

Institute for Christian Teaching
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**ENVIRONMENTAL SCIENCE EDUCATION
IN SEVENTH-DAY ADVENTIST COLLEGES AND UNIVERSITIES:
A MODEL PROGRAM**

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Forward

The idea behind this proposal was born as a result of a problem currently being addressed in the country of Zimbabwe and one, I suspect, which is not unique. In the developing world it has been traditionally difficult to promote environmental issues with limited resources particularly while meeting the basic demands of a developing society. In Zimbabwe however, the issue is being aggressively confronted and the government has already in place environmental policies comparable to the developed world. The implementation of the policy has however lagged behind as a result of inadequate human resources. This was noted by Jain, "although some countries may have stringent environmental regulations on their books, these regulations have not been enforced" (Jain, et. al, 1993, p. 2). Not only is there a dearth of environmental health officers but their training is not at the requisite professional level. Collaborations have been taking place between the parties involved in administering environmental health concerns in the country and Solusi Seventh-day Adventist University. The two national universities, namely the University of Zimbabwe and the National University of Science and Technology have acknowledged that they can at best assist with professional training in the area of Environmental Science in the somewhat distant future, and at worst, they will not be able to incorporate such a multi-disciplinary program in their rigid compartmentalized system. The Department of Environmental Health Services under the Ministry of Health has, following negotiations with Solusi, sanctioned the idea of an Environmental Health program at Solusi, and have promised support for the program in the way of providing full student grants. They have also given their assurance of supplying students from personnel within the Ministry. With this backdrop and the philosophical reasoning that follows, I decided to develop a program which could be universally relevant within the Seventh-day Adventist education system. I am convinced that such a program is necessary in all denominational schools at the tertiary level, and that this particular aspect of stewardship should be taught to the future leaders of the Church and the World.

Environmental Science Education in Seventh-day Adventist Colleges and Universities: A Model Program

1. Introduction

"The environment is an epidemiological term that refers to conditions that may be favorable or unfavorable to both the agent and the host. There are three general classifications in the environment factor including the (1) physical or inanimate, which includes geologic, geographic or climatic features; (2) animate or biological, which includes trees, grasses, flowers, as well as pathogenic parasites; and (3) socioeconomic, which is comprised of a variety of elements, including the relationship of people to other people" (Shirreffs, 1982, p.77).

Following the Rio Environmental Summit in 1990, governments and the population at large have been made increasingly more aware of the long term benefits and associated costs of preserving the global environment. We have a new concern and recognition that our ultimate survival depends upon the viability of the environment for sustaining life. With the belief in the imminent return of Christ, there has however traditionally been a tendency amongst Seventh-day Adventists to focus activities and planning on the short term while issues relating to distant events are given a lesser priority. Regard for the environment, which has relatively long term implications, has been synonymous with responsible citizenship of the globe. This apparent tension needs to be addressed as Seventh-day Adventists continue to maintain their humanitarian image in the world. A further factor against which Adventist philosophy has cautioned is aggravating the stress on the environment by human beings. Materialism presently pervades all aspects of life and "under such a system the status quo involves not the preservation of a carefully developed niche, but rather mass consumption of consumer goods, rapid resource turnover, and an unparalleled rate of obsolescence for virtually every kind of product" (Greenwood, 1973, p.379). "Most of us are also reluctant to give up the profligate consumption of resources which characterizes the modern lifestyle"(Jain, et. al., 1992, p.1). The environmental impact has been felt right from the mine to the garbage dump. Recently public awareness has increased in some of the global issues relating to the environment, yet individual response to the universal problem has been limited. Unfortunately the task of forging the mold in individual responsibility is largely left to big business with the corporate world's inertia and is resulting in a wait and see approach. It is therefore imperative that the individual capacity for response be cultivated through appropriate education.

In April 1987, the World Commission on Environment and Development published a paper *Our Common Future* setting out a global agenda for change incorporating the notion of sustainable development. The report itself was not just limited to the environment in isolation. "The environment does not exist as a sphere separate from human actions, ambitions and needs and attempts to defend it in isolation from human concerns have given the very word 'environment' a connotation of naivety in some political circles." (Brundtland, 1987, p.22). This is particularly true in the developing world, where the emphasis is on people and environmental policies should be formulated to achieve certain socio-political goals. The 1990's has been dubbed the decade of the environment with an emerging world view which purports spending "less money on defense and more on environmental protection and clean up" (Allen, 1992, p.2). More than two decades ago, soon after the famous 1972 United Nations Conference on the Human Environment in Stockholm, Greenwood wrote "educate the public in the facts it needs to choose between alternative environments. Make environmental education a part of school curriculum at every level" (Greenwood, 1973, p.391). Not only is there a need for graduates capable of exercising management and control, and who can steer committees through decisions involving the environment, but every citizen of planet earth needs to be enlightened in this area. The Seventh-day Adventist world view encompasses the notion of stewardship of the earth. Paul Knight recognizes education "to help bring man back to at-one-ness with God, his fellowman, his own self, and *the natural world*"(Knight, 1985, p.50)(Italics inserted). Aristotle wrote¹ "a social instinct is implanted an all men by nature, and yet he who first founded the state was the greatest of benefactors. For man, when perfected, is the best of animals, but when separated from law and justice, he is worst of all" .

2. Philosophy of Environmental Education

2.1 Problem

"Human development, especially in the twentieth century, represents an intrusion into the overall balance that maintains the earth as a habitable place in the universe"(Jain, 1992, p1). This has largely been caused by decision making based purely on short-term economic grounds. This has been most vividly observed in the aftermath of totalitarian regimes of eastern Europe. Centrally organized industrial development took place without regard to environmental consequences. Industrialization was the priority and under such a system, production targets and subsidies took precedence over conserving resources or investing in pollution control. Indiscriminate dumping of hazardous wastes, inappropriate agricultural practices have left a legacy of permanently degraded environmental conditions. Human health has suffered and life expectancies lowered which have placed an economic burden on some societies which can least afford it (French, 1990, p.10). In an article entitled "*War between Man and Earth*"², Barry Commoner identifies the environmental problem on earth as a war and offers three solutions;

1. The war will end only when the "technosphere is defeated".
2. A standstill treaty can be called in which human society must give up future economic development and the subsequent attack on the environment.
3. Reduce economic activities such that we return to a hunter-gatherer way of life.

However any of the solutions, he asserts will represent a defeat and a "loss of things of value for human society, the technosphere's inventor and beneficiary". He goes on "I say this in the conviction that every human life, however degraded by poverty or enhanced by wealth has equal value; that having more than life's necessities is better than having less; that a symphony performed in an urban concert hall has a value not supplanted by the music of a lone shepherd's pipe. If it were true that we had to give up such values to end the assault on the ecosphere, then, in my judgment, the war would end with the tragic defeat of human society". Thomas Beddoes in 1824 penned the following graphic portrayal of man's destruction of the environment;

Nature's polluted
There's a man in every secret corner of her
Doing damned wicked deeds. Thou art,
Old World, a hoary, atheistic,
Murdering star.

The above quotes introduce two important aspects of our interaction with mother earth. Firstly there should be a symbiotic relationship between the inhabitant and the habitation. From the injunction given by God in Genesis to develop and preserve the earth it is clear that humankind was to cultivate the earth, known as the *creation mandate*. "Creation was meant to be developed". (Walsh, 1984, p.57). Secondly the sustainability of planet earth lies in the hands of humankind. Human beings form part of a dynamic system, and "must co-exist in a state of dynamic equilibrium with natural systems" (Greenwood, 1973, p.381). A determined effort must be made to ensure that the inhabitants of the earth can intelligently occupy and maintain this complex system into which they have been born.

2.2 From Garden to City

From the creation mandate, Walsh states that "Human beings have the God-given mandate to develop the creation"(Walsh, 1984, p.58). The Edenic command to till and keep the earth was further extended through Noah for him to populate the Earth (Gen 8:17). Clearly the cultivation of humanity on the earth implies that cohabitation was to be developed. The ultimate development is portrayed in Revelation 21:2 as a "full-fledged city" (Walsh, 1984, p.58). Jesus's parable of the talents (Mathew 25, 14-30) is also an indictment to invest the natural resources of the planet for the benefit of humankind whilst preserving their source. The concept that we do not belong on this planet or that we were intended to remain hunter-gatherers brings about a feeling of guilt as portrayed in the poem by Beddoes. Referring to our existence on earth, Paul Davies concludes his book *The Mind of God* with the words "We were truly meant to be here" (Davies, 1992, p.232). The responsibility of humankind to his fellow inhabitant

extends to future generations irrespective of the ultimate destination or duration on the planet. It is also irresponsible to assume that past failure in the area can only be remediated in the earth made new when "calf and lion will feed together" (Isaiah 11.6). The traditional character of Adventist education will not be diminished by developing the value of responsible cohabitation of the earth.

2.3 Preservation of the Environment

Recently in Salt Lake City a small school brought about a shift in thinking in the Federal Government of the United States. Jackson Elementary School petitioned the local government to clean up an unused chemical storage site near the school grounds. Undaunted by replies of no funds, they petitioned residents and held sales to raise sufficient money to assist cleanup of the site. With under \$3000 they approached the Federal Government with the donation toward the necessary cleanup. However there was no fund in which to receive the donation so the Superfund Law was inaugurated and has set the stage for the new impetus to cleanup the environment. This dramatically illustrates the growing awareness of environmental issues at the grass roots level. In September 1989, Scientific American dedicated a volume to Managing the Planet Earth in which the overall message was "the story of the sustainable world is the story of our time, a time when human beings need to reaffirm their roles as stewards". Walsh contends the "the Biblical idea of stewardship, however, balances authority with servanthood. This strikes at the heart of our humanity. Although we are indeed Lords of the earth, we are also servants of God. We are called to exercise our rule in obedient response to Yahweh's ultimate sovereignty. Subduing the earth is an issue of covenantal responsibilities" (Walsh, 1984, p.59).

2.4 The Developing World

Within the constraints of the Third World, environmental education takes on another facet. Traditional colonialist views of conservation which were generally opposed by rural people are being largely replaced by sustainable development which "often starts from a search for ways to redirect development that are more benign for nature conservation." (Adams, 1992, p.184). What were once regarded by environmentalists as non-western and thus poorly defined conservation policies of the traditional Third World, have been recognized with a "new orthodoxy of peasant rationality and skill".(Adams, 1992, p.169). Whilst environmental organizations such as *Friends of the Earth* broaden their campaign to embrace the Third World, the context of their protests is somewhat different from the developed world. The focus of environmental pressure groups in the First World is "reformist particularly the modification of the policies of the aid agencies".(Adams, 1992, p.193) The greening of development agencies in the Third World can offer few reformist solutions to the dilemma and tragedy of poverty. Economies are being drawn into the die of the global economy and traditional culture and ideas are being overturned. Development is taking place, even if not a result of some government strategic planning. The rural poor need education commensurate with the new technologies and materials which are now available to them. Technical advice to enable them to control their own resources should be part of the development

of the rural Third World. However, education should be indigenized to avoid some of the mistakes of the colonial era. Western notions of development are often alien to indigenous norms and values creating uncertainty and confusion. Crehan describes the curriculum of formal schooling in northwest Zambia as "alien not only in its content but in its very form"(Crehan, 1985, p.99). Green development therefore focuses on the human need as defined by the individual and not rigorously imposed without regard to the human aspect. It is not so much the way the environment is managed as it is about who "has the power to decide how it is managed"(Adams, 1992, p.202). Only universal education on the environment will ensure that whoever has the power will be appropriately informed.

3. An Environmental Education Program

The fostering of awareness of our environment is integrated into the development of Adventist culture at an early age through various activities including Pathfinders. Courses about the environment are being offered at all levels at schools in the education system in which issues are presented and discussed. These form an essential basis for exposure to the discipline and help formulate career choices in environment science. The physical and life sciences also offer opportunity to sensitize students to what is sometimes called the '*Green Movement*'. While most other human related disciplines can be studied at the tertiary level, environment science is conspicuously absent in Adventist institutions of higher learning. The need is real and urgent. "A different pattern of human behavior will be needed to succeed. It will require shifting from the present reactive mode, by which collective action is taken only when severe problems or crises occur to a much more proactive orientation in which preventative measures are taken on the basis of careful anticipation and foresight" (Vig, 1990, p.383). Graduates with the balance offered in our schools could exert their influence with confidence derived from the reputation of denominational schools who "send forth men strong to think and to act, men who are masters not slaves of circumstances" (White, 1903, p.18). Some secular universities have for some time been offering such programs while Loma Linda is at present the only Adventist institution offering a degree in environmental health. We have the opportunity to establish a blueprint for others to follow.

3.1 Purpose

The graduate in this program would at least be qualified for an entry level position as a professional environmental health/science officer in both government and non-governmental organizations. Specialization through graduate school or in-service education would then equip the individual for the specific job. The liberal-arts background should compliment the professional education to produce a person capable of intelligent, valued decisions for the good of humanity both in the short and long term. Education affects the environment in many ways. John W Mellor identifies three. "First some environmental destruction occurs simply because people do not understand the harm of what they are doing. Second, education influences population

growth.... Third, education increases income" (Mellar, 1990). When in the area of the environment, to this can be added the increased appreciation of the interrelation of humans and their habitat and the subsequent improvement in standard of living. Environmentally aware people are a requisite at all levels of management. The available technology and the complexity of environmental issues has made it necessary to educate specifically people who can fill these positions. However as these will be employed within the full spectrum of commerce and industry, it is important that they be trained in a broad based setting such as a university.

There are elements in the broad range of issues under environmental science which represent rigorous scientific endeavor. These elements are related to a knowledge of the scientific principles involved. The program will introduce the basic principles of many such disciplines, from civil engineering to biology and yet the graduate will be master of perhaps none of these. It is expected that in decision making, deficiencies will be made up through consultation with experts who will have additional knowledge and experience in their respective areas. The graduate will, however, have the ability to analyze a situation diagnostically and be able to call in the right personnel who have specific expertise.

3.2 Staffing

Because of the complexity of the science and the depth covered in each of the topics, it is unlikely that suitably qualified faculty will be on staff for each and every area. There are more than a dozen such areas which would need to be taught by personnel with the requisite academic and professional background. Any institution which offers a science program would have the human resources to teach the basic sciences of physics, chemistry, mathematics and biology. In disciplines which are traditionally professional such as air and water pollution control, waste management, industrial hygiene and community health, resident professionals will be rare. Naturally the goal for an institution would be ultimately to recruit appropriate faculty commensurate with enrollment. However one solution to the problem of appropriate faculty is to use adjunct lecturers sourced from government and non-governmental organizations. This would resolve the problem whilst also exposing students to professionals working in the field. This guarantees relevant course material and knowledge and practice of current regulations. This method of staffing is being used successfully in various universities both in developed countries like the United States and developing countries such as Zimbabwe.

3.3 Funding

The other implication of a program of this nature is the cost. It is costly to establish because of the sophisticated scientific equipment required. However, with a solid science program in place, the additional costs to implement the program would be less. Because environmental issues are topical and 'big business' attempts to portray a green image, funding in the area is not scarce. The public has been sensitized to issues following media coverage of incidents like Chernobyl and the Exxon Valdes oil

spill. In the latter case, public reaction had a detrimental affect on sales. With the commitment from the corporate world, it is now easier to secure funding for equipment for such a program. "The business world is increasingly recognizing that sustainable development and production which is sustainable can, indeed, be good for business"(Jain, et. al., 1993, p.4). So, whilst expensive in nature, public interest and support can make an environmental science program viable. In developing countries collaboration with government and non-governmental agencies might be the best way to secure funds and support.

3.4 Curriculum

The curriculum for an environmental program cannot be altogether comprehensive because of regional priorities and issues. However what follows is a guide which would meet the necessary requirements to equip a graduate to interact in the professional world. The admission requirements for a program of this nature would be as for a Denominational Institution at the tertiary level. It is assumed that incoming students would have met the basic requirements in mathematics and science. The program is composed of two distinct phases, covering the scientific base for understanding the concepts involved and the response of people and nature to the environmental insult. It must be noted that in addition to the listed courses there are the general education requirement courses which are normally part of an Adventist broad based program. These include subjects in religion, fine arts, humanities and social sciences and comprise about one third of the academic program.

4. Curriculum

4.1 Life Sciences

Objectives: to understand the interaction between living organisms and their environment. Areas to be studied include biology, microbiology and ecology.

4.2 Physical Sciences

Objectives: to develop a knowledge and skill in physics and chemistry to enable a full understanding of all the aspects of environmental science. Areas to be studied include physics, chemistry, biochemistry, mathematics and statistics.

The balance of the program is dedicated to the scientific study of the environment from 3 points of view, i) human development and the environment ii) the response of the environment to development iii) aspects of environmental problem management

4.3 Human Development and the Environment.

Objectives: To alert students to their responsibilities to the environment. The philosophy of environmental stewardship will be developed. Students will be able to include environmental issues in decision making. Areas to be studied include;

- Environmental ethics
- Built environment
- Elements of environmental pollution
- Elements of water and waste-water treatment
- Energy technology and its environmental impact
- Environmental assessment
- Occupational health
- Environmental health administration and management
- Health physics
- Environmental economics

4.4 Response of the Environment to Development

Objectives: To help the student understand the natural physical systems operating in the environment and their response to human encroachment on the natural world. Areas of study include;

- Environmental chemistry
- Environmental toxicology
- Radioactivity and the environment

4.5 Environmental Problem Management

Objectives: To introduce to the student various issues relating to remediation of environmental problems. The student will be able to identify, analyze and find solutions to new problems based upon existing strategies. Areas to be studied include;

- Hazardous waste management
- Principles of air pollution and control.

5. Courses

5.1 Scientific Basics

- Biology, microbiology
- Physics
- Chemistry, biochemistry
- Mathematics

- Statistics
- Ecology

5.2 Environmental Science Courses

ELEMENTS OF ENVIRONMENTAL POLLUTION

The impact of physical, chemical and biological assaults on human beings and environment in air, water, wastewater, natural streams, occupational health, noise and solid waste.

THE ENVIRONMENT AND HEALTH

Examination of the relationship between human health and environmental disease agents; exposure and risk assessment of health hazards; origin, evaluation and control of environmental health problems common to modern societies, e.g., pesticide use, environmental cancer, indoor air pollution, toxic waste.

SOLID WASTE MANAGEMENT AND TREATMENT

The generation, storage, transport, processing, ultimate disposal and regulations of municipal solid wastes and recovery of resources.

PRINCIPLES OF EPIDEMIOLOGY

Study of environmental disease patterns in human populations; emphasis on the association between environmental exposures and disease occurrence; analysis of causal relationships and risk estimates.

ELEMENTS OF WATER AND WASTE-WATER TREATMENT

Introduction to principles of water treatment and waste-water treatment plants with the emphasis on state of the art technology as applied to the region.

ENERGY TECHNOLOGY AND ITS ENVIRONMENTAL IMPACT

Environmental impact of various energy sources; renewable energy sources; regional demands for energy.

ENVIRONMENTAL TOXICOLOGY

Principles and applications of toxicology to environmental problems

ENVIRONMENTAL ASSESSMENT

The principles and procedure of developing environmental impact statements.

PRINCIPLES OF AIR POLLUTION AND CONTROL

Fundamentals of atmospheric contamination; effect of pollution on human beings and the environment; principles of measurement and survey; methods of control; air cleaning; legal aspects.

ENVIRONMENTAL SAMPLING

Methods for collection and analysis of samples from contaminated air and water sources; particulate in both air and water as well as gaseous and dissolved pollutants

RADIOACTIVITY AND THE ENVIRONMENT

Atomic and nuclear radioactivity; interaction of radiation with matter; biological effects of radiation; exposure limits; environmental radiation; radioactive waste treatment and disposal.

OCCUPATIONAL HEALTH

Survey of urban and rural environmental factors within the general framework of air, water, food and shelter as they affect our survival, prevention of disease, performance, and enjoyment.

BUILT ENVIRONMENT

Land, air and water pollution control within the living and working built environments; structural design and materials for minimum impact.

HAZARDOUS WASTE MANAGEMENT

Hazardous waste management, RCRA and other legislation and regulations, treatment and disposal technology, sampling and analysis, fate in the environment, site cleanup.

ENVIRONMENTAL HEALTH ADMINISTRATION AND MANAGEMENT

Organization and functions of public health agencies discussed in conjunction with regulations and their implementation.

ENVIRONMENTAL ETHICS

Human responsibility to the environment; policies to ensure sustainable development.

APPLIED HEALTH PHYSICS

Basic concepts and practices of radiation monitoring and protection; use of survey instrumentation and radioisotope handling techniques.

ECONOMICS

Introduction to economics with regard to long term environmental investment; optimizing natural resources.

ENVIRONMENTAL CHEMISTRY

Equilibria; acid-base dissolution and precipitation, multiphase; oxidation-reduction in aquatic systems; elements of chemical thermodynamics.

SEMINAR

Discussion and critique of presentations by guest speakers.

TOPICS IN ENVIRONMENTAL SCIENCE

Specialized areas of environmental science.

6. Conclusion

The Adventist image in the world is one of genuine interest in restoring human beings spiritually, mentally and physically. The development of nature by human beings has been at the expense of the future sustainability of the planet and thus a social injustice to generations to come. Our responsibility to our fellow being has been shown to include a share in the task of educating the culture of sustainability as well to implant through its guidelines in all decision making bodies, the moral code of ethics for the environment as envisaged by its world view. Pandit Nehru, the great thinker and first prime minister of India, in the light of modern science and discoveries wrote " we feel there is no hope in the world, and all we can do is to be true to one another. And yet we take such a dismal view... History teaches us growth and progress and of the possibility of an infinite advance for men". The perceived dichotomy between development and preservation can be resolved and this begins with education. The fact that we are meant to be here is confirmed by the words "It was the maker of all things who ordained the wonderful adaptation of means to end, of supply to need. It was He who in the material world provided that every desire implanted should be met" (White, 1903, p.133). Change in the environment has occurred due to both natural forces and human dominion. The nature and direction of the change need to be understood and appreciated by all so that the overall balance that maintains the earth as a habitable place in the universe may be preserved. This understanding is best achieved through education to the goal that environmentalism pervades all aspects of human society.

7. Bibliography

Adams, W. M.: *Green Development; Environment and Sustainability in the Third World*.
Routledge, London 1992

Allen, John: *Environment 91/92; Annual Reports*.
Dunkin Publishing Group Inc., Connecticut, 1992

Benarde, Melvin A: *Our Precious Habitat*.
W.A Norton & Co. Inc., New York, 1970

Brundtland, H: *Our Common Future*. For the World Commission on Environment and
Development.
Oxford University Press, Oxford, 1987

Canter, D, Krampen, M, Stea, D: Editors: *Environmental Perspectives*
Avebury, Gower Publishing Company, England, 1988

Crehan, F.: *Bishimi and Social Studies: the production of knowledge in a Zambian
Village*,
African Affairs 84: 89-110, 1985

Davies, Paul: *The Mind of God*.
Simon & Shuster, New York, 1992

Detwyler, T. R.: *Man's Impact on Environment*
McGraw-Hill, New York, 1971

French, H.F.: *Green Revolutions: Environmental reconstruction in Eastern Europe and
the Soviet Union*.
Worldwatch Paper 99, Worldwatch Institute, 1990.

Goudie, A.: *Environmental Change*.
Oxford University Press, Oxford, 1977

Greenwood Ned and Edwards J.M.B: *Human Environments and Natural Systems: a
Conflict of Dominion*.
Duxbury Press, Massachusetts, 1973

Jain, R.K., Urban, L.V., Stacey, G.S., Balbach, H.E.: *Environmental Assessment*.
McGraw-Hill, Inc., New York, 1993

Knight, George R: *Myths in Adventism*.
Review and Herald Publishing Association, Washington DC, 1985

Marx, W: *Man and his Environment:Waste*
Harper and Row, New York, 1971

Mellar, J.W.: from *Environment*, Vol 30, No. 9, Nov 1980.

Shirreffs, J.H.: *Community Health; Contemporary Perspectives*
Prentice-Hall, Inc., New Jersey, 1982

Vig, Norman J and Kraft, Michael E: *Environmental Policy in the 1990's.*
C Q Press, Washington, 1990

Walsh, Brian J and Middleton J. Richard: *The Transforming Vision.*
Intervarsity Press, Illinois, 1984

White, Ellen. G.: *Education.*
Pacific Press Publishing Association, California, 1903

¹Politics, 1.2

²"Ending the War with Nature, from *The Nation*, April 30, 1990