (1968), the only effective way by which pollution can be reduced is by the creation of coercive laws which make it cheaper for polluters to treat their pollutants than to discharge them into the environment untreated. Hardin states that coercive laws are necessary to stop the tragedy of the commons and that these coercive laws must apply to the problem of overpopulation; the freedom of breeding is based on laws that “follow the pattern of ancient ethics, and therefore are poorly suited to governing a complex, crowded, changeable world” (p. 1245). Without such legislations and regulation “Freedom to breed will bring ruin to all” (p. 1248).

The birth of SD. In 1972, the United Nations Conference on the Human Environment was held in Stockholm, Sweden, in order to address the problems of the degradation of the environment caused by economic growth. The Swedish government was particularly concerned about the pollution of their lakes caused by other European countries (Dresner, 2002). The conference succeeded in internationalizing the problem of degradation of the environment and lead to the creation of the United Nations Environment Programme (UNEP) whose mission is to “provide leadership and encourage partnership in caring for the environment by inspiring, informing and enabling nations and people to improve their quality of life without compromising that of future generations” (UNEP, 2009, par. 1).

In *The Sustainable Society*, Pirages (1977) intended to reconcile the limits of economic growth with social justice by stating that with low growth is very difficult to

obtain social equality; therefore, growth is necessary until a certain point in which equality can be attained; however, it requires to bring down economically the rich to give to the poor; this measure then can be very difficult politically to achieve.

The term of Sustainable Development began to acquire status after the 1980s World Conservation Strategy (WCS) presentation. The presentation was commissioned by the UNEP and prepared by the International Union for the Conservation of Nature and Natural Resources (IUCN) in conjunction with the World Wildlife Fund (WWF). The title of the WCS presentation was *Living Resources Conservation for Sustainable Development*, and its objectives were to describe the importance of conservation and its contribution to human survival, to identify the priorities for conservation, to identify requirements for dealing with conservation, and to propose ways for effectively achieving conservation (IUCN, UNEP, & WWF, 1980).

The Brundtland Report. In 1983, the UN established the World Commission on Environment and Development (WCED) in order to address the problem of deterioration of the environment caused by the increasing scale of overexploitation and consumption. In its final report published in 1987 titled *Our Common Future*, also known as *The Brundtland Report* (UN-WCED, 1987), the commission described four causes as the culprit for the degradation of the environment:

1. Poverty, which forces people to destroy vegetation in order to use land for food, fodder, fuel, or timber.
2. Economic growth, which increases the stress on the environment by using more fuels and resources to supply the necessities and consumption of increasing populations.

3. Pollution, of air, land, and water, and development of technology such as nuclear weapons which threaten the survival of humans, other living species, and the integrity of the earth; and
4. Economic crises, which are experienced by the decline of GDP in developed countries and overexploitation of land and natural resources in developing countries.

The commission suggested the creation of a new approach for development. This new approach was called Sustainable Development, defined as a “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (UN-WCED, 1987, chapter 2, part V). This definition, although highly ambiguous, is widely accepted, and even some scholars argue that the term should not be defined too rigorously because its vagueness allows diverging positions (i.e. traditional economists versus ecologists) to find a common ground (Tilbury, Stevenson, Fien, & Schreuder, 2002).

In the report it is stated that the future is threatened due to economic discrepancies which causes poverty, and a short-sighted way to pursue prosperity through farming, forestry, and industrial practices that only bring prosperity over a short period, causing irreversible damage to the environment and threaten the basis for human progress.

According to the report, SD requires a progressive transformation of economy and society in which attention must be paid to changes in access to resources and distribution of cost and benefits, with concerns toward social equity within and between generations.

Concerns and Criticisms

Robinson (2004) classified concern and criticism about SD in three categories: vagueness of the definition, SD might attract hypocrites, and SD might foster delusions.

The following sections will address these concerns and criticism based on each of these three approaches.

Vagueness of the definition. SD has been an evolving concept and consequently it is possible to find many interpretations in the literature (Tilbury et al., 2002). Lélé (1991) argues that the goal of SD is to achieve development through the conservation of living resources. According to Lélé, the term must be clearly defined, otherwise, it would lead to endless debate with little progress, turning the concept into a “cliché... a fashionable phrase that everyone pays homage to but nobody cares to define” (p. 607).

Kidd (1992), stated that SD began to emerge in the 1950s as a result of interrelationships among six strains of thought, or roots. These strains of thought are: the ecological-carrying capacity root, the resources-environment root, the biosphere root, the critique of technology root, the no-growth-slow-growth root, and the eco-development root. These strains of thought have either an ecological origin or a socio-economical origin; therefore, according to Kidd, sustainability does not emerge simply as an ecological concept, but rather as an approach to fix the existing environmental, social and economic problems. Kidd states that each of these strains of thought was fully developed before the term SD itself was used, and some are based on fundamentally different concepts each claiming validity. In this order of ideas, Kidd argues that the search for a unique definition seems pointless. Regardless, the existence of multiple meanings is tolerable if described clearly.

Munasinghe (1993) described three types of sustainability: economic SD, as a way of generating a maximum flow of economic welfare while maintaining the assets such as the environment; social sustainability defined as people oriented and identified

with the stability and cultural diversity of social systems; and environmental sustainability defined as a way to preserve the ecological systems. Considering that conventional economic analysis is biased against adequate valuation of natural capital, cost of natural capital depletion, and lack of consideration with the right of future generations to benefit from natural resources, these approaches raise a concern of how to balance, reconcile, and place values over economic, social, and environmental issues.

Pugh (1996) stated that a sustainable society and sustainability represent an oxymoron since the most successful societies are also the most exploitive of natural resources; therefore, it is illogical to try to sustain them. He also criticizes the concept of cultural sustainability since culture is never static. He stated that arguing for culture preservation is denying an important aspect of culture itself which is change.

Neoclassical economists look at SD from the perspective of capital. Neumayer (2003) states that most of the economic proponents of SD accept the concept that SD is a development that “does not decrease the capacity to provide non-declining per capita utility for infinity” (p. 7), in which elements that form that capacity of providing utility are called capital.

Neoclassical economist state that the degradation of natural resources, or natural capital, should not be a cause of concern because there will always be increases in other forms of capital such as human-made than can replace the natural capital (e.g., Pezzey & Toman, 2002; Solow, 1974). Even Solow stated that “the world can, in effect, get along without natural resources” (p. 11).

This strain of thought in which natural resources can be replaced by human made capital is called *substitutability* or *Weak Sustainability* (Neumayer, 2003). Weak

sustainability is based on the assumption that natural capital is either abundant or substitutable; therefore, it can be safely run down as long as enough man-made capital is built up in exchange. Some proponents of weak sustainability (e.g., Baldwin, 1995; Beckerman, 1992) state that economic growth, which is an entropic process that increases waste, might be beneficial for the environment, arguing that environmental quality is a luxury of rich nations where people become better educated and better able to express their desires and defend their interest.

According to Neumayer (2003), rich people are more likely to be aware of environmental hazard; he states that rich countries can afford spending money on environment protection, where man-made capital is either new or the replacement of old which tends to produce more pollution, and where the service sector is replacing industries known for being high polluters; in addition, according to Neumayer, population growth in rich countries tends to decrease.

Weak sustainability proponents state that it is economically irrational to sacrifice income by limiting increases in greenhouse gases or combating global warming because, according to their calculations, damages from unrestricted emissions are less than 10% of GNP while future generations will likely have more than 10% of increase in income (Nordhaus & Boyer, 2000).

Conversely, post-neo-classic economists who support the *Strong Sustainability* theory, argue that natural resources are finite and there are many environmental assets for which there are no human-made substitutes (e.g. the ozone layer or bio-diversity). According to the strong sustainability theory, weak sustainability is an oxymoron since economic subsystems cannot grow beyond the scale at which resources are capable of

supporting (Daly, 1996). Supporters of strong sustainability also argue that once economic growth has achieved a threshold, by which all the basic necessities are covered, any more gained in economic growth would have a negative impact in human well-being with social and environmental cost (Siegel, 2006).

Proponents of strong sustainability rebut the proposition that economic growth might be beneficial for the environment stating that on the contrary, high incomes lead to the demand of more material possessions, which itself means higher pressure on the environment (Martinez-Alier, 2002). They also state that high-income countries are cleaner because they export their most-polluting industries to lower-income countries (Proops, Atkinson, Frhr. v. Schlotheim, & Simon, 1999). An objection of strong sustainability supporters to the weak sustainability theory on reduction of population growth in rich countries states that, female education, not higher income, is the best way to reduce population growth (Subbarao & Raney, 1993).

Commons (1995) states that a relationship between economic growth and environmental quality is impossible, and that economic growth on its own does not seem to be a viable prescription for the solution of environmental problems. Commons argues that the problem resides in that neoclassical economist do not read science.

Supporters of *Moderate Weak Sustainability* recognize that there are environmental assets, or natural capital, for which there are no substitutes and at the same time are essential to support life such as the ozone layer or the biochemical cycle of the atmosphere (Barbier, Burgess, & Folke, 1994). These assets are called *critical natural capital*. These supporters state that someday technological advances could replace these critical natural capitals, but since we do not know for certain that such substitution will

take place, it is irrationally to continue as if the outcome will be good when environmental risks have the potential to have negative consequences; therefore, moderate weak sustainability supporters accept that the conservation of these assets is absolutely necessary (Pearce, Markandya, & Barbier, 1989).

Since moderate strong sustainability supporters state that natural capital should be preserved unless there is an existing substitute, they conclude that in case of renewable resources harvesting rates should not exceed regeneration rates, wasting emissions should not exceed the assimilative capacity of the environment; and non-renewable resources should not be exploited faster than the rate of creation of renewable substitutes (Daly, 1991).

Most of the problems with trying to define SD are based in linguistic confusion (Dresner, 2002). If sustainability is interpreted as only achieving development for the well-being of humans, this interpretation leads us to a trivial and an inconsequential definition; trivial because of the generalized desire to achieve human well-being, and it is inconsequential because it does not describe what needs to be done to achieve that goal; however, if SD is interpreted as maintaining development for the present human welfare while preserving resources for future generations, this interpretation is meaningful and widely accepted because it describes the purpose, which is the human well-being for the present and the future, and it describes how to obtain it, which is by the adequate use of resources to allow future generations to benefit from them (Lélé, 1991).

Edwards (2005) states that the key innovation of the definition of SD given in The Brundtland Report is in the expansion of an early focus on the preservation of the ecology and the environment to include basis for economy and equality, seeking a

context in which the genuine interest of all parties (i.e. environmentalist, economists, and poor and rich nations), can be generally satisfied within a framework of equity.

Jacobs (1991) argues that the term can not be defined too rigorously because SD is like a *contestable concept*, defined as a concept that can have a variety of interpretations because it is generally accepted as good, although sometimes their interpretations are contradictory. Examples of ‘contestable concepts’ are liberty, social justice, and democracy.

Hypocrisy: Greenwashing. The term *greenwashing* was coined in 1991 by the environmentalist group Greenpeace to describe organizations that mislead people presenting “inaccurate, and hypocritical corporate claims of green virtue” (Darnovsky, 1996, p. 8).

According to Robinson (2004), a more serious concern about the vagueness of the definition of SD is not directly related to the definition itself, but to the use of the term to promote activities that might not be sustainable. The problem arises not due to the definition itself, but in “principle as how it is measured in practice” (p. 374). How can we evaluate or claim that a product or activity is sustainable? How can we compare products with others that are more or less sustainable?

During the last few years, sustainable guidelines, standards, and green certifications began to emerge; however, a qualitative measure of the environmental impact of a product is a difficult task to achieve (Darnovsky, 1996). One example of these assessments is called the *Lifecycle Assessment (LCA)*, which evaluates the environmental impact of the production, distribution, use, and disposal of a product. In every stage, LCA takes into consideration the amount of resources depleted, energy and

water used, the emissions produced, and the solid waste generated; however, the impact of any product varies with local conditions and “depend on social rather than technical judgments” (p. 255). Regardless of these limitations, green certifications “represent a remarkable development over quite a short period of time” (Robinson, 2004, p. 374).

Delusion: SD as an oxymoron. Environmentalist such as O’Riordan (1988) argues that SD is a contradiction of terms used merely as a cover for continuing to destroy the natural world. For traditional economists such as Pezzey and Toman (2002), SD is too cautious about the future leading to the decline of economic growth simply for the sake of an excessive concern about the depletion of natural resources.

According to Robinson (2004), the problem with SD is that its definition takes ultimately and purely an anthropocentric position. From those adopting a non-anthropocentric position, the SD argument missed the point, which is the need of a new set of ethics or values to guide humanity to an appropriate relationship with nature. On the social side, SD avoids questions of power and exploitation, ignoring fundamental social and political changes needed. Instead, SD “distract us from the real social and political changes that are required to improve human well-being, especially of the poor, in any significant way” (p. 376).

Other criticisms. Aguirre (2002) argues that although the focus of SD on population is not necessarily incorrect, population control policies have become the dominant factor to promote economic development which is detrimental because a key element of development is human capital.

Baden (2009) argues that improvement of the quality of the environment depends on the economy of markets and the guarantee of legitimate property rights. He stated that

it is necessary to “reject arguments of those who on behalf of the ecology, has called for the restoration of a new form of interventionism camouflaged under the term of ‘sustainable development’.... The liberal alternative to ‘sustainable development’ is by establishing a relationship between authority and responsibility. It relies on mechanisms of incentives....it seeks to mobilize the energy of private entrepreneurs for the service of nature” (p. 18).

Dovers and Handmer (1993) argued that it is not the term of SD that is important, but the potential for integration of disciplines that were previously considered separated such as world deforestation, overpopulation, desertification, stratospheric ozone depletion, poverty, basic needs for human existence, consumption and waste production in industrialized countries, and global climate change. The authors stated that sustainability is characterized by eight contradictions, paradoxes, conflicts, and tensions as follows:

1. The Paradox of Technology and Culture: Technology must shift from its present use of encouraging consumption and production of waste, to a technology used in the service for the environment, and to stimulate creativity and inventiveness in the least devastating ways.
2. Humility versus arrogance. We must be humble in front of the great level of ignorance and uncertainty about global environmental and ecological issues. We need to maintain an open mind regarding new knowledge and experiences, listen to new ideas and leaders, and ensure flexibility to deal with new circumstances; however, we must be arrogant and make decisions in the face of the ignorance. Curiously, at the present, we seem to have humility for the status quo and arrogance defending it.

3. Intergenerational versus Intra-generational equity. The intra-generational distribution of resources presents a profound political conflict as it is judged in the West as impossible.
4. Growth versus limits. The two words in SD, sustainable and development, present an oxymoron due to the confusion between development and economic growth.
5. Individual versus collective interests. Environmental issues are overwhelmingly collective problems, raising tensions with individual interests. Since most of the laws are based on rights of the individual, these tensions might be addressed through legislation and education.
6. Democracy: Diversity versus Purpose. A competent democratic approach of local environmental issues may be flooded by global environmental change.
7. Adaptability versus Resistance. Among the many tactics that Homo sapiens use to perpetuate themselves and their social structures, the use of marginal changes or fine-tunings is one of the most successful. This tactic “gives the appearance of significant changes in response to pressure, while retaining intact the underlying assumptions and institutional structure” (p. 220). Unfortunately, these marginal changes, although successful under previous circumstances, is a major impediment to achieve sustainability.
8. Optimization versus space Capacity. Optimization leads to greater use of resources and increase of waste. Natural beauty has no monetary value therefore it is difficult to protect from the impact of consumption and the negative effects of human greed. Although some of these paradoxes and contradictions might look irreconcilable, sometimes they can be overcome by ignoring them or by the use of mechanisms of trial

and error and diplomacy. Humans are capable of holding contradictions while undertaking actions that contradict our beliefs. This ability might help us make rapid changes to priorities in the face of threatening environmental issues.

The Precautionary Principle

One of the most critical dilemmas of moderate, weak and strong sustainability is to determine what constitutes critical natural capitals and how much of them should be preserved. Randall (1991) argues that there is a positive probability that literally any species, known and unknown, will eventually prove usefulness, and therefore must be considered critical natural capital.

Critical natural capital, also known as life support systems, are extremely complex; we are just beginning to understand how unique, precious, and vital these resources are for our own survival (Timothy O'Riordan & Cameron, 1994). We do not know how far these critical systems are being stressed, nor how close the breakdown of these systems may be.

In a stage of uncertain and ignorance about critical- life support systems, the 1992 UN Conference on Environment and Development (UNCED, 1992) adopted the *Precautionary Principle*, which states that when there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. A second point of the precautionary principle states that the costs of proof should be shifted to those who believe that an economic activity has only an insignificant impact on the environment (Timothy O'Riordan & Cameron, 1994).

A Solid Base to Achieve SD: Education

According to WCED in their Brundtland Report, development that is sustainable requires a progressive transformation of economy and society (UN-WCED, 1987, chapter 3, part IV). As it will be described later in this chapter, education, specifically higher education, plays a significant role to produce the social and economical change required to attain SD.

Education for Sustainable Development

Education which includes principles of SD is called ESD. ESD is built on a progression of environmental-ecological and social disciplines (Dale & Newman, 2005). The basic premise of ESD is to consider human activities and natural systems as interdependent agents which can not be considered in isolation. ESD is considered as a multidisciplinary area of knowledge (Koester, Eflin, & Vann, 2006), which must include environmental awareness of ecosystems and natural resources, their importance and limitations, the threats that human activities present to them, and build the skills necessary for monitoring, analysis and intervention (Geiser, 2006). ESD must also include principles of social-economic and environmental values and ethics, a commitment for life and its preservation, and an “attachment to qualities of health, harmony, balance, diversity, peace, participation, and justice” (Orr, 1992, p. 145).

International organizations have recognized the importance of ESD to achieve sustainability. Some of the most significant international events in which the importance of education for SD has been recognized are the following:

The Stockholm Conference. The first attempt to discuss at international level the importance of education as a mechanism to preserve the environment was at the 1972

Stockholm Conference on the Human Environment. In Principle 19, participants at the conference made a call to educate children and adults regarding environmental issues as a way to promote responsible conduct of individuals, enterprises, and the communities to protect and improve the environment (UNEP, 1972).

The Belgrade Charter. In 1975, UNESCO held an environmental education workshop called the *Belgrade Charter*. During the workshop, participants stated that the goal of environmental education must be to develop a world-wide population aware of, and concerned about the problems caused by human activity on the environment. Participants made a call to work collectively to bring a solution to these problems and to prevent the creation of new ones (UNESCO, 1975).

The Tbilisi Declaration. During the Tbilisi Declaration, organized by UNESCO in cooperation with the UN Environmental Programme (UNEP) in 1977, participants stated that universities must undertake research concerning environmental education and train experts in the field. Participants made a call to universities to develop curriculums concerning environmental education, engage faculty and staff into environmental issues, engage in regional and international initiatives of cooperation for the environment and inform and educate the public about environmental issues (UNESCO & UNEP, 1977).

The Earth Summit. Participants at the 1992 UN Conference on Environment and Development (UNCED) in Rio de Janeiro, also known as The Earth Summit, developed a comprehensive plan of action for all nations in every area in which humans impact the environment. In this plan of action called *Agenda 21*, participants stated that "Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues... It is also critical for achieving

environmental and ethical awareness, values and attitudes, skills and behaviors consistent with sustainable development" (UN DESA-SD, 2005, Chapter 36.3). This type of education, since then known as ESD, should deal with the issues arising between the environment (physical and biological) and the socio-economic-spiritual aspects of human activities for development.

ESD in Higher Education

Orr (1992) stated that "those whose decisions are wreaking havoc on the planet are not infrequently well educated, armed with B.A.'s, B.S.'s, LL.B.'s, M.B.A.'s, and Ph.D.'s" (p. 149), and that "without significant precaution, education can equip people merely to be more effective vandals of the earth" (Orr, 1994, p. 5). According to Orr, the main problem of traditional education is students are educating at all levels as if there is not crisis of resources, population, climate change, species extinction, acid rain, deforestation, ozone depletion, and soil loss. Other areas in which education is failing according to Orr, are the absence of transmitting knowledge about the place where students live, the problem of overspecialization, which Orr calls the "terminal disease of contemporary civilization... surely debilitating to the individual intellect" (Orr, 1992, p. 129), and the disintegration of the small community.

Bowen (1977) stated that historically, the benefits of the expansion of higher education in The United States have been very beneficial; however, in order to obtain all its potential in the future, higher education must change towards "the building of a humane civilization, rather than in rising the earnings and status of individuals and in augmenting the gross national product" (p. 457).

Influence of higher education in human behavior change. According to Bowen (1977), most of the research in human behavior find that major changes in personality occur during the college experience. The most distinctive outcome is the liberation of personality, in which students become more open-minded toward new ideas, more curious, more adventurous in confronting new questions, and problems, and more open to experience. Bowen stated that students in college are likely to be more rational, more aware and open to diversity of opinion, more tolerant, less authoritarian, less prejudiced, and less dogmatic.

Bowen (1977) also stated that higher education attracts persons with leadership skills, and many of them eventually will occupy positions of influence such as teachers, clergyman, business managers, public officials, lawyers, physicians, accountants, social workers, librarians, journalists, advertising executives, writers, artists, and scientists. These educated people are increasingly influential in public affairs and shaping public opinion. College educated-people, as members of a society, inevitably influence others, modifying values, attitudes, and behaviors.

Relationship between higher education and social change. Neave (2000) stated that the basic responsibility of academia is to transmit (hand on) knowledge to what is largely defined as “the community”, even though the concept of “the community” varies depending upon the kind of State in which it is defined. For instance, “the community” in a unitary State like France is different than in a federal State like The United States. “The community” can also be different in a secular States than in a one-religion States.

Lowenthal, (1975), Meyer (1976), and O’Neal and Trent (2005), stated that higher education has adequately served the contemporary society in capacities such as (a)

producing new knowledge, (b) validating knowledge, (c) educating citizens, and (d) certifying educational experiences for entry to professional careers.

According to Bowen (1977), higher education, specifically in America, can be compared with a production system. The inputs (i.e. resources) of this system such as labor, land, and capital, are transformed into academic environments (physical, human, and cultural), which produces changes in students (directly or indirectly), in knowledge, and in services to the public. At the same time, these products produce changes in society such as improving performance of the government, the economy, in human equality and freedom, in amelioration of social problems, and in general improving quality of life. Finally, these changes in society produce further more changes in individuals and society, even into future generations. Bowen states that “the goal of higher education is to equip students to view their own society with some detachment, to compare it with other societies, to discover discrepancies between its aspirations and its realities, to gain perspective on its social problems and shortcomings, and to acquire the will as well as the political and technical skills needed to work for change” (p. 49). He concludes that the immediate outcome of higher education consists of primary change individuals and ideas, which consequently influence changes in social institutions, organizations, values, and attitudes.

Shoben (1971) stated that although higher education is maintained to enhance and give continuity to the society in which it is created, at the same time it is a device for cultivating the brainpower and resources to ultimately modify that society; in other words, universities are “conservative agencies and forces for social change” (p. 55).

Higher education as a significant factor to achieve SD. According to Bowers (1997), it can be difficult to ignore the connection between higher education and the introduction of millions of tons of toxic chemicals into the environment affecting weather patterns, and the impact of technology on fisheries, forests, and aquifers. The negative impact of higher educated people on natural resources is unprecedented (Corcoran & Wals, 2004). Given what academics know about the current ecological condition of the planet, “there is an obligation for universities to become leaders in the movement to prevent global ecological collapse” (Moore, 2005, p. 326). Benson, Harkavy, and Hartley (2005) stated that higher education institutions can overcome the harmful effects of disciplinary fragmentation, narrow specialization, bureaucratic issues, and outdated customs and attitudes, by identifying and trying to solve real-world significant issues, which by their nature, require interdisciplinary collaboration.

Holland (2005) identified a trend in which many universities and colleges are exploring the concept of the civic mission of higher education. Watson (2003) stated that institutes of higher education in Europe are shifting their historical role of generating and transmitting knowledge to society, to an emerging role in which higher education institutes contribute to the society through collaborative approaches of discovery, learning and engagement. Gibbons, Limoges, Nowotny, Schartzman, Scott, and Trow (1994) began to see a shift in higher education institutions from the traditional pure-disciplinary university-based research to a new research, characterized for being problem-solving oriented, trans-disciplinary, and heterogeneous. Figure 2 shows the relationship between higher education, as an important agent of social and economical change, and sustainability.

Role of HE for Sustainable Development

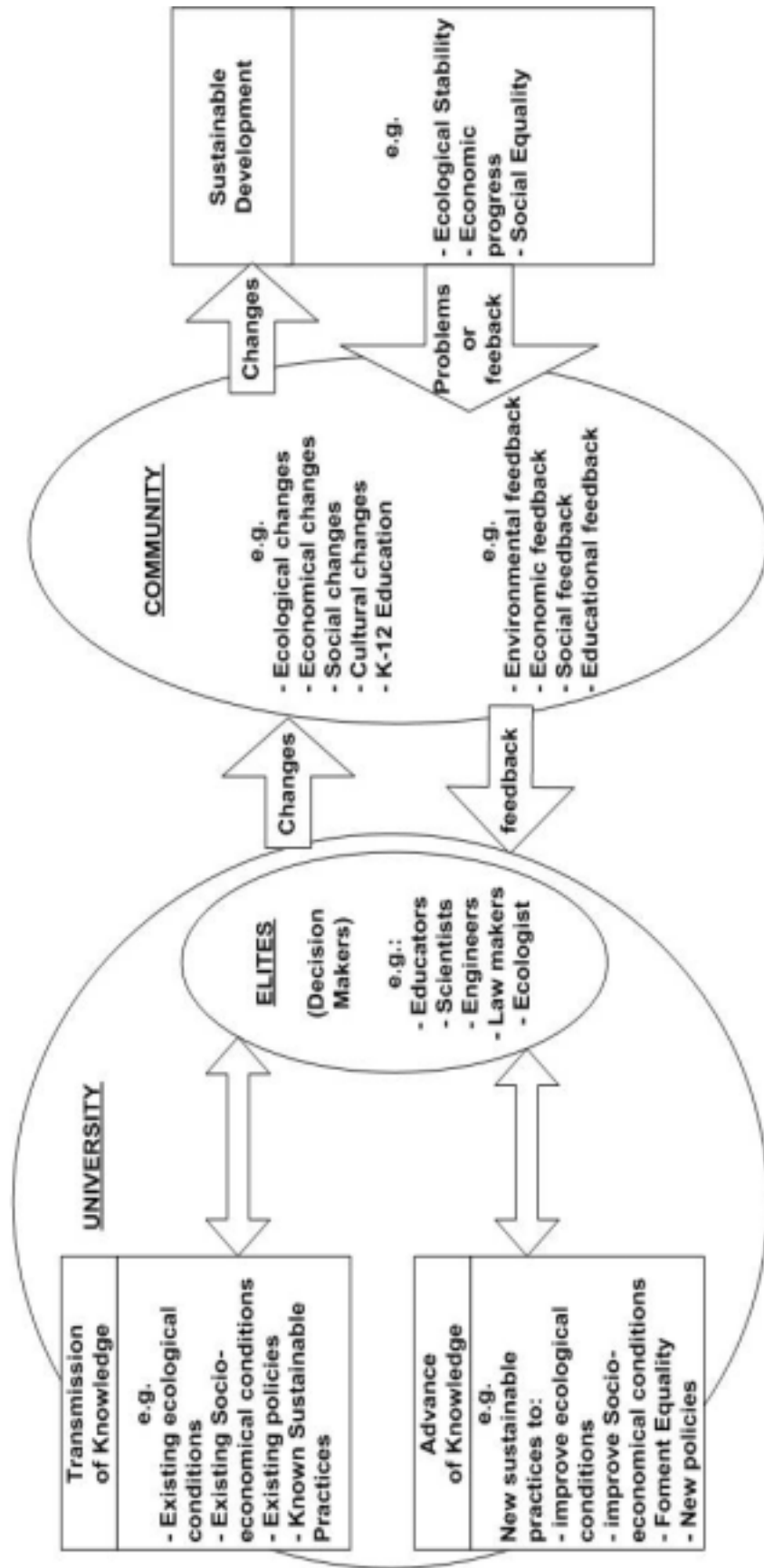


Figure 2. Role Higher Education for Sustainable Development. Graphic designed by the author based on the works of Bowen (1977), Lowenthal, (1975), Neave (2000), Meyer (1976), and O'Neal and Trent (2005).

In figure 2, the agents of action (i.e. higher education institutions, students, and society) are represented by ovals, while the processes (i.e. transmission of knowledge, research, and socio-economic activities) are represented by boxes. Inside the boxes are examples of some of the activities required to attain SD.

Figure 2 shows also the cycle of knowledge as follows: Universities make students aware (i.e. transmission of knowledge) of the actual environmental and socio-economic conditions of the planet, the crisis of resources, the problem of over-population and over-exploitation of resources, the problems of consumism, the negative impact of climate change, the ecological tragedy of the extinction of species, the ecological impact of acid rain, deforestation, ozone depletion, and soil loss, the enormous economical discrepancies between classes, and the importance of diversity and cultural differences.

Once students have the knowledge and they can associate them with real socio-economic situations in their community (local or global), Students can engage in research or advancement of these knowledge in order to either provide solutions, or to propose new perspectives of the problems in the hope that new generations of students will provide solutions. A cycle of knowledge between higher education institutions and society are required in order to achieve SD.

International Agreements to include ESD in Higher Education

Bowers (1997) stated that it is difficult to ignore the connection between higher education and the introduction of millions of tons of toxic chemicals into the environment affecting weather patterns, and the impact of technology on fisheries, forests, and aquifers. The negative impact of higher educated people on natural resources is unprecedented (Corcoran & Wals, 2004). Given what academics know about the current ecological

condition of the planet, “there is an obligation for universities to become leaders in the movement to prevent global ecological collapse” (Moore, 2005, p. 326).

In the 1990s universities began to create, participate and sign international agreements and declarations related to ESD in response to their lack of action regarding environmental issues, and the constant criticism by several sectors of the society for the inability of these centers of education to be models of environmental education (Wright, 2004).

According to Mader (2004), the impact of signing these declarations by universities is beneficial for SD since all declarations contribute to the awareness of SD in university decision makers, promote scientific discussion about SD, and signing a declaration is a way to be part of the community. Although signing a declaration is the first step towards sustainability, these declarations are only self commitments to act; therefore, further programs or initiatives are necessary to motivate universities to continue working to meet the compromises acquired at the moment of the signature. The most significant international agreements of institutes of higher education on sustainability and ESD are the following:

The Talloires Declaration. In 1990, under the auspice of Tufts University European Campus, 22 university presidents, vice-chancellors, and rectors met at Talloires, France, to discuss the role of universities in environmental management and SD. The result was the Talloires Declaration, considered as the first international document focused specifically in higher education for SD (Wright, 2004).

Participants of the event, most of them university administrators, funded the University Leaders for a Sustainable Future (ULSF) organization, and signed the

agreement in which they expressed their commitment to incorporate sustainability and environmental literacy in teaching, research, operations, and outreach at universities and colleges. The action plan signed was as follows:

- Increase awareness about SD
- Create a culture of sustainability
- Foster environmental literacy for all
- Educate environmentally responsible citizenship
- Practice institutional ecology
- Stimulate interdisciplinary initiatives
- Encourage involvement of government, foundations, industry, primary and secondary educational institutions and other stakeholders, and
- Encourage other institutes of higher education to sign the declaration

By 2001 over 350 university presidents and chancellors from more than 40 countries have signed the Talloires Declaration (ULSF, 2001).

The Halifax Declaration. In December of 1991, at the Halifax conference titled *Creating a Common Future: University Action for Sustainable Development*, 33 university presidents from 10 countries met with representatives from business, the banking community, governments, and non-governmental organizations, in order to discuss the role of universities to protect the environment and foster development. The meetings were sponsored by The International Association of Universities (IAU), The UN University, the Association of Universities and Colleges of Canada, and Dalhousie University.

The result was the Halifax Declaration in which it was stated that universities are entrusted with the big responsibility of helping for the development of policies and actions necessary for an “environmentally secure and civilized world” (IAU, 1991), and presented a detailed plan of action by identifying short and long term goals at the local, regional, national, and international levels.

The Kyoto Declaration. At the Ninth IAU Round Table in 1993 in Kyoto, it was stated that SD implies changes of the existing value systems; it is the mission of universities to create awareness in the people about these new values and a sense of global responsibility and solidarity (IAU, 1993). The declaration provided an action plan in which the limitations of some universities to implement ESD was recognized, but encouraged them to take actions including the development of ecological literacy programs, development of partnerships with other universities, industry, and government, engage public in SD awareness, and encourage sustainable research and practices. The Kyoto declaration was signed by leaders of 90 international universities.

The Swansea Declaration. At the same time of the Kyoto Declaration, leaders from 400 universities in 47 countries were discussing a similar agenda at the 15th Quinquennial Congress of the Association of Commonwealth Universities held in Swansea, Wales. The name of the conference was *People and the Environment- Preserving the Balance*. Participants at the event signed the Swansea Declaration in which it was expressed the disappointment of the insufficient presence of universities at the Rio Summit, and the desire to add themselves to the voice to others who are concerned about the degradation of the environment and the urgency to implement effective SD practices (Association of Commonwealth Universities, 1993).

The CRE-COPERNICUS Charter. The Conference of Rectors of Europe (CRE), now called European Universities Association (EUA), created the Co-operation Programme in Europe for Research on Natural and Industry through Coordinated University Studies (COPERNICUS). This organization wrote a charter called the *CRE-Copernicus*, whose goal was to bring together universities and other sectors of society in Europe to promote a better understanding of the interaction between humans and the environment and to collaborate on environmental issues. The charter was presented to over 400 universities from 36 nations at the CRE biannual conference in Barcelona Spain in 1993.

The Thessaloniki Declaration. In 1997, UNESCO and the Government of Greece organized the *International Conference on Environment and Society Education and Public Awareness for Sustainability*, in which 1,200 leaders from 84 countries unanimously signed the Thessaloniki Declaration. The declaration stated that insufficient progress was made after five years of The Earth Summit, and participants declared that education and public awareness should be recognized as one of the pillars for sustainability, with legislations, economy, and technology, to create awareness and rapid change of behaviors and lifestyles, including changes in consumption and production (IAU, 2005).

The Lüneburg Declaration. In 2001, the University of Lüneburg in Germany and the COPERNICUS Programme organized a conference titled *Higher Education for Sustainability: Towards the World Summit on Sustainable Development 2002* in preparation for the World Summit on SD to be held in Johannesburg in 2002. Participants in the event were the IAU, the COPERNICUS-CAMPUS, ULSF, and UNESCO. These

organizations created the Global Higher Education for Sustainability Partnership (GHESP) program and signed the Lüneburg Declaration.

In the declaration, participants reaffirmed the importance of the role of ESD in higher education, in which the ultimate goal is to impart knowledge, values, and skills needed to empower people to make the changes required to achieve SD. Participants endorsed the Agenda 21, and the Thessaloniki Declaration, and made a call to governments and the UN to include higher education in future World Summits on SD and make higher education a topic of discussion during such events.

Participants proposed a plan of action in order to create a higher level of awareness about SD and promote the full implementation of the Talloires, Kyoto and Copernicus declarations, and developed a toolkit for universities designed to move from commitment to concrete actions (AUI, 2001).

The Ubuntu Declaration. During the 2002 UN World Summit on Sustainable Development in Johannesburg, members signed the Ubuntu Declaration in which it was recognized that the importance of developing a curriculum for SD at all levels of education and called educators, government, and all relevant stakeholders, to facilitate networking between developed and developing countries in the creation of strategic educational planning for SD, and for the creation of centers of excellence in SD (IAU, 2002).

The Decade for ESD

In December of 2002, after the Johannesburg's summit, the UN adopted the resolution 57-254 declaring the Decade for Education for Sustainable Development (DESD) between the years 2005 and 2014. The goal of DESD is to "integrate the

principles, values, and practices of sustainable development into all aspects of education and learning... This educational effort will encourage changes in behavior that will create a more sustainable future in terms of environmental integrity, economic viability, and a just society for present and future generations” (UNESCO, 2002, p. 1).

The International Implementation Scheme

UNESCO was required to develop an International Implementation Scheme (IIS) for the DESD. The draft was built from the work of more than two thousand contributions, reviewed by leading academics and experts, and presented to the 59th session of the UN General Assembly in New York in October 2004, and later at the 171st session of the UNESCO Executive Board in Paris in April 2005.

The primary focus of the ISS was to describe goals and objectives of the DESD, describe the commitment of nations to achieve DESD, and define key milestones. One of the key milestones is to collect indicators of progress for monitoring achievement. The document also describes how nations, groups and individuals can take roles and being actors in the DESD by contributing to the milestones. One of the primary actors for the DESD is the educational community which can provide relevant information from research by gathering baseline information and creating longitudinal studies (UNESCO, 2005b).

ESD in the LAC Region

The first meeting to discuss environmental education in the LAC region was held in Bogotá, Colombia in 1976. During this event, participants discussed the implications of The Belgrade Charter to the region. In 1982, regional environmental educators created the Network for Environmental Education for the LAC region (Red de Formación

Ambiental para America Latina y el Caribe). In 1985, regional environmental educators attended in Bogotá, the first seminar on university and the environment in the LAC region; consecutive meetings have been held in 1986 in Brasilia, in 1987 in Belem, and in 1989 in Havana, Cuba (González, 1996).

The First Ibero-American congress about environmental education (Congreso Iberoamericano de educación ambiental) was launched in Caracas, Venezuela in 1981. Other congress has been held in Guadalajara, Mexico, (1997), Caracas, Venezuela (2000), Havana, Cuba (2003), and Joinville, Brazil (2006).

In 1996, environmental educators from the LAC region and the Iberia region created the International Organization of Universities for Sustainable Development and the Environment (OIUDSMA). Presently, this organization is joined by 20 universities from the LAC region and the South of Spain (OIUDSMA, 2006).

In 2007, the Brazilian Minister of Environment had a formal agreement to promote the Earth Charter to every sector of Brazilian society. At the same time, two ministers of the Mexican Government made public commitments to the Charter (Earth Charter, 2009). In March of 2008, educators of the LAC region and UNESCO delegates met in Havana, Cuba, during the X International Workshop of Physics Education. Participants to the event declared the necessity of implementing a monitoring and evaluation scheme with the purpose of collecting ESD information in the Caribbean region. The final document was sent to UNESCO as an initiative for the DESD Monitoring and Evaluation Framework (UNESCO, 2008).

Costa Rica as a pioneer of ESD in the LAC region. Costa Rica has been a pioneer in the region by implementing programs aimed to include ESD in their national

educational systems (Mendoza et al., 1995). In Costa Rica, the Institutional Program of Sustainability and Peace (PRINSOPAZ), a program sponsored by UNESCO and the Earth Charter and directed by the University of Costa Rica, has the mission of promoting environmental education and reduction of pollution on campuses, in surrounding communities, and throughout the country (Calder & Clugston, 2003a).

Mexico has been also a pioneer for the inclusion of ESD in national programs. The Center for Education and Training for Sustainable Development (CECADESU), which is part of the Mexico's Ministry of Environment and Natural Resources, in partnership with Mexico's Ministry of Public Education, lead a program called National Strategy of Environmental Education for Sustainability, which goal is to include ESD in all aspects of the public education in Mexico.

The collection of indicators of progress of these programs in universities in Costa Rica might be useful to policy makers and educators as they can serve as examples for the implementation of similar programs in other countries.

Conclusions

As it was described during this chapter, SD is a response to the current ecological-environmental and socio-economical crisis created by centuries of pollution, depletion of natural resources, and inequity. These crises are not only threatening the survival of other species around us, but the survival of the Homo sapiens species itself.

SD is an evolving concept and consequently multiple interpretations can be found in the literature. Some of these interpretations can lead us to trivial or inconsequential definitions, to an oxymoron, or to a meaningful definition. However, deeper analysis of the term can lead us to a “paralysis by analysis” causing delays in essential changes

urgently needed to work for a sustainable society (Tilbury et al., 2002). Recent review of literature reveals an emerging consensus with the definition of SD given in the Brundtland's report (e.g., Dresner, 2002; Edwards, 2005; Rogers, Jalal, & Boyd, 2008). In this order of ideas, this is the definition adopted for this study.

Socio-economical changes are required to achieve SD, and education, specifically higher education, plays a significant role to produce those changes. Since 1990, universities have been aware of their responsibility to educate conscious citizens with regard to the impact of human activities on the land, poverty, and the necessity to protect resources for future generations. Universities began to participate and sign international agreements and declarations related to SD as a first step towards sustainability.

In 2002, the UN declared the Decade for Education for Sustainable Development (DESD) in order to integrate ESD into all aspects of education and learning as an effort to change behaviors for a more sustainable future. In 2004, UNESCO developed a draft to describe goals, objectives, and milestones for the DESD (The International Implementation Scheme - IIS). One of the key milestones of the IIS is to collect indicators of progress.

The goal of the present study was to collect some of these indicators of progress in Costa Rica's universities, for being a country pioneer in the region in implementing national policies for the inclusion of ESD in all areas of education.

Chapter 3: Methodology

Introduction

The goal of this chapter is to describe the methodology followed for this study as a mechanism to assessing the status of the ESD in Costa Rica's universities. This chapter describes the type of research used for the study, the participants selected, the instrument used (the survey), the strategy implemented to administer the survey and collect the data, and strategy followed for the analysis of data.

Importance of Qualitative Studies for Educational Research in Developing Countries

Preston (1997) stated that large-scale, cross-national quantitative research in developing countries “are seen to assume roles which are passive, non-reflective and determined by the researcher. They may learn nothing in the process of the study nor of its findings or the use to which they are put”(p. 46). Kai-ming (1997) argues that although mathematical models, mainly used in quantitative research, can be powerful tools for forecast and policy simulations, they have two primary limitations: (a) the assumptions of the models are not always verifiable, and (b) mathematical models rarely take into account emerging trends that are not statistically significant but are common sense in the field.

Qualitative research, in other hand, is aimed to generate theories and hypotheses from the data that emerge rather than testing preconceived and in some cases inappropriate frames of reference; qualitative research provides the researcher with greater flexibility in the research design, data collection, and analysis (Crossley & Vulliamy, 1997).

Due to the factors mentioned above, added to the innate characteristic of qualitative research towards the sensibility to local cultural contexts, scholars advocate qualitative case study as a methodology for educational research in developing countries (e.g., Crossley & Vulliamy, 1997; Fry & Thurber, 1989; Van Der Eyken, Goulden, & Crossley, 1995).

Research Design

The type of research selected for this study was a quantitative-qualitative cross-sectional. The instrument used for the study was based on The Sustainability Assessment Questionnaire-SAQ (see Appendix C) designed by the University Leaders for a Sustainable Future (ULSF). The purpose of the instrument was to measure the extent to which universities in Costa Rica are including ESD topics in their curriculum, research and scholarship, faculty-staff development and rewards, outreach and service, student opportunities, and institutional mission and planning. The survey was preferred over other methodologies because it provides a quick snapshot of the status of ESD in institutes of higher education, it is economically viable and it provides a rapid turnaround in data collection. The survey was administered via the Internet.

The quantitative data were collected by using a Likert-type ordinal scale, and some nominal and yes-no questions. Qualitative data were collected using open-ended questions. Descriptive analysis was performed to the quantitative questions, but calculations of mean and standard deviation were inappropriate because values between intervals in the instrument were not equal. Descriptive analysis was presented using frequencies and percentages in each category. Calculation of percentages was done using commercial spreadsheet software.

The analysis of qualitative data was based on Moustakas's (1994) analysis of significant statements. The SAQ instrument allowed cross-reference of responses (Greene, Caracelli, & Graham, 1989). This analytical method also allowed the researcher to seek convergences among the data.

Population

The population selected for this research was based on a list of universities obtained from the web site of Costa Rica's Minister of Education (2009). This list is shown in Table 1 and Table 2 in Chapter 4. The universities are certified by CONESUR (National Council of Higher Education of Costa Rica). I contacted CONESUR via telephone and verified that the list obtained from the minister's web site was accurate. The classification between public and private universities was necessary because the high number of students enrolled in public universities, which in 2007 was up to 48% (CONARE, 2008).

Instrument

Shriberg (2002) analyzed 11 of the most adopted assessment tools to measure sustainability initiatives in higher education institutions. The common goal of these instruments is dual: to identify best practices in education of sustainability and operations, and to allow communication of progress within and across institutions. Shriberg's analysis can be summarized as follows:

- *The National Wildlife Federation's State of the Campus Environment Survey* is a comprehensive tool helpful to identify barriers, drivers, incentives and motivations toward sustainability. This instrument is mainly focused on measuring eco-efficiency efforts.

- *The Sustainability Assessment Questionnaire (SAQ)* is a useful teaching tool which emphasizes sustainability as a process. Its drawback is that the tool does not provide a mechanism for comparisons.
- *The Audit Instrument for Sustainability in Higher Education* provides a flexible framework for institutional comparison, but it is difficult to comprehend due to its large number of variables and dependencies.
- *The Higher Education 21's Sustainability Indicators* provides a process-oriented framework to move beyond eco-efficiency with a small set of indicators. Its drawback is that it is difficult to measure.
- *The Environmental Workbook Report* is useful on strategic planning and prioritization of efforts with a focus on eco-efficiency compliance.
- *The Greening Campuses Instrument* provides an action plan to incorporate sustainability process but its main focus is in Canadian community colleges.
- *The Campus Ecology Instrument* provides a baseline for current tools for sustainability with focus on environmental issues.
- *The Environmental Performance Survey* is a process oriented tool compatible with environmental management systems with an eco-efficiency focus.
- *The Indicators Snapshot-Guide* provides a quick way to determine priorities for sustainability with an emphasis on eco-efficiency.
- *The Grey Pinstripes with Green Ties* provides information about environmental courses, institutional support, and faculty research, focusing primarily on environmental issues.

- *The EMS Self-Assessment* is a rapid way to self-assessment processes for sustainability with focus on eco-efficiency.

Criteria for the Selection of the SAQ

Based on the previous analysis of instruments to measure sustainability initiatives in higher education institutions, the Sustainability Assessment Questionnaire (SAQ) is the most appropriate tool for the purpose of this research due to its focus on education of sustainability.

The SAQ was developed by the University Leaders for a Sustainable Future (ULSF) between 1999 and 2001 and since then has been reviewed periodically. The SAQ aims to raise consciousness and to encourage debate about sustainability in the institutes of higher education. The instrument is a blend of quantitative and qualitative measures and has been used in hundreds of institutes of higher education around the world, primarily because it is a comprehensive tool easy to implement and free to use. The ULSF has made considerable progress with the instrument over the past few years to make it comprehensive, reliable, and valid; however, these properties rest firmly on the principle that indicators need to be constantly monitored, evaluated and improved (ULSF, 2008).

Description of the Questionnaire

The cross-sectional auto-ranking questionnaire is primarily based on the SAQ instrument (ULSF, 2008), with an addition of six introductory questions based on the framework of UNESCO's DESD (UNESCO, 2002). The questionnaire takes about 30 minutes to complete. This questionnaire included a presentation page (see Appendix A), for which the purpose was to identify the researcher, the representing institution, and a

short explanation of the rationale and significance of the study, an introductory page followed with directions and definitions (see Appendix B) to familiarize the participant with the survey, and finally with the 25-questions survey (see Appendix C), which is divided into seven areas of assessment. These areas of assessment are as follows:

1. Area for general assessment about sustainability and ESD. This area of assessment provided a snapshot of how, in general, the institute of higher education addresses the topic of ESD. This area of assessment consists of six questions. Two of the questions are based on a 0-4 auto-ranking scale (0-*don't know*; 4-*a great deal*) with an open-ended question to provide more information about these topics; three questions are yes-or-no with open-ended questions to provide more information; and, one question with multiple choices with an option to provide more information. This area of the assessment addresses research question number one.
2. Area for curriculum assessment. This area of assessment was designed to measure the extent to which the institute of higher education is addressing the topic of ESD in the curriculum. The area provides examples of courses in ESD to facilitate the participants to answer the questions. This area of assessment consists of five questions, two of them based on a 0-4 auto-ranking scale (0-*don't know*; 4-*a great deal*), one question of opinion, one yes-or-no question and one question with multiple choices. All the questions end in an open-ended question to encourage the participant to elaborate and provide insightful information. This area of the assessment addresses research question numbers three and four.
3. Area for research and scholarship assessment. This area of assessment was designed to measure the level in which faculty and students participate in research and scholarship in

areas of sustainability. The questionnaire provides examples of various sustainability disciplines to facilitate the participants to answer the questions. This area of assessment consists of three questions: One question with two sub-questions based on a 0-4 auto-ranking scale (0-*don't know*; 4-*a great deal*) with an open-ended question to obtain more information from the participant, one direct question with two sub-questions and one yes-or-no question with space to provide more information about the choice. This area of the assessment addresses research question number five.

4. Area for the assessment of faculty and staff development and awards for contributions to SD. The objective of this area is to measure practices in the institute of higher education to promote SD in faculty and staff, through hiring processes, recognition, scholarships, and development. This area of assessment consists of three questions. All questions are based on a 0-4 auto-ranking scale (0-*don't know*; 4-*a great deal*) each one with an open-ended question to provide additional information. This area of the assessment addresses research question number six.

5. Area for the assessment of outreach and service. This area measures participation of the institute of higher education in local community development, partnership with local schools, relationship with local government and business, or with international organizations in issues related to SD. This area of assessment consists of two questions, one based on a 0-4 auto-ranking scale (0-*don't know*; 4-*a great deal*) with an open-ended question to provide additional information and one with a direct question to describe in detail these participations. This area of the assessment addresses research question number seven.

6. Area for the assessment of student opportunities. The objective of this area is to measure practices in the institute of higher education to provide students with opportunities to participate in SD initiatives. This area of assessment consists of three questions, two of them are multiple-choice with an open line to describe choices not provided in the list and one question based on a 0-4 auto-ranking scale (0-*don't know*; 4-*a great deal*) with an open-ended question to provide additional information. This area of the assessment addresses research question number eight.

7. Area for the assessment of institutional mission, structure and planning. This area measures the commitment of the institute of higher education to promote SD at the institutional mission level. This area of assessment consists of five questions. One question has four sub-questions based on a 0-4 auto-ranking scale (0-*don't know*; 4-*a great deal*) with an open line to provide comments; One question is a multiple-choice question with an open line to describe choices not provided in the list; and three direct questions about the commitment of the institution towards SDE. This area of the assessment addresses research question number one.

Since Spanish is the national language in Costa Rica, the survey was translated into Spanish by the main researcher who is fluent in Spanish.

Administering the Survey and Data Collection

A three-stage process was adopted to administer the survey and to follow up in order to ensure a high response rate in data collection (Salan & Dillman, 1994). In universities with available telephone numbers, the Dean of Academics was contacted to explain the objectives of the study. A follow up email was sent identifying briefly the researcher, the institution represented, and announcing the purpose and scope of the

survey, its significance and a link to the survey. The survey was administered on-line. Data were collected using an internet survey collector called *SurveyMonkey* (SurveyMonkey, 2009). For universities without a valid telephone number, an email was sent with the details of the study.

One week later, I made a reminder telephone call and sent a reminder email to those who did not respond to the questionnaire. After a second week, a third personalized email was sent to non-respondents respectfully asking them to either respond to the questionnaire or to provide a new contact person. A total period of three weeks was used to administer the survey and collect the data.

Data Coding and Analysis

There were three types of questions in the survey: auto-ranking questions, multiple choices questions, and questions of opinion and comments. For auto-ranking and multiple choices questions, the coding used was *Descriptive* since this information required little interpretation. For questions that required an opinion or a comment, *Analytical coding* was the most appropriate methodology to use in order to discover and explore new themes (Morse & Richards, 2002).

Once results of the surveys were collected, they were fed into a database for coding and analysis. Data were cleaned by scanning incoherent answers. A descriptive analysis was performed to the clean data stored in order to determine frequencies and percentages. For analytical coding, intense analysis of the data was required in order to identify themes and topics; data were read entirely to obtain a general sense of the responses, and to search for patterns and behaviors useful to postulate conclusions.

The methodology used for the analysis of qualitative questions was based on Moustakas's (1994) analysis of significant statements. Cross-reference of responses (Greene et al., 1989) was performed between qualitative and quantitative responses. This analytical method also allowed the researcher to seek convergences among the data.

Chapter 4: Results

Introduction

The purpose of this chapter is to report the results of the data collected. This chapter is divided in four sections: Section one presents a brief history of organizations involved in decision making of higher education in Costa Rica; section two describes the population studied; section three reports the results of the first six questions in the survey (see Appendix C), which address the framework UNESCO-DESD; finally, section four reports results of the questions in the survey which address each of the eight research questions.

Brief History and Structure of the Higher Education System in CR

Since the reform of the University of Cordoba in Argentina in 1918, public universities in Latin America have become more accessible to the emerging middle class, and their main objective has been the education of students to address national social problems while maintaining their autonomy (Twombly, 1997). The public higher education system in Costa Rica has been part of this trend, specifically with the foundation of the University of Costa Rica (UCR).

The UCR was established by law in 1940, and opened in 1941, as a social reform to shift away the control of higher education from the elites to the middle class, and with the goal to contribute to the solution of social problems and progress of the country (Twombly, 1997). Approximately every ten years, UCR conducts a congress in which the goals of the university are evaluated, and major changes are implemented in structure, governance, programs and curriculums. During the third congress in the 1960s, the role of the university was defined as a commitment to study and find solutions to national

social problems, by establishing several measures such as obligatory courses on national reality, obligatory social service, stimulation of research, and increase students' representation in governance bodies.

To achieve these goals, the objectives of general education were re-defined as to incorporate students into national situations for the creation of critical consciousness about national realities within the Latin American context, and within "a universal and humanistic vision of the world" (Twombly, 1997, p. 12). Student were required to take two semesters of seminars on national reality during the third or fourth year of their major, and to perform a required minimum of 150-300 hours of community service (trabajo comunitario universitario: TCU) after 50% of the coursework had been completed.

During the 1970s, the UCR created regional centers to facilitate access to higher education to a larger portion of the population. Simultaneously, it opened opportunities for the foundation of the other three public universities along with private universities. The three other public universities were created during the 1970s as follows: The *Instituto Tecnológico de Costa Rica* was founded in 1973, the *Universidad Nacional* was founded in 1973, and the *Universidad Estatal de Distancia* was founded in 1977.

The National Council of Rectors (CONARE) was created in 1974 as an independent entity with the goal to coordinate public universities (CONARE, 2009). The same year, the Office of Higher Education Planning (OPES) was created as an entity of CONARE to provide the government with a five-years national higher education plan called PLANES.

In 1975, the Government authorized the creation of private universities to facilitate more access to higher education. The first private university approved in Costa Rica was the *Universidad Autónoma de Centro América* in 1975. By the 1990s, the environment of higher education in Costa Rica had begun to change due to political and economical trends toward privatization and globalization of the economy (Twombly, 1997). By the 1990s, seven private universities and 14 *parauniversities* (technical schools) were opened in Costa Rica, and by the year 2000, 50 private universities were offering higher education programs (CONARE, 2008). The growth of private universities in Costa Rica came to halt in 2001, when new legal regulations were compulsory for the creation of centers of education.

The National Council of Private Higher Education (CONESUP) is an organism of the Minister of Public Education founded in 1981 to authorize the creation of private universities. Prior authorizing the creation of a new private university or program, CONESUP must submit a request to OPES for its approval. In 1999, the Association of United Rectors of Private Universities (UNIRE) was founded with the goal of fomenting the collaboration between private universities, defend their interests and promote the system of accreditation of programs in private universities, and promote the State to stimulate the private initiative (UNIRE, 1999). In 1999, the National Higher Education Accreditation System (SINAES) was created as an entity of CONARE. In 2002, SINAES was institutionalized by Law 8256 as the official entity for the accreditation of higher education programs (CONARE, 2008). Figure 3 illustrates the structure of the mentioned higher education organizations in Costa Rica.

Higher Education System in Costa Rica

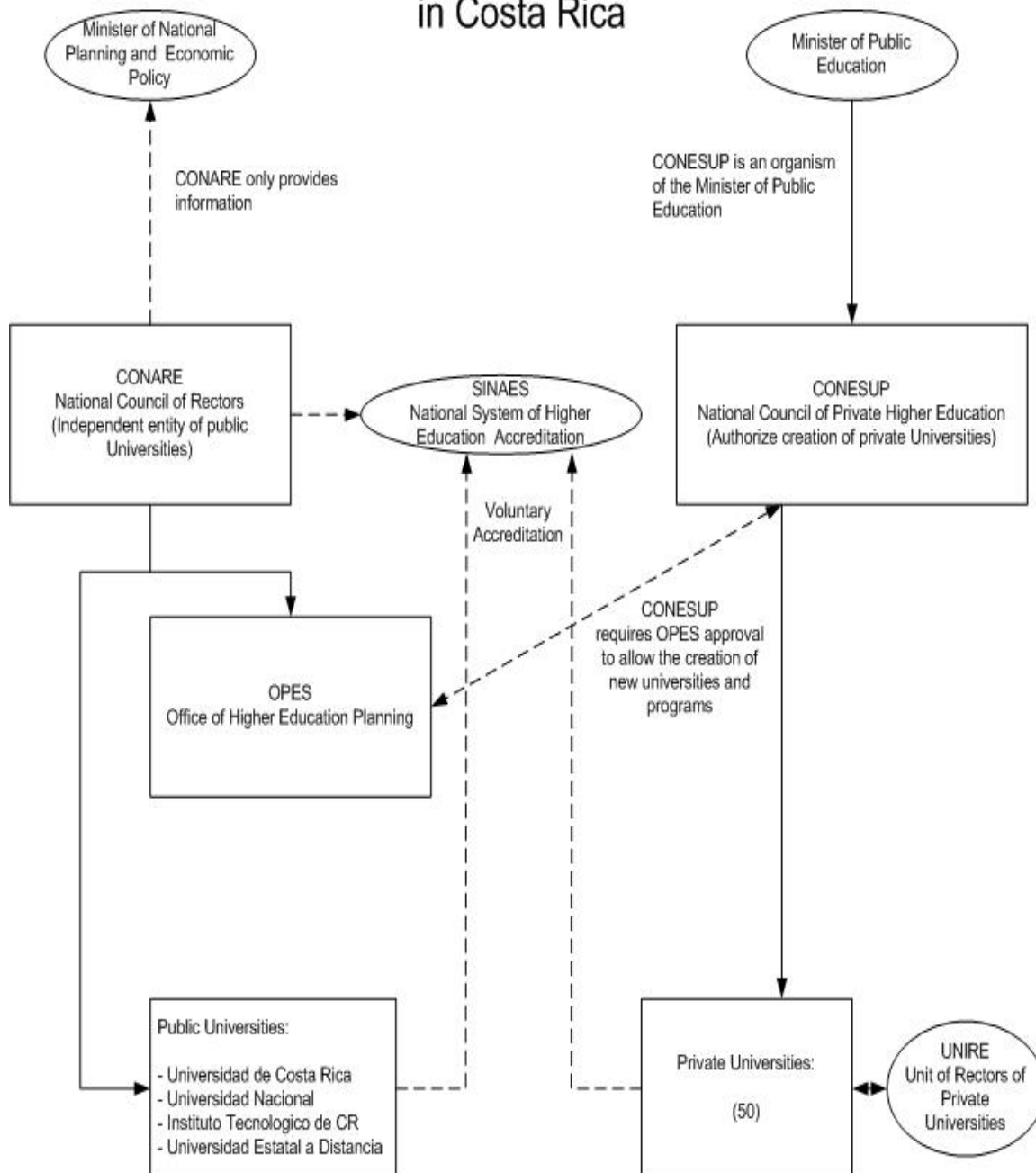


Figure 3. Structure of the Higher Education System in CR. Content obtained from "Consejo Nacional de Rectores [National Association of Rectors]" by CONARE, 2008, retrieved October 23, 2009, from <http://www.conare.ac.cr>, and "Acta Constitutiva de la Asociación Unidad de Rectores de Universidades Privadas de Costa Rica [Constitutive act of the united association of rectors of private universities of Costa Rica]" by UNIRE, 1999, retrieved Oct, 23, 2009, from <http://www.unire.or.cr/leyes-reglamentos/constitutiva.htm>.

Population

Table 1 and Table 2 present the list of universities certified by CONESUR. The list was obtained from the web site of Minister of Public Education of CR (2009). CONESUR was contacted via telephone to verify that the list obtained from the minister's web site was accurate. Although the number of private universities was confirmed by telephone (i.e. 50 private universities), CONESUR did not provide the list with names of the universities via email as I requested.

In 2007, the total of higher education students enrolled in public universities in CR was 48% (CONARE, 2008). Because the number of public universities is minimum compared with the number of private universities (i.e. four public universities and 50 private universities), but there is a high percentage of students enrolled in public universities, a classification between public and private universities was necessary.

From the 54 universities listed, nine did not have an active web-site or is under construction, nor a valid telephone number to be reached, and seven on the list did not have a valid telephone number although their web sites were active. I sent emails to these seven universities asking them to participate in the survey; however, none of them replied. I contacted the other 38 universities via telephone to explain the purpose of the survey and I sent a follow up email with more details about the purpose, objectives, and other pertinent information about the research (see Appendix A for the presentation page and Appendix B for the introduction page). Of the 45 universities contacted (seven by only email and 38 by telephone and email), 24 responded to the survey obtaining a response rate of 53%. From the universities that responded, four were public, for a 100% return rate, and 20 were private, for a return rate of 49%.

Table 1.

List of Public Universities

Name Public University	URL
Universidad de Costa Rica	http://www.ucr.ac.cr
Universidad Nacional	http://www.una.ac.cr
Instituto Tecnológico de Costa Rica	http://www.tec.cr
Universidad Estatal a Distancia	http://www.uned.ac.cr

Table 2.

List of Private Universities

Name Private University	URL
Universidad Adventista de Centroamérica	http://unadeca.net/content
Universidad Americana	http://www.uam.ac.cr
Universidad Autónoma de Centro América	http://www.uaca.ac.cr
Universidad Autónoma de Monterrey	http://www.unamon.com
Universidad Bíblica Latinoamericana	http://www.ubila.net
Universidad Braulio Carrillo	No web site found
Universidad Católica de Costa Rica	http://www.ucatolica.ac.cr
Universidad Central	http://www.universidadcentral.com
Universidad Centroamericana de Ciencias Sociales	http://www.ucacis.com
Universidad Continental de las Ciencias y las Artes	http://www.uccart.com
Universidad Creativa	http://www.ucreativa.com
Universidad Cristiana del Sur	no web site found
Universidad Cristiana Internacional	http://www.esepa.org
Universidad de Cartago Florencio del Castillo	http://www.uca.ac.cr
Universidad de Ciencias Empresariales	http://www.ucem.ac.cr
Universidad de Ciencias Médicas	http://www.ucimed.com
Universidad de Ciencias y las Artes	http://www.udelascienciasyelarte.ac.cr
Universidad de la Salle	http://www.ulasalle.ac.cr
Universidad del Diseño	http://www.unidis.ac.cr
Universidad del Turismo	http://www.utur.cr
Universidad del Valle	http://www.udelvalle.com
Universidad Empresarial de Costa Rica	http://www.unem.edu
Universidad en Ciencias Administrativas San Marcos	no web site found
Universidad Escuela Libre de Derecho	http://www.uescuelalibre.ac.cr
Universidad Evangélica de las Américas	http://www.unela.net

(table continues)

Name Private University	URL
Universidad Federada de Costa Rica	http://www.ufederada.ac.cr
Universidad Fidéлитas	http://www.ufidelitas.ac.cr
Universidad Fundepos Alma Mater	http://www.fundepos.ac.cr
Universidad Hispanoamericana	http://www.uhispanoamericana.ac.cr
Universidad Iberoamericana	http://www.unibe.ac.cr
Universidad Independiente de Costa Rica	http://www.uindependiente.ac.cr
Universidad Interamericana de Costa Rica	http://www.uinteramericana.edu
Universidad Internacional de las Américas	http://www.uia.ac.cr
Universidad Internacional San Isidro Labrador	http://www.uisil.com
Universidad Isaac Newton	no web site found
Universidad Juan Pablo II	http://ujpii.ac.cr
Universidad Latina de Costa Rica	http://www.ulatina.ac.cr
Universidad Latinoamericana de Ciencia y Tecnología	http://www.ulacit.ac.cr
Universidad Libre de Costa Rica	http://www.ulicori.ac.cr
Universidad Magister	http://www.umagister.com
Universidad Metodista	no web site found
Universidad Metropolitana Castro Carazo	http://www.umca.net/index.html
Universidad Panamericana	no web site found
Universidad para la Cooperación Internacional, San José	http://www.uci.ac.cr
Universidad San Juan de la Cruz	http://www.sanjuandelacruzuniversity.us
Universidad Santa Lucía	http://www.usantalucia.com
Universidad Santa Paula	http://www.uspsantapaula.com
Universidad Tecnológica Costarricense	no web site found
Universidad Veritas	http://www.uveritas.ac.cr
University of San José	http://www.usanjose.ac.cr

Results to Introductory Questions Regarding the Framework UNESCO-DESD

The first part of the survey consists of six quantitative and qualitative questions aimed to measure the scope by which the participants are aware of the framework of UNESCO-DESD. Descriptive analysis was performed on the quantitative data and analysis of significant statements was performed on the qualitative data to corroborate and complement the results. Table 3 summarizes the percentages of responses to the quantitative questions.

Table 3.

*Percentage of Responses to Introductory Questions*Public Universities ($N=4$)

Survey Question	(don't know)	(none)	(a little)	(quite a bit)	(great deal)	Totals
1. Acceptance Brundtland Def.	0	0	0	25%	75%	100%
2. ESD Priority at University	0	0	0	25%	75%	100%

Survey Question	(yes)	(no)	(no response)	Totals
3. ESD equal to Environmental. Ed.	0%	75%	25%	100%
4. Heard about DESD	50%	50%	0	100%
5. Heard about Earth Charter	100%	0%	0	100%

Private Universities ($N=20$)

Survey Question	(don't know)	(none)	(a little)	(quite a bit)	(great deal)	Totals
1. Acceptance Brundtland Def.	15%	0%	5%	20%	60%	100%
2. ESD Priority at University	0%	10%	0%	30%	60%	100%

Survey Question	(yes)	(no)	(no response)	Totals
3. ESD equal to Environmental. Ed.	25%	65%	10%	100%
4. Heard about DESD	35%	55%	10%	100%
5. Heard about Earth Charter	80%	10%	10%	100%

Two qualitative approaches were used for the analysis of the open-ended questions: A concurrent cross-validation of responses strategy (Greene et al., 1989) was implemented with the respective quantitative data, and a selection of significant statements using Moustakas' (1994).

Table 4 presents the selective significant statements from the open-ended question number one in the survey. Results revealed that 40% of the statements made reference to ecology/environment concerns, while 20% made reference to the economic pillar of SD. Additional statements selected were: request for inclusion of culture, request for the inclusion of community action, and request for the inclusion of a statement about social change or social transformation. A participant stated that the Brundtland's definition is too anthropocentric.

Table 4.

Significant Statements to Clarifying SD Definition

Themes	Frequency	Percentage
Ecology/Environment	4	40%
Economy	2	20%
Culture	1	10%
Anthropocentric definition	1	10%
Community	1	10%
Process change/Transformation	1	10%
Total	10	100%

In question six, participants were asked to indicate what international agreements related to ESD their university has signed. Only 10% of the participants selected one or more of the international agreements proposed.

Results to Research Questions One and Two: Inclusion of ESD in Curriculums

This section of the chapter addresses research questions one and two, both related to the inclusion of sustainability in curriculums. Research question number one is: To what extent have universities in Costa Rica included ESD in their curriculums? Research question number two is: In what curriculums has ESD been included?

Table 5.

Percentages of Inclusion of Sustainability in Curriculums

Public
Universities
(N=4)

Survey Question	(don't know)	(none)	(a little)	(quite a bit)	(great deal)	Totals
7. Offer of courses in sustainability	0	0	0	50%	50%	100%
8. Inclusion of sustainability in traditional classes	0	0	75%	25%	0%	100%

Private
Universities
(N=20)

Survey Question	(don't know)	(none)	(a little)	(quite a bit)	(great deal)	Totals
7. Offers courses in sustainability	0%	15%	25%	40%	20%	100%
8. Inclusion of sustainability in traditional classes	0%	20%	55%	10%	15%	100%

The quantitative portion of questions seven and eight in the survey, address research question number one; the qualitative portions of these questions address research question number two. Table 5 presents the results for the descriptive analysis of questions

seven and eight of the survey. It can be observed that 60% of the private universities offer few courses in sustainability while 100% of the public universities offer these courses.

The results of the qualitative portion of the questions revealed that biology, environmental sciences, and economics were the major traditional areas in which sustainability is being included. Half of the respondents from private universities were specific describing these areas; other traditional classes listed were tourism, public health, architecture, and ethics.

Results to Research Question Three: ESD required for Undergraduate Students

Table 6 presents the percentages of responses to question number nine in the survey which addresses research question number three: Are universities in Costa Rica requiring undergraduates to take courses in sustainability?

Table 6.

Requirement of ESD for Undergraduates

9. Are undergraduates required to take courses in sustainability or environmental education?	Public Universities (N=4)	Private Universities (N=20)
Yes	75%	55%
No	25%	45%
Total	100%	100%

Results to Research Question Four: Research and Scholarship in SD

Questions 10, 11, and 12 of the survey address research question number four: To what extent are universities in Costa Rica addressing research and scholarships in sustainability? Table 7 presents the results of the quantitative portion of the questions.

Table 7.

Extent of Research or Scholarship in SD

10. Amount of research or scholarship in SD (estimate)

University	(don't know)	(none)	(a little)	(quite a bit)	(great deal)	Totals
Public (N=4)	50%	0%	0%	50%	0%	100%
Private (N=20)	10%	30%	50%	10%	0%	100%

11. Percentage of Faculty who teach or do research in SD

University	none	1-24%	25-49%	50-74%	75-100%	Total
Public (N=4)	0%	25%	50%	25%	0%	100%
Private (N=20)	35%	30%	15%	20%	0%	100%

12. Multidisciplinary Infrastructure for research in ESD

University	(yes)	(no)	Totals
Public (N=4)	75%	25%	100%
Private (N=20)	30%	70%	100%

Results to Research Question Five: ESD as a Factor for Faculty and Staff Hiring and Promotion

Questions 13 and 14 of the survey address the research question number five: To what extent is ESD recognized as a factor for faculty and staff hiring and promotion? Table 8 presents the results of the quantitative portion of the questions. Questions 14 have a qualitative component for concurrent comparison.

Table 8.

ESD as a Factor for Faculty and Staff Hiring and Promotion

Public
Universities
(N=4)

Survey Question	(don't know)	(none)	(a little)	(quite a bit)	(great deal)	Totals
13. Faculty/staff hiring and promotion	0%	25%	75%	0%	0%	100%
14. Faculty and staff develop. for ESD	0%	0%	50%	50%	0%	100%

Private Universities
(N=20)

Survey Question	(don't know)	(none)	(a little)	(quite a bit)	(great deal)	Totals
13. Faculty/staff hiring and promotion	5%	50%	25%	15%	5%	100%
14. Faculty and staff develop. for ESD	0%	20%	50%	20%	10%	100%

Results to Research Question Six: SD Initiatives for the Community

Question 15 in the survey addresses research question number six: To what extent are these universities participating in SD initiatives for the community at the local, regional, national or international level? Table 9 presents the results of the quantitative portion of the question.

Table 9.

SD Initiatives for the Community

15. SD initiatives for
community

University	(don't know)	(none)	(a little)	(quite a bit)	(great deal)	Totals
Public (N=4)	0%	0%	0%	75%	25%	100%
Private (N=20)	5%	10%	30%	30%	25%	100%

The question in the survey has a qualitative component for concurrent comparison. Participants from public universities described some of the sustainability programs at their institutions as being oriented towards the community such as the inter-institutional environmental commission called “Proyecto Horizontes Ambientales del IDESPO”, the “Hormiga” team, which is a group of students who pay their student loans by participating in environmental activities for the community, the “Zona Económica San Carlos”, in which students help the community of San Carlos implement economic development programs, and community work required for graduation for pre-graduate and masters programs

Two of the participants from private universities described specifically programs with the community. One was the inter-institutional program of collaboration with the School of Ecology of Costa Rica (Colegio Ecologico Intercolegial), virtual activities about food print and development, consultancy with the community for the development of Agenda 21 at local level, and sustainable programs for eco-tourism such as the program of communities for the reserve of the biosphere, the water, and peace, and work with communities of the province of Neuquen in Argentina.

Results to Research Question Seven: Student Opportunities for SD Initiatives

Questions 16, 17 and 18 in the survey address the research question number seven: To what extent are these institutions providing opportunities for students to participate in SD initiatives?

Table 10 presents the results for question 16 in the survey. Question 16 asks participants to select or mention institutional organizations where students can have the opportunity to participate in sustainability activities. The question provides the option of

multiple choices (shown in the table) since universities can have more than one of these organizations.

Table 10.

Organizations for Student Opportunities in SD Initiatives

16. Institutional Organizations for Student Participation in SD	Public Universities	Private Universities
Student Environmental Center	100%	0%
Ecology House or Sustainable Dormitory	50%	5%
Orientation program(s) on sustainability for students	75%	25%
Student Group(s) with an environmental or sustainability focus	25%	20%
None	0%	60%
None of the above	0%	5%

All public universities provide programs in which students can have the opportunity to participate in sustainability activities but these programs are being offered only in 40% of the private universities. The open-ended portion of question 16 asks participants to provide the name of other programs implemented at their institutions. Only 20% of participants from private universities gave specific examples of institutional organizations where students can participate such as “El Refugio de Vida Silvestre La Marta”, which goal is the protection of wildlife refuges, the program “Gestion Ambiental Integral”, in which students perform activities for the protection of the environment, and eco-clubs where students can participate in environmental and sustainable programs.

Orientation programs are important in order to provide guidelines to students who want to participate in sustainability programs. These orientation programs have been provided in 75% of the public universities but only in 25% of the private universities.

Survey question 17 asks participants about events in which students can participate in SD activities. The question provides multiple choices and an open-ended

question to allow participants to provide additional information. Table 11 presents the results for the quantitative portion of the question.

Table 11.

Events to Encourage Students Participation in SD Initiatives

17. Events for SD Encouragement	Public Universities	Private Universities
Job fairs and career counseling focused on work in sustainable enterprises	50%	20%
Pledge of social and environmental responsibility	50%	35%
Others	0%	5%
None	50%	40%

Question 18 of the survey asks participants to provide information regarding the extent in which student groups participate in sustainable initiatives. Table 12 presents the quantitative results of the question. Participants from public universities stated that in 75% of their institutions student groups have quite a bit of participation in sustainable activities. In private universities, 55% have a little or more than a little involvement. In 35% of the private universities, student groups do not have any involvement in sustainable activities.

Table 12.

Student Groups Involvement in Sustainability

18. Student Groups Involved in SD

University	(don't know)	(none)	(a little)	(quite a bit)	(great deal)	Totals
Public (N=4)	25%	0%	0%	75%	0%	100%
Private (N=20)	10%	35%	35%	10%	10%	100%

Question 18 in the survey has a qualitative component for concurrent comparison. Half of the participants stated that recycling is one of the biggest student activities for participation in SD initiatives; the other half stated that the main activity was in community work.

Results to Research Question Eight: Commitment for Sustainability

There are five questions in the survey (questions 19 to 23) which address research question number 8: To what extent are universities in Costa Rica committed to ESD? Question number 19 in the survey measures the extent in which universities' formal written statements of purpose and objectives reflect a commitment to sustainability. Table 13 presents the quantitative portion of this question.

Table 13.

Extent of Formal Written Commitments to Sustainability

19. Extent of formal written commitments to sustainability						
University	(don't know)	(none)	(a little)	(quite a bit)	(great deal)	Totals
Public (N=4)	0%	0%	0%	25%	75%	100%
Private (N=20)	0%	15%	30%	25%	30%	100%

Results reveal that in 100% of public universities, the formal written commitment to sustainability is quite a bit or higher; in private universities the result is 55%. In the qualitative portion of the question, 75% of public universities provided examples of statements committed to sustainability. For example, during the 50 anniversary of the University of Costa Rica, directors of the university created a policy of comprise towards sustainability. In another example, the vision of the National University of Costa Rica

(Universidad Nacional), consists of acquiring academic excellence based on the mission of the university, which is consistent with environmental responsibility in the present and the future, and its compromise to make contributions for a sustainable and balance development of the society in a framework of solidarity and harmony between humans and nature.

In private universities, 35% provided examples such the mission of the university Veritas, which states its compromise for the protection of the environment, the implementation of permanent actions to mitigate the impact in the environment, and the importance of responsible participation to build a sustainable development, and the University for International Cooperation (Universidad para la Cooperación Internacional), which mission consists of the formation of leaders, capable of inducing and conducting changes required for acquiring economic, environmental, and socio-cultural development.

Table 14 presents the results of the survey question number 20 in which participants were asked to select from the list, or mention positions, committees, or practices to reinforce the commitment of their institutions to sustainability. Participants were able to select more than one choice and an open-ended question was provided to allow them to add activities not listed.

Questions 21, 22, and 23 in the survey are qualitative. The analytical procedure was based on Moustakas's (1994) analysis of significant statements. Table 15 presents the significant statements extracted from the responses of survey question number 21 regarding the activities organized at universities to give visibility to sustainability organized by frequency of occurrence.

Table 14.

Positions, Committees, or Practices to Sustainability

20. Positions, committees, or practices for commitment to sustainability	% Public Universities (N=4)	% Private Universities (N=20)
Environmental Council or Task Force	25%	15%
Environmental Coordinator	75%	0%
Dean of Environmental Programs or Director of Sustainability Programs	50%	5%
Energy Officer	0%	15%
Green Purchasing Coordinator	50%	10%
Institutional Declaration of Commitment to Sustainability/Environmental Responsibility	100%	15%
Orientation programs on sustainability for faculty and staff	50%	15%
Socially responsible investment practices and policies	75%	35%
Regularly conducted environmental audits	75%	10%
Others	0%	5%
None	0%	35%

Table 15.

Activities to Give Visibility to Sustainability

Themes	Freq	Percentage Public	Percentage Private	Percentage Total
Celebrations	8	75%	25%	24%
Conferences	7	75%	20%	21%
Invitation of experts	5	100%	5%	15%
Recycling programs	5	75%	5%	15%
Blue Flag Program	2	25%	5%	6%
Programs for the reduction of energy	1	0%	5%	3%
Programs for the reduction of printing	1	0%	5%	3%
Community programs	1	0%	5%	3%
Day without noise	1	0%	5%	3%
Day without smog	1	0%	5%	3%
Electronic communications	1	0%	5%	3%
Total	33			100%

Table 16 and Table 17 present the significant statements extracted from the responses of survey question 22 regarding the strengths and weaknesses of universities for implementing ESD.

Table 16.

Strengths Implementing ESD

Strengths	Frequency	Percentage Public	Percentage Private	Percentage Total
Consideration of the importance of SD by administrator, faculty, and students	7	50%	25%	33%
Competent faculty in SD	5	50%	15%	24%
Institutional compromise	4	50%	10%	19%
Incorporation of SD in curriculums	2	25%	5%	10%
Existence of research center in SD	1	25%	0%	5%
Programming Congress and Seminars	1	25%	0%	5%
Initiatives to work in SD	1	25%	0%	5%
Totals	21			100%

Table 17.

Weaknesses Implementing ESD

Weaknesses	Frequency	Percentage Public	Percentage Private	Percentage Total
Lack of institutional support	4	25%	15%	15%
Lack of resources	4	0%	20%	15%
Cultural change	3	25%	10%	11%
Need of obligatory courses in SD	2	0%	10%	7%
Inter departmental cooperation	2	0%	10%	7%
Lack of promotion	2	0%	10%	7%
Too little research	2	0%	10%	7%
Lack of knowledge	2	0%	10%	7%

(table continues)

Weaknesses	Frequency	Percentage Public	Percentage Private	Percentage Total
Lack of aggressive institutional policies	2	0%	10%	7%
Leadership	1	0%	5%	4%
Lack of incentives	1	0%	5%	4%
Inclusion in curriculums	1	0%	5%	4%
Inclusion in curriculums	1	0%	5%	4%
Totals	27			100%

Table 18 presents the significant statements extracted from the responses of survey question 23 regarding the next steps planned to strengthen their commitment to sustainability.

Table 18.

Next Steps Planned to Strengthen Commitment to ESD

Next Steps	Freq.	Percentage Public	Percentage Private	Percentage Total
Reorganization of curriculum to include SD	4	25%	15%	15%
Promotion of SD practices (reduction of energy, water use, recycling)	4	50%	10%	15%
Cooperation between universities and SD organizations	4	0%	20%	15%
Nothing	4	0%	20%	15%
Conformation of multidisciplinary commissions, departments or teams to work in SD	2	25%	5%	7%
Creation of programs for SD	1	0%	5%	4%
Create research towards SD	1	0%	5%	4%
Fortify existing programs	1	0%	5%	4%
Centralization of activities	1	0%	5%	4%
Classes in SD for faculty	1	0%	5%	4%

(table continues)

Next Steps	Freq.	Percentage Public	Percentage Private	Percentage Total
Teach social responsibility and sustainability in business programs	1	0%	5%	4%
Implement new policies towards SD	1	0%	5%	4%
Involve alumni in SD programs	1	0%	5%	4%
Provide continue education programs in SD	1	0%	5%	4%
Total	27			100%

The responses have been organized by frequency of occurrence. Significant statements reveal that 15% of the respondents stated that the next step is to reorganize the curriculum to include SD, 15% stated that they will promote SD practices, 15% stated that they will begin to cooperate with other universities and SD institutions, and 15% stated that they will do nothing in the near future.

This concludes the presentation of the results extracted from the responses to the survey. Quantitative responses were presented using descriptive analysis while the responses to the quantitative answers were presented using Moustakas's (1994) analysis of significant statements. Chapter 5 contains the discussions of the results of this study and provides recommendations for further studies.

Chapter 5: Discussions of Results, Conclusions, and Recommendations

Introduction

The purpose of this chapter is to discuss the results presented in Chapter 4 and conclude the research. This chapter is divided in three sections: Section one summarizes the objectives of this study; section two describes how the study was implemented and the methodology used; section three contains the discussion of the results; section four presents the conclusion; and section five presents suggestions for future work.

Summary of the Problem and the Purpose

Due to the important role that universities play to achieve sustainability, universities began to sign international agreements and declarations as a compromise to introduce ESD in their programs, curriculums, and regular practices. In developed countries, studies for assessing the status of ESD in their institutes of higher education are common (Calder & Clugston, 2003b); however, these studies are scarce in developing countries (W. Calder, personal communication, October 26, 2007). Some countries in the Latin American Region, such as Costa Rica, have created national policies to include ESD at all levels of education. Regardless, there is not a comprehensive study that shows how well these universities are meeting their compromise to sustainability.

The aim of this study was to assess the extent to which universities in Costa Rica are including ESD in programs and curriculum, research and scholarship, faculty and staff development and rewards, outreach and community service, student opportunities, and institutional mission and planning. The results of this study might provide information to organizations interested in sustainability education, about the extent in which universities in Costa Rica are addressing ESD in their curriculums and activities,

create awareness about sustainability in universities in Costa Rica in which ESD is currently not being addressed, or promote actions or plans consistent with UNESCO-DESD goal of integrating principles, values, and practices of sustainability in all aspects of education and learning by the year 2014.

To achieve this aim, the following research questions were proposed:

1. To what extent have universities in Costa Rica included ESD in their curriculums?
2. In what curriculums has ESD been included?
3. Are universities in Costa Rica requiring undergraduates to take courses in sustainability?
4. To what extent are universities in Costa Rica addressing research and scholarships in sustainability?
5. To what extent is ESD recognized as a factor for faculty and staff hiring and promotion?
6. To what extent are these universities participating in SD initiatives for the community at the local, regional, national or international level?
7. To what extent are these institutions providing opportunities for students to participate in SD initiatives?, and
8. To what extent are universities in Costa Rica committed to ESD?

Discussions about the Methodology

The methodology applied for this study was quantitative-qualitative exploratory cross-sectional. The selection of this methodology was the most appropriate in order to meet the objectives of the study as it will be discussed in this chapter. The instrument selected was based on *The Sustainability Assessment Questionnaire* (SAQ) developed by

the *University Leaders for a Sustainable Future* (ULSF). This instrument, as it was expected, provided a quick snapshot of the status of ESD in universities, it was economically viable and it provided a rapid turnaround in data collection. The survey was supplemented with six additional questions based on the framework of UNESCO's DESD.

The population in the study consisted of 45 universities selected from 54 listed in the Costa Rica's minister of education web-site (see Table 2). The universities were contacted via telephone, when possible, and via email in all cases. The return rate was 53%. Participants from the four public universities completed the survey, with a return rate of 100%. Participants from 20 private universities completed the survey, for a return rate of 49%. The classification between public and private was necessary because public universities, although not numerous, have a very high number of student enrollment (CONARE, 2008).

The Quantitative data were collected mainly using a Likert-type ordinal scale, with the use of some nominal and yes-no questions. Qualitative data were collected using open-ended questions. Descriptive analysis was performed to the quantitative questions. One of the disadvantages of the instrument was that calculations of mean and standard deviation were inappropriate because values between intervals were not equal. Descriptive analysis was presented using frequencies and percentages in each category. Calculation of percentages was done using commercial spreadsheet software.

The methodology used for the analysis of qualitative questions was based on Moustakas's (1994) analysis of significant statements. The SAQ instrument allowed the cross-reference of responses by the use of a concurrent comparison approach (Greene et

al., 1989). This analytical method also allowed the researcher to seek convergences among the data.

Discussions to Results of Research Questions

The following section will address the discussions to each of the research questions.

Discussions to results of introductory questions. According to the results shown in Table 3, only 50% of the public universities have heard about the DESD; however, in these universities there is a high acceptance of the Brundtland's definition and ESD has a high priority. Descriptive analysis also revealed that just 35% of the private universities have heard about the DESD, and that 80% have heard about the Earth Charter, which headquarters are in Costa Rica.

The concurrent comparison analysis of qualitative responses revealed that those participants who partially accepted the Brundtland's definition wanted to make it more clear or complement it. Some of the most significant statements to clarify the definition are shown in Table 4. Although implicit in the definition, 40% of the participants stated that the definition of SD should include a statement about the ecology and the environment, while 20% stated that the definition should include an economy component. One of the participants stated that the definition of SD declared by ALIDES, the Central American Alliance for Economic Development, was more accurate than the Brundtland's definition; therefore, according to the participant, this definition should be the one used in the region.

The majority of participants, 75% in public and 65% in private universities, were able to distinguish the difference between ESD and environmental education. A more

cautious approach was taken by one of the public university's participant, who declined to answer this question because that particular university has not committed to an official approach. Although a big percentage responded that these two terms are different, it is my opinion that in order to achieve sustainability, all university professors should know the difference.

In question six, participants were asked to indicate what international agreements related to ESD the university has signed. Only 10% selected one of the international agreements; however, in the open-ended question they were not sure if their universities directly signed the agreement or if the agreements mentioned were part of the national agreements.

One of the participants mentioned that they are working with the ULSF for a certification in sustainability and that this year they won the national *Blue Flag Ecological Award*, an adaptation of the *European's Blue Flag Programme*. The Program was developed with the objective of awarding communities that implement sustainable development practices at beaches and marinas. The program maintains a strict measure of the quality of the water, evaluates what kind of environmental education is provided in such community, the level of public information, the level of environmental management, and other safety services.

Discussions to results of research questions one and two. Table 5 shows that 100% of the public universities offer 'more than a little' of courses in sustainability, while only 60% of the private universities offer them. It is also important to note that public universities have not included a great-deal of sustainability in their traditional curriculums, that 75% have included a little, and that 25% have included quite a bit. In

private universities, 15% have included sustainability a great deal into their traditional classes; however, 75% have included only a little or less than a little, and 20% have not included any sustainability at all.

The concurrent comparison analysis revealed that participants at public universities, who stated that their institutions offer more than a little of curriculum courses in sustainability, were specific in describing the areas in which these courses are being offered. Areas mentioned in the list were biology, environmental sciences, and economics; however, only half of the participants at private universities stated that their institutions offer more than a little of courses in sustainability. Participants were specific describing these areas, besides biology and environmental sciences, they described courses in tourism, public health, architecture, and ethics.

The qualitative data confirmed the quantitative results regarding the minor inclusion of sustainability in traditional areas of knowledge. Two of the participants stated that sustainability was incorporated by the inclusion of case studies in traditional classes, while another participant stated that SD was in the mission statement of the university; however, the qualitative analysis did not corroborate any great deal of inclusion of sustainability in traditional classes.

Discussions to results of research question three. According to the results shown in Table 6, a high percentage of public universities (75%) are requiring undergraduates to take courses in sustainability, while in private universities the percentage is much lower (55%). Based on qualitative analysis, universities are incorporating sustainability in the curriculum as an elective. It is the hope of this researcher that by 2014, when the DESD is completed, that all undergraduate students should be sustainable literate.

Discussions to results of research question four. According to the results shown in Table 7, the discrepancy in the amount of research and scholarship for sustainability between public and private universities is large: 50% of the public universities are doing quite a bit of research and scholarship, while only 10% of the private universities have done quite a bit. Even in the qualitative section of the question, one of the participants from a public university who responded *don't know* in the quantitative portion of the question, stated that it was too difficult to make an estimate although the institution has several research programs in SD. Another participant from a public university cited more than 10 research programs in SD although the quantitative response to this question was *don't know*.

At private universities, 30% do not do any research or provide any scholarship for SD. In 80% of these universities, less than half of the faculty teaches or does research in SD. The majority of the participants from private universities who responded *a little or more than a little* to the quantitative portion of question 10, were able to describe briefly some of their research programs. All who responded yes to the multidisciplinary infrastructure for SD were able to provide examples. This big discrepancy between public and private universities could be explained considering that, as it can be extracted from the data collected, private universities do not consider research as an objective of their mission.

Discussions to results of research question five. The responses shown in Table 8 indicate that all public universities have little or less than a little of recognition for hiring and promoting staff and faculty with ESD experience, but all these universities recognized the importance of ESD for professional development, at least a little. At

private universities, 50% do not recognize contributions to sustainability as a factor for hiring or promoting faculty or staff; however, 80% considered SD important for professional development. Qualitative analysis of the data that emerged from this question did not provide any useful information to corroborate the quantitative response.

Discussions to results of research question six. As Table 9 indicates, 100% of public universities work quite a bit or more in initiatives for SD in the community. This number is much lower in private universities (55%), although 25% stated that they have a great deal of initiatives for SD in the community, matching public universities in this area.

In the qualitative portion of this question for concurrent comparison, participants from public universities described some of the sustainability programs at their institutions oriented towards the community. Two of the participants from private universities described sustainable programs with the community, while the rest simply stated that their involvement with the community was a requirement for graduation but did not mention any specific program.

Discussions to results for research question seven. According to the responses shown in Table 10, all participants representing public universities stated that their institutions have student environmental centers while participants at private universities do not have these types of centers. The orientation programs in SD had a high score (75%) in public universities, while only 25% of public universities provide this type of orientation.

At private universities, 60% of the participants stated that their institutions do not have any type of institutional organization where students can participate in SD activities.

Participants from private universities only 20% gave specific examples of institutional organizations where students can participate.

As it is shown in Table 11, half of the public universities organize job fairs and provide career counseling to students to work in sustainable issues, while only 20% of the private universities organize these kinds of events. The other half of the public universities, do not organize these events, a little higher than 40% of the private universities.

In the question regarding the participation of student groups involved in sustainable issues (Table 12), 75% of the public universities stated that these organizations have ‘quite a bit’ of involvement in sustainable practices in their universities, while in private universities, 55% stated that there is *a little* or *more than a little* of involvement, even though 35% of the private universities stated that these groups do not have any involvement at all. In the qualitative component of the question, 50% of the participants, from public and private universities, stated that recycling is one of the biggest student activities for participation in SD initiatives, while the other 50% stated that the main activity was community work.

Discussions to results of research question eight. According to the results shown in Table 13, 100% of the public universities have *quite a bit* or higher formal written commitments to sustainability, while only 55% of the private universities have these formal written statements. Of this 55%, only 35% provided examples of these statements, while 75% of public universities provided such examples. This institutional commitment might explain the creation of environmental positions, committees, and departments, including orientation programs on sustainability, and other organizations as shown in

Table 14. The number of this type of organizations is much lower in private universities; however, it is interesting to notice that 35% of private universities have programs in social responsibility.

Table 15 presents activities that universities plan in order to foment or give visibility to sustainability. The results indicate a high tendency towards celebrations, conferences, and inviting experts; however, community programs are not being considered as a way to promote sustainability.

Table 16 shows the results regarding the strengths and weaknesses of universities implementing ESD. Based on these results, it can be concluded that administrators, faculty, and students give importance to SD, that universities have competent faculty to work on sustainability issues, and that institutions have a commitment; however, parties interested are not receiving enough institutional support. A reason might be the lack of resources and the need of culture change.

As far as for the future, Table 17 presents what next steps universities are taking for sustainable initiatives. Results indicate an awareness of the importance of reviewing the existing curriculum to include SD topics, as well as an interest in promoting SD practices at their campuses and cooperate with other universities and SD organizations in sustainability issues. Not all universities expressed plans to work with local communities. A few universities (4%) do not have any plans to implement ESD.

Implications for the LAC Region

This section describes some of most important implications for the LAC region of Costa Rica's national policy in ESD, specifically in universities. These implications can be classified in three areas: (a) implications of ESD as a strategy to achieve SD in the

region, (b) implications for the advance of regional research, specifically in the area of SD and biodiversity, and (c) regional economic implications.

Implications in the LAC region to achieve SD. López (1995) identified 24 initial SD strategies in Latin America, and classified Costa Rica as the first country in the region with a national strategy to focus on SD and with the necessary political support for implementation.

By the beginning of the new millennium, Costa Rica became a leader and an example to other developing countries in achieving conservation and SD, due in part to its environmental policies and educational strategies (Steinberg, 2001). One of the most important Costa Rica's strategies to strengthen their commitment to conservation and SD was by making public the importance of the environment to the country, creating environmental university programs, organizing seminars, and leading discussion groups in SD and the environment.

The first effort for the implementation of a national policy to achieve SD in Costa Rica was by the publication in 1990 under *Estrategia Nacional de Conservación para el Desarrollo Sostenible-ECODES* (National Conservation Strategy for Sustainable Development), a state initiative published by the Ministerio de Recursos Naturales, Energía y Minas-MIRENEM (Minister of Natural Resources, Energy, and Mines), supported by the academia and by non-governmental organization such as the Unión Mundial para la Naturaleza-UICN, Conservation International, The Conservation Foundation, The Nature Conservancy, and The World Wildlife Fund-WWF (Mendoza et al., 1995).

Two of the goals of ECODES were the creation of a national master plan for environmental education and the creation of a national entity for SD in Costa Rica. Regarding environmental education, the government published in 1991 the national master plan for environmental education and created the national commission for environmental education.

Regarding the creation of a national entity for SD, the government launched in 1994 the Sistema Nacional para el Desarrollo Sostenible-SINADES (National System for Sustainable Development), an organization which integrates a legislative commission, a technical commission represented by universities, a public representation, and an organization for the promotion of SD in Costa Rica. One of the main goals of SINADES is to promote training to change attitudes and actions towards SD.

Role of Costa Rica's universities to promote regional ESD. The participation of universities in the development and implementation of strategies for SD in Costa Rica have been significant (Mata, 2002). The UCR participated actively in the elaboration of ECODES by providing high educated level of human resources that helped shape the theoretical and political strategy of the document.

In 1993, the UCR created a set of institutional environmental policies critical for shaping the commitment of the academia to SD. Within this set of policies, it was stated that the future of country depends on the ability of humans to live in peace among themselves and in harmony with nature, that the rational use of natural resources should be supported by raising critical environmental awareness among students and encouraging the teaching, investigation and extension to the community of SD, and that it

is the university duty to support the creation of projects oriented to diagnose conditions and provide education about conservation and the environment (Mata, 2002)

The UCR embarked on a program to save the highly polluted creek that runs through the campus and extended the project to the community living around the creek. The program, launched in 1995, was called Programa Institucional de Sostenibilidad y Paz-PRINSOPAZ (Institutional Program of Sustainability and Peace) because of the importance of both, peace and sustainability, to improve the quality of the environment. In 1997, PRINSOPAZ joined the Earth Council and created the Grupo Costarricense Promotor de la Carta de la Tierra (Costa Rican Group promoter of the Earth Charter), a joining group of universities, governmental, and non-governmental organizations with the goal of promoting the Earth Charter to all levels of education in Costa Rica. In 2007, the Brazilian Minister of Environment had a formal agreement to promote the Earth Charter to every sector of Brazilian society. At the same time, two ministers of the Mexican Government made public commitments to the Charter (Earth Charter, 2009).

Regional higher education accreditation. Globalization, the rapid expansion of higher education in the region, specifically of private universities, and the internationalization of higher education, create a need to maintain a certain level of international recognition to facilitate mobility of students and academic cooperation (Samoilovich, 2008). Accreditation systems are mechanism of regulation to guarantee that universities meet certain criteria at institutional and at academic level, and present those results to society (Aguilar, 2008). Although all of the countries in the LAC region have incorporated systems of accreditation, these regulatory systems are scared at the regional level.

SINAES, the national system for the accreditation of higher education programs in Costa Rica, was created in 1999 and it is considered a pioneer entity in the Central America region for the accreditation of courses and programs (Samoilovich, 2008). At the regional level, the Consejo Centro Americano de Acreditación -CCA (Central American Council of Accreditation), based in Costa Rica, is a pioneer in giving recognition to national agencies of accreditation in the region (Aguilar, 2008).

Implications in the advance of regional research. The *National Biodiversity Institute of Costa Rica* (INBio), an institution created in 1989 with the purpose of classifying the rich biodiversity of Costa Rica, provides workshops to share similar experience with regional and international scientists (Steinberg, 2001). By 2007, INBio has discovered 2,590 new species and completed 1,607 scientific publications (INBio, 2007).

The Organization for Tropical Studies (OTS) includes 63 universities and research institutions from the United States, Latin America and Australia, with the mission to provide education, research, and promote the responsible use of natural resources (OTS, 2008). The organization has three biological stations in Costa Rica and have trained environmental NGOs in Honduras, El Salvador, Panama, and Bolivia (Steinberg, 2001).

Economic Implications

Debt-for-Nature swaps. The debt-for-nature swap is a transaction proposed by Lovejoy in 1984, in which certain amount of the foreign debt of a developing country is cancelled or forgiven by the debtor government by implementing domestic environmental protection projects (Thapa, 1998). The debt-for-nature swaps provide an alternative to the

Latin America debt crises that emerged from careless spending practices in the 1950s, 1960s, and 1970s (Franko, 2007). Costa Rica, due to its institutionalized commitment to conservation and SD, has emerged as a regional and international leader in debt-for-nature swaps (Steinberg, 2001).

Economic competitiveness and SD. The Latin American Center for Competitiveness and Sustainable Development (CLACDS), a program created in 1996 by the Central American Institute of Business Administration (INCAE) with base in Costa Rica, supports public and private sectors in the LAC region in issues related to the implementation of competitive business and sustainability programs such as regional exports, mitigation of natural disasters, and the development and implementation in the region of the Certification of Sustainable Tourism (INCAE, 2009).

Sustainable Tourism. Since the 1980s, Costa Rica has been “very successful in attracting tourists” (Franciscus, Dieperink, & Miranda, 2009, p. 1225). By 2002, tourism became the most important economic activity, surpassing other economic activities such as the export of micro-electronic, café, and bananas (Pratt, 2002).

Aware of the problems caused by the tourism industry to their natural ecosystems, the government of Costa Rica lunched policies to promote more sustainable forms of tourism, such as the Environmental Service Payment, which offers financial stimulus for reforestation and protection of areas, as well as the creation in 1995 of the Sistema Nacional de Areas de Consevación-SINAC (National System for Area’s Conservation), which goal is to achieve sustainable management of Costa Rica’s natural resources (Franciscus et al., 2009).

The *Instituto Costarricense de Turismo-ICT* (Costa Rican Institute of Tourism), developed the Blue-Flag eco-label program, with the objective of awarding communities for the implementation of sustainable practices at beaches and marinas by measuring sustainable practices such as quality of the water and environmental education. This institute also developed the Certification for Sustainable Tourism (CST), praised to be the premier sustainable tourism certification program in the world, and classified by UNEP as the most comprehensive eco-label system for accommodation facilities, mainly because it includes environmental and socio-cultural criteria (Tepelus & Castro, 2005).

Conclusions of the Study

Purpose and significance of the study. As it was presented in Chapter 2 and shown in Figure 2, higher education plays a significant role to in producing the social and economical change essential to achieve SD; therefore, it is vital for universities to educate their students to be sustainable literate and to deal with the complexities of SD (UNESCO, 2005a). To achieve this goal, universities need to include principles of sustainability in all aspects of education. Such is the goal of the Decade of Education for Sustainable Development declared by UNESCO.

The aim of this study was to assess the extent to which universities in Costa Rica are including ESD in six areas of academic operation: curriculum, research and scholarship, faculty and staff development and rewards, outreach and community service, student opportunities, and institutional mission and planning, and describe some of the implications in the LAC region of Costa Rica's commitment to ESD, specifically in higher education. Figure 4 shows the significance of the study.

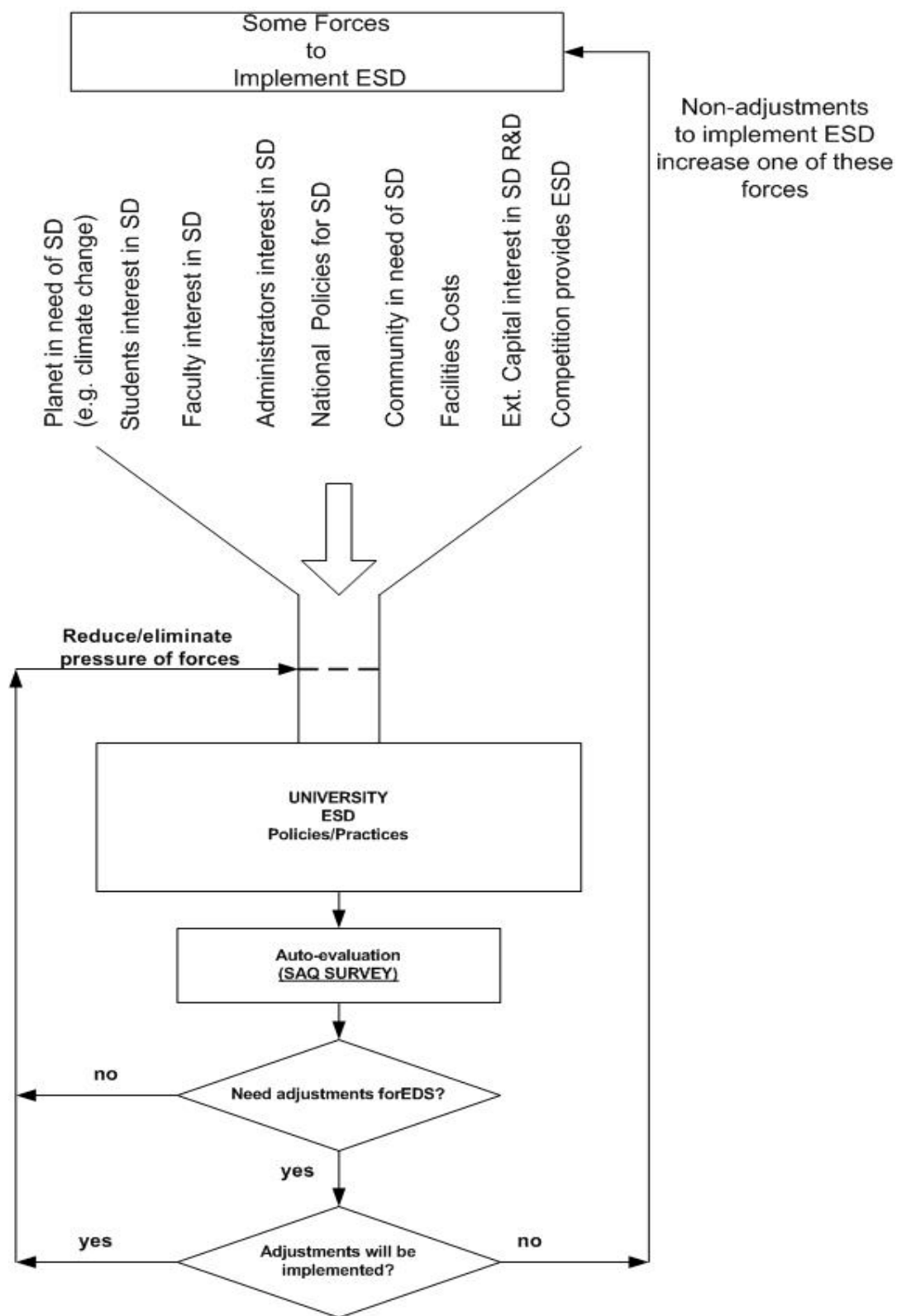


Figure 4. Significance of the Study at University Level. Original graphic produced by the author.

Universities in Costa Rica that participated in this study went through a self analysis of their policies and practices in ESD. The results of this study might help universities to measure their level of commitment to ESD in the six areas analyzed in the study, and determine if actions are necessary. If actions are taken, universities will be able to diminish, or even eliminate, internal or external pressures to implement ESD. The same practices can be implemented in other institutions at the regional and international level. The final goal is to build a sustainable society where “everyone shares responsibility for the present and future well-being of the human family and the larger living world” (Earth Charter, 2009).

Conclusions regarding the methodology applied and the instrument. Regarding the methodology and the instrument used for the study, the conclusions are the following:

- The representation of the population can be considered significant (53%).
- This study was mostly qualitative. Some scholars advocate qualitative methods for educational research in developing countries because this methodology is sensible to local cultural contexts (e.g., Crossley & Vulliamy, 1997; Fry & Thurber, 1989; Van Der Eyken, Goulden, & Crossley, 1995).
- The questions, format, and scalability of the SAQ instrument were very appropriate for the objectives of this study and the size of the population.
- The strategy adopted for the analysis of data consisting of a descriptive analysis for quantitative data, analysis of significant statements for qualitative data, and concurrent comparison, was very useful to cross-validate responses.

Conclusions regarding the results of the study. A classification between public and private universities was necessary because although the number of public universities in

Costa Rica is minimum compared with the number of private universities (i.e. four public versus 50 private universities), there is a high percentage of students enrolled in public universities. A description of the educational system in Costa Rica is described in Chapter 4.

Based on the results presented in Chapter 4 and discussed at the beginning of this Chapter, and the implications for the LAC region presented in the previous section, it can be concluded that Costa Rica's national policy on ESD, specifically in universities, has been significant for the following reasons:

- There is a generalized knowledge and acceptance of the Earth Charter as a framework for sustainability (around 80% of all participant universities), although knowledge about the DESD is only known by less than half of the institutions.
- There is a generalized understanding of the importance of preserving the environment for the SD of the country.
- There is a generalized understanding in universities of the importance of participation and commitment to the community.
- Although public universities in Costa Rica have been addressing ESD in a more substantial way, private universities have been doing a fairly good job, specially those whose areas of interest are in tourism, medicine, agriculture, and the environment; however, there is a need for private universities to improve their practices and take advantage of the opportunities that these changes can bring to their institutions, to their community, to the country, and to the region in general.

Final conclusions. The unprecedented scale of environmental deterioration due to human activities requires actions for change and universities play a significant role to produce these urgent actions. Universities in Costa Rica are undertaking this task by implementing ESD programs and this study provided an assessment of their progress. An additional achievement of the study was that by undertaking the survey, some universities in Costa Rica reported becoming more aware of ESD and the challenges ahead to improve their practices. The results of this study might allow the refining of the instrument itself so it can be a more insightful and effective instrument in measuring change and encouraging it.

Recommendations for Further Studies

- It is recommended to implement a similar study in a few years to measure the level of progress in ESD.
- As it was described in this chapter, eco-tourism is one of the biggest economical activities in Costa Rica (Pratt, 2002). There is a significant interest on ESD in universities with programs focused on tourism. A full sustainability assessment of universities with tourism programs might be very beneficial to improve the quality of the higher education programs in tourism in Costa Rica and improve the quality of the industry as a whole.
- It is recommended that a new study be implemented, in which the data collected in this research is analyzed with the goal of identifying patterns for the creation of further studies, such as change in culture and private versus public policies.
- The results of this study might be useful as a base to compare to similar studies in developed and developing countries.

- The limitations described at the end of Chapter 1, open the possibilities for new research such as a field verification of the data, a full assessment of sustainability for a systematic comparison among universities, and the creation of a guide towards sustainability.
- It is recommended that a study should be initiated, which evaluates the challenges and opportunities of private universities in Costa Rica and the LAC region to improve their sustainable practices, and take advantages of the opportunities that these changes can bring to their institutions, to their community, to the country, and to the region in general.
- Private universities, especially in the LAC region, might look at the Costa Rican experience and the results of this research to improve their ESD practices.
- Although the instrument selected was appropriate for this research, especially for the size of the population, the metrics used for the Likert-type questions are not scalable for bigger studies. A recommendation for further studies is to improve the metrics to allow a deeper statistical analysis.
- The instrument used an open-ended question for universities to describe their strengths and weaknesses for ESD (see Appendix B). The number of responses to this question might have been higher if the format was multiple-choice with an open-ended question at the end; therefore, it is recommended to change the format of this question using the topics obtained in this research.
- Similar studies in other countries, especially in the LAC region, can be very beneficial to promote sustainability in higher education to achieve the goals of UNESCO-DESD for the creation of a better and sustainable future for all.

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APPENDIX A

Presentation Page

May, 2009
NAME
TITLE
ADDRESS

Dear Participant:

UNESCO declared the Decade for Education for Sustainable Development to integrate sustainability in all aspects of education by the year 2014 and calls for universities to incorporate sustainable principles in their curriculum and practices.

One of the key milestones for the Decade is to collect indicators of progress. Several studies have been performed in developed countries to collect these indicators; however, studies of this type are inexistent in Latin America and the Caribbean region.

This study “Assessment of Education for Sustainable Development in Institutes of Higher Education in Latin America and the Caribbean”, a dissertation conducted in partial fulfillment of the requirements for the degree of Doctor of Education at Pepperdine University, is the first attempt to fill this gap and to promote education for sustainable development in higher education institutes in the Latin America and the Caribbean region. We are kindly requesting your participation.

In order to protect your confidentiality as a participant of the survey, we would like to clarify that:

- The survey consists of 25 questions and can be completed in 30 minutes
- Your response to the survey is totally voluntary
- You will not have to answer every single question
- Class standing, grades, or job status will not be affected by refusal to participate or by withdrawing from the study.
- Results will be reported either in aggregate or without institutional or individual names (or other forms of identification)
- Responses will not be shared with anyone outside the research team
- Respondents will receive a confidential summary of results upon a written request
- Responses to the survey will be kept confidential and secure, which means that the information will be coded and kept in a secure server and only the main researcher will be able to access such information.
- You have the option to sign an actual consent form if you wish to do so. Please send me an email requesting this form.

Please let us know if you have any questions, concerns, or suggestions. We greatly appreciate your participation.

The link to the survey is the following:

http://www.surveymonkey.com/s.aspx?sm=JLfk1wCycWBuhFL4LboBQ_3d_3d

Sincerely,

Jairo H. Garcia
Doctoral Student
jhgarci@pepperdine.edu
Educational Technology
Graduate School of Education and Psychology
Pepperdine University
Pepperdine University Plaza Pepperdine University Plaza
Los Angeles, CA 90045 Los Angeles, CA 90045

APPENDIX B

Introduction Page



(To skip the introduction please click on "Next" at the bottom of this page)

INTRODUCTION:

May 2009

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- Please let us know if you have any questions, concerns, or suggestions. We greatly appreciate your participation.
- Please click on the NEXT button shown below to begin with the survey.

APPENDIX C

Questionnaire

General Information:

Please enter the name of your institution:

Please enter your title:

Please enter your email address:

MM DD YYYY

Please enter the

date:

//

The Brundtland Report defines Sustainable Development as "a kind of development which meets the needs of the present without compromising the ability of future generations to meet their own needs". Please indicate the extent to which this definition is accepted at your institution:

(don't know)

(not accepted)

(a little)

(quite a bit)

(great deal)

Please describe other definition used at your Institution:

Please indicate the extent to which Sustainable Development is considered a priority in your institute:

(don't know)

(none)

(a little)

(quite a bit)

(great deal)

In your institution, is Education for Sustainable Development (ESD) considered "the same" as environment education?

(yes)

(no)

Please clarify (optional)

Have you heard before about the UNESCO Decade of Education for Sustainable Development (DESD)?

Have you heard before about The Earth Charter?

(yes)

(no)

(yes)

(no)

Please indicate if your institution has signed or is part of any of the following international agreements :

The Talloires Declaration

The Halifax Declaration

The Kyoto Declaration

The Swansea Declaration

The Thessaloniki Declaration

The Lüneberg Declaration

University Leaders for a Sustainable Future -ULSF

The Earth Charter

I don't know

None of the above

Other (s) - Please specify:

Please indicate the extent to which your institution offers courses which address topics related to sustainability. (Such topics could include globalization and

sustainable development; environmental policy and management; environmental philosophy; nature writing; land ethics and sustainable agriculture; urban ecology and social justice; population, women and development; sustainable production and consumption; and many others.)

(don't know)

(none)

(a little)

(quite a bit)

(great deal)

Other courses you might want to list (optional)

Indicate the extent to which sustainability in your institution is a focus woven into traditional disciplinary education in science, math, literature, history, the arts, etc.?

(don't know)

(none)

(a little)

(quite a bit)

(great deal)

comments (optional):

Are undergraduates required to take a course on issues related to the environment or sustainability?

(yes)

(no)

Please estimate the amount of research or scholarship being done (by faculty, students or staff) at your institution in disciplines in the area of sustainability. For example in:

- Renewable energy
- Sustainable building design
- Ecological economics
- Indigenous wisdom and technologies
- Population and development
- Total environmental quality management, etc.

(don't know)

(none)

(a little)

(quite a bit)

(great deal)

Optional: Please list any research or scholarly activities you are aware

What percentage of faculty members teach or do research on sustainability issues?

Does your institution have established multidisciplinary and interdisciplinary structures (such as an institute or center) for research, education and policy development on sustainability issues?

(%)

(yes)

(no)

If yes please specify:

To what extent does criteria for hiring (and promotion) recognize faculty and staff member contributions to sustainability (in scholarship, teaching, or campus and community activities)?

(don't know)

(none)

(a little)

(quite a bit)

(great deal)

To what extent does your college or university provide significant faculty and staff development opportunities to enhance understanding, teaching and research in sustainability?

(don't know)

(none)

(a little)

(quite a bit)

(great deal)

Please describe recent faculty or staff development opportunities (optional):

A sustainable institution supports sustainable community development in its local area and in the surrounding region through partnerships with primary and secondary schools and relationships with local governments and businesses. It may also seek international cooperation in solving global environmental justice and sustainability challenges through conferences, student/faculty exchanges, etc. To what extent is your institution involved in sustainable community work or partnerships at local, regional, national or international levels.

(don't know)

(none)

(a little)

(quite a bit)

(great deal)

Please clarify:

Institutions committed to sustainability provide students with specific opportunities and settings. Please check which of the following are present on your campus:

Student Environmental Center

Ecology House or Sustainable Dormitory

Orientation program(s) on sustainability for students

Student Group(s) with an environmental or sustainability focus

Others (please specify):

How does your college or university encourage students to consider sustainability issues when choosing a career path? [Please check below where applicable]

To what extent are student groups across campus directly involved in sustainability initiatives?

Job fairs and career counseling focused on work in sustainable enterprises

Pledge of social and environmental responsibility

Others

None

Other (s) (please specify)

(don't know)

(none)

(a little)

(quite a bit)

(great deal)

Please describe which groups are most involved and how:

To what extent do the formal written statements describing the purposes and objectives in your institution reflect a commitment to sustainability?

(don't know)

(none)

(a little)

(quite a bit)

(great deal)

Please describe how:

Institutions committed to sustainability create certain positions and committees, as well as engage in certain practices, which reinforce this commitment. Please check which of the following are present on your campus:

Environmental Council or Task Force

Environmental Coordinator

Dean of Environmental Programs or Director of Sustainability Programs

Energy Officer

Green Purchasing Coordinator

Institutional Declaration of Commitment to Sustainability/Environmental Responsibility

Orientation programs on sustainability for faculty and staff

Socially responsible investment practices and policies

Regularly conducted environmental audits

Others

None

Others (please specify)

How is a concern for, and commitment to, sustainability to give visibility in your campus (for example, with guest speakers, conferences, Earth Day celebrations, etc.)? Please describe key events that have happened in the past year:

Please describe the greatest strengths and weaknesses of your institution in educating for sustainability.

What “next steps” are planned at your college or university to strengthen your commitment to sustainability?

IMPORTANT: PLEASE CLICK ON "DONE" ONCE YOU FINISH THE SURVEY.

Please add any additional comments below (optional):

APPENDIX D

The Earth Charter

P R E A M B L E

We stand at a critical moment in Earth's history, a time when humanity must choose its future. As the world becomes increasingly interdependent and fragile, the future at once holds great peril and great promise. To move forward we must recognize that in the midst of a magnificent diversity of cultures and life forms we are one human family and one Earth community with a common destiny. We must join together to bring forth a sustainable global society founded on respect for nature, universal human rights, economic justice, and a culture of peace. Towards this end, it is imperative that we, the peoples of Earth, declare our responsibility to one another, to the greater community of life, and to future generations.

Earth, Our Home

Humanity is part of a vast evolving universe. Earth, our home, is alive with a unique community of life. The forces of nature make existence a demanding and uncertain adventure, but Earth has provided the conditions essential to life's evolution. The resilience of the community of life and the well-being of humanity depend upon preserving a healthy biosphere with all its ecological systems, a rich variety of plants and animals, fertile soils, pure waters, and clean air. The global environment with its finite resources is a common concern of all peoples. The protection of Earth's vitality, diversity, and beauty is a sacred trust.

The Global Situation

The dominant patterns of production and consumption are causing environmental devastation, the depletion of resources, and a massive extinction of species. Communities are being undermined. The benefits of development are not shared equitably and the gap between rich and poor is widening. Injustice, poverty, ignorance, and violent conflict are widespread and the cause of great suffering. An unprecedented rise in human population has overburdened ecological and social systems. The foundations of global security are threatened. These trends are perilous—but not inevitable.

The Challenges Ahead

The choice is ours: form a global partnership to care for Earth and one another or risk the destruction of ourselves and the diversity of life. Fundamental changes are needed in our values, institutions, and ways of living. We must realize that when basic needs have been met, human development is primarily about being more, not having more. We have the knowledge and technology to provide for all and to reduce our impacts on the environment. The emergence of a global civil society is creating new opportunities to build a democratic and humane world. Our environmental, economic, political, social, and spiritual challenges are interconnected, and together we can forge inclusive solutions.

Universal Responsibility

To realize these aspirations, we must decide to live with a sense of universal responsibility, identifying ourselves with the whole Earth community as well as our local communities. We are at once citizens of different nations and of one world in which the local and global are linked. Everyone shares responsibility for the present and future well-being of the human family and the larger living world. The spirit of human solidarity and kinship with all life is strengthened when we live with reverence for the mystery of being, gratitude for the gift of life, and humility regarding the human place in nature.

We urgently need a shared vision of basic values to provide an ethical foundation for the emerging world community. Therefore, together in hope we affirm the following interdependent principles for a sustainable way of life as a common standard by which the conduct of all individuals, organizations, businesses, governments, and transnational institutions is to be guided and assessed.

PRINCIPLES

I. RESPECT AND CARE FOR THE COMMUNITY OF LIFE

1. Respect Earth and life in all its diversity.
 - a. Recognize that all beings are interdependent and every form of life has value regardless of its worth to human beings.
 - b. Affirm faith in the inherent dignity of all human beings and in the intellectual, artistic, ethical, and spiritual potential of humanity.
2. Care for the community of life with understanding, compassion, and love.
 - a. Accept that with the right to own, manage, and use natural resources comes the duty to prevent environmental harm and to protect the rights of people.
 - b. Affirm that with increased freedom, knowledge, and power comes increased responsibility to promote the common good.
3. Build democratic societies that are just, participatory, sustainable, and peaceful.
 - a. Ensure that communities at all levels guarantee human rights and fundamental freedoms and provide everyone an opportunity to realize his or her full potential.
 - b. Promote social and economic justice, enabling all to achieve a secure and meaningful livelihood that is ecologically responsible.
4. Secure Earth's bounty and beauty for present and future generations.
 - a. Recognize that the freedom of action of each generation is qualified by the needs of future generations.
 - b. Transmit to future generations values, traditions, and institutions that support the long-term flourishing of Earth's human and ecological communities.

In order to fulfill these four broad commitments, it is necessary to:

II. ECOLOGICAL INTEGRITY

5. Protect and restore the integrity of Earth's ecological systems, with special concern for biological diversity and the natural processes that sustain life.
 - a. Adopt at all levels sustainable development plans and regulations that make environmental conservation and rehabilitation integral to all development initiatives.
 - b. Establish and safeguard viable nature and biosphere reserves, including wild lands and marine areas, to protect Earth's life support systems, maintain biodiversity, and preserve our natural heritage.
 - c. Promote the recovery of endangered species and ecosystems.
 - d. Control and eradicate non-native or genetically modified organisms harmful to native

species and the environment, and prevent introduction of such harmful organisms.
 e. Manage the use of renewable resources such as water, soil, forest products, and marine life in ways that do not exceed rates of regeneration and that protect the health of ecosystems.
 f. Manage the extraction and use of non-renewable resources such as minerals and fossil fuels in ways that minimize depletion and cause no serious environmental damage.

6. Prevent harm as the best method of environmental protection and, when knowledge is limited, apply a precautionary approach.

- a. Take action to avoid the possibility of serious or irreversible environmental harm even when scientific knowledge is incomplete or inconclusive.
- b. Place the burden of proof on those who argue that a proposed activity will not cause significant harm, and make the responsible parties liable for environmental harm.
- c. Ensure that decision making addresses the cumulative, long-term, indirect, long distance, and global consequences of human activities.
- d. Prevent pollution of any part of the environment and allow no build-up of radioactive, toxic, or other hazardous substances.
- e. Avoid military activities damaging to the environment.

7. Adopt patterns of production, consumption, and reproduction that safeguard Earth's regenerative capacities, human rights, and community well-being.

- a. Reduce, reuse, and recycle the materials used in production and consumption systems, and ensure that residual waste can be assimilated by ecological systems.
- b. Act with restraint and efficiency when using energy, and rely increasingly on renewable energy sources such as solar and wind.
- c. Promote the development, adoption, and equitable transfer of environmentally sound technologies.
- d. Internalize the full environmental and social costs of goods and services in the selling price, and enable consumers to identify products that meet the highest social and environmental standards.
- e. Ensure universal access to health care that fosters reproductive health and responsible reproduction.
- f. Adopt lifestyles that emphasize the quality of life and material sufficiency in a finite world.

8. Advance the study of ecological sustainability and promote the open exchange and wide application of the knowledge acquired.

- a. Support international scientific and technical cooperation on sustainability, with special attention to the needs of developing nations.
- b. Recognize and preserve the traditional knowledge and spiritual wisdom in all cultures that contribute to environmental protection and human well-being.
- c. Ensure that information of vital importance to human health and environmental protection, including genetic information, remains available in the public domain.

III. SOCIAL AND ECONOMIC JUSTICE

9. Eradicate poverty as an ethical, social, and environmental imperative.

- a. Guarantee the right to potable water, clean air, food security, uncontaminated soil, shelter, and safe sanitation, allocating the national and international resources required.
- b. Empower every human being with the education and resources to secure a sustainable livelihood, and provide social security and safety nets for those who are unable to support themselves.
- c. Recognize the ignored, protect the vulnerable, serve those who suffer, and enable them to develop their capacities and to pursue their aspirations.

10. Ensure that economic activities and institutions at all levels promote human development in an equitable and sustainable manner.

- a. Promote the equitable distribution of wealth within nations and among nations.
- b. Enhance the intellectual, financial, technical, and social resources of developing

nations, and relieve them of onerous international debt.

- c. Ensure that all trade supports sustainable resource use, environmental protection, and progressive labor standards.
- d. Require multinational corporations and international financial organizations to act transparently in the public good, and hold them accountable for the consequences of their activities.

11. Affirm gender equality and equity as prerequisites to sustainable development and ensure universal access to education, health care, and economic opportunity.

- a. Secure the human rights of women and girls and end all violence against them.
- b. Promote the active participation of women in all aspects of economic, political, civil, social, and cultural life as full and equal partners, decision makers, leaders, and beneficiaries.
- c. Strengthen families and ensure the safety and loving nurture of all family members.

12. Uphold the right of all, without discrimination, to a natural and social environment supportive of human dignity, bodily health, and spiritual well-being, with special attention to the rights of indigenous peoples and minorities.

- a. Eliminate discrimination in all its forms, such as that based on race, color, sex, sexual orientation, religion, language, and national, ethnic or social origin.
- b. Affirm the right of indigenous peoples to their spirituality, knowledge, lands and resources and to their related practice of sustainable livelihoods.
- c. Honor and support the young people of our communities, enabling them to fulfill their essential role in creating sustainable societies.
- d. Protect and restore outstanding places of cultural and spiritual significance.

IV. DEMOCRACY, NONVIOLENCE, AND PEACE

13. Strengthen democratic institutions at all levels, and provide transparency and accountability in governance, inclusive participation in decision making, and access to justice.

- a. Uphold the right of everyone to receive clear and timely information on environmental matters and all development plans and activities which are likely to affect them or in which they have an interest.
- b. Support local, regional and global civil society, and promote the meaningful participation of all interested individuals and organizations in decision making.
- c. Protect the rights to freedom of opinion, expression, peaceful assembly, association, and dissent.
- d. Institute effective and efficient access to administrative and independent judicial procedures, including remedies and redress for environmental harm and the threat of such harm.
- e. Eliminate corruption in all public and private institutions.
- f. Strengthen local communities, enabling them to care for their environments, and assign environmental responsibilities to the levels of government where they can be carried out most effectively.

14. Integrate into formal education and life-long learning the knowledge, values, and skills needed for a sustainable way of life.

- a. Provide all, especially children and youth, with educational opportunities that empower them to contribute actively to sustainable development.
- b. Promote the contribution of the arts and humanities as well as the sciences in sustainability education.
- c. Enhance the role of the mass media in raising awareness of ecological and social challenges.
- d. Recognize the importance of moral and spiritual education for sustainable living.

15. Treat all living beings with respect and consideration.

- a. Prevent cruelty to animals kept in human societies and protect them from suffering.
- b. Protect wild animals from methods of hunting, trapping, and fishing that cause extreme,

prolonged, or avoidable suffering.

c. Avoid or eliminate to the full extent possible the taking or destruction of non-targeted species.

16. Promote a culture of tolerance, nonviolence, and peace.

a. Encourage and support mutual understanding, solidarity, and cooperation among all peoples and within and among nations.

b. Implement comprehensive strategies to prevent violent conflict and use collaborative problem solving to manage and resolve environmental conflicts and other disputes.

c. Demilitarize national security systems to the level of a non-provocative defense posture, and convert military resources to peaceful purposes, including ecological restoration.

d. Eliminate nuclear, biological, and toxic weapons and other weapons of mass destruction.

e. Ensure that the use of orbital and outer space supports environmental protection and peace.

f. Recognize that peace is the wholeness created by right relationships with oneself, other persons, other cultures, other life, Earth, and the larger whole of which all are a part.

T H E W A Y F O R W A R D

As never before in history, common destiny beckons us to seek a new beginning. Such renewal is the promise of these Earth Charter principles. To fulfill this promise, we must commit ourselves to adopt and promote the values and objectives of the Charter.

This requires a change of mind and heart. It requires a new sense of global interdependence and universal responsibility. We must imaginatively develop and apply the vision of a sustainable way of life locally, nationally, regionally, and globally. Our cultural diversity is a precious heritage and different cultures will find their own distinctive ways to realize the vision. We must deepen and expand the global dialogue that generated the Earth Charter, for we have much to learn from the ongoing collaborative search for truth and wisdom.

Life often involves tensions between important values. This can mean difficult choices. However, we must find ways to harmonize diversity with unity, the exercise of freedom with the common good, short-term objectives with long-term goals. Every individual, family, organization, and community has a vital role to play. The arts, sciences, religions, educational institutions, media, businesses, nongovernmental organizations, and governments are all called to offer creative leadership. The partnership of government, civil society, and business is essential for effective governance.

In order to build a sustainable global community, the nations of the world must renew their commitment to the United Nations, fulfill their obligations under existing international agreements, and support the implementation of Earth Charter principles with an international legally binding instrument on environment and development.

Let ours be a time remembered for the awakening of a new reverence for life, the firm resolve to achieve sustainability, the quickening of the struggle for justice and peace, and the joyful celebration of life.
