LEARNERS AND ACADEMIC STAFFS' ENVIRONMENTAL KNOWLEDGE, ATTITUDE, INTENTION AND BEHAVIOR (THE CASE OF ADAMA UNIVERSITY).

By

Atlabachew Getaye

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Academic Staffs and Learners' Environmental Knowledge, Attitude and Behavior: The Case of Adama University

Atlabachew Getaye

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Advisor	Signature
Wegayehu Teheje	06/08/'07
Internal Examiner	Signature
Wubishet Shiferaw	06/08/2007
External Examiner	Signature

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Abstract

Environmentally speaking, Ethiopia is in poor health due to deforestation, degradation, excessive loss of fertile top soil, over grazing and waste disposal. The existing environmental problems manifest crisis of values, beliefs, knowledge and ideas. Despite the existing problematic reality, Ethiopian Education Policy and Environmental Policy give due regard to the well being of the environment and sustainable utilization of resources. Nevertheless, there is no available research done in Ethiopian higher institutions on whether students and academic staffs have promising environmental knowledge, attitude, intention and behavior. Besides, the relationships and linear predictive powers of environmental knowledge, attitude, intention and behavior are not studied in order to design a coherent environmental education system.

To examine the above issues, examinations of environmental knowledge, attitude, intention and practice were developed and conducted at Adama University. First year Business and Technical students and academic staffs were the target population, selected using stratified and simple random sampling.

The findings reveal that both students and academic staff do not have low environmental knowledge. Similarly, their attitudes are neutral. Both groups also exhibit an infrequent habit of environmental practice activities. As to relationships of environmental knowledge, attitude, intention, and practice, they show positive relationships among one other, having differences in strength. Besides, learners and academic staffs environmental knowledge predicts their attitude, intention and practice, showing differences in explanation power.

Thus, there is a need to arm the community of higher learning in particular and the public in general with the required experiences and understanding of environmental knowledge, attitude, intention and practice in an integrated and holistic manner.

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INTRODUCTION

1.1 Background of the Study

Like any other developing countries, Ethiopian economy highly depends on environmental resources. These entail its soil, forests, waters, minerals, species and lakes. The development of the country, one way or another, is greatly linked to the nature and level of ecological capital. If nature and society form a shared continuum based on interactive principles, it will not be hard to realize sustainable development (MacNail, 1990; Miller, 1996).

Practically, however, environmental problems in Ethiopia are presently escalating at a speedy pace. The state of environmental crisis becomes severe in the northern, central and eastern part of the country. This is because the degrees of deforestation, degradation and excessive loss of fertile top soil have been intensified by early settlement and intensive agriculture. Urban environmental problems such as access to basic environmental infrastructure and services, pollution from industrial wastes and emissions, resource losses such as ground water deflation and natural degradation are pressing problems (Beletu and Yosef 1990; Gebeyehu, Yosef and Gronrall, 1992). This reality matches with the claim of MacNail as quoted in Easter and Mondemaker, (1993:112) that "During the past two decades the poor countries of developing world have experienced a massive depletion of ecological capital".

The seriousness of environmental depletion witnesses that the relationship between nature and people are unfriendly. Thus, it seems high time to take urgent actions by redressing people's lifestyles. People can experience sustainable development by acquiring appropriate environmental knowledge, know how, skills and capacities (Ibid). In other words, sustainable development will be feasible as a result of "the

development of the people" (Galtuag (1983) as quoted in Hjnal and Kiss (1983: 19)).In line with this, Cohen (2000) puts forward his disagreement regarding the nature of environmental studies saying:

> Researchers involved in examining national preparedness for ecological modernization have tended to focus on institutional or economic factors, with less attention paid to cultural and knowledge based potentialities. Yet it is widely acknowledged that all environmental action depends critically upon underlying knowledge system (In Barrett and Kuroda (2002:237)) .

In fact, to bring about new environmental theoretical framework, environmental knowledge is a necessary condition but not a sufficient one (Easter, 1979; Geller et al, 1982). In addition to information, it requires the acquisition of various environmental problems' coping strategies, methods and techniques. It needs to undress one's old habits and internalize new habits. It presupposes developing skills such as "imagination, decision power, organizational and co-ordination, social and communication skills, the ability to motivate and convince people, to make people work in a team, but also political skills to handle diverging concerns and interest groups"(Easter and Mandemaker,1993:72).

The underlying value with regard to environment is human nature symbiosis. Human and nature well being are two sides of the same coin. Accordingly, "The intelinkages between these two 'systems' are at the root of environmental education" (Regnier, 2003:1).

Realizing the above fact, Ethiopian education and training policy provides due regard to the environment. The general objective of Ethiopian education and training policy (1994), states the need to "Bring up citizens who can take care of and utilize resources wisely---". Similarly, one of the specific objectives emphasizes the need" to provide education that can produce citizens who posses national and

international outlook on the environment, protect natural resources and historical heritages of the country". On top of these, Ethiopia has an impressive environmental policy which defines the goals and strategies in order to preserve and conserve the ecology of the country (Ethiopian Environmental Policy, 1997). All these are done presuming that proper environmental education and policy can possibly result from appropriate knowledge, know how, attitudes and behavior toward environment.

At this juncture, it appears high time to examine learners and academic staffs' knowledge, attitudes, intention and behavior about environment. In relation to Adama University in particular and Ethiopian higher learning in general, the present researcher fails to get any pertinent research, done in the field of environment. Lack of available research and the intensifications of environmental problems are, thus, the driving forces to conduct this study.

1.2 Statement of the Problem

Studies reveal that environmental practices stem from proper knowledge and attitudes (Kaiser et al; 1999; Jvy and Chuan, 1998; Vining and Ebreo , 1992). If appropriate knowledge and attitudes are instilled in learners and other people, according to humanistic and integrated models, their actions will, by and large, be directed towards sustainable development. Otherwise, they may play a debilitating role for the above models uncover that man's decision grounds on his knowledge and experience

Giving prominence to the above assertion, many countries have conducted a survey study on their citizen's environmental knowledge, attitudes and behavior (Bohl, 1976; Eyers 1975; Perkers, 1973; Toeler and Swan, 1972) as it would contribute immensely for the betterment of the environment. In Ethiopia, nevertheless, the issue has not yet got

researchers attention in spite of the importance of the topic. In fact, the present researcher could not find any pertinent studies on the issue

Thus, the researcher aims at investigating the level and relationships of learners and academic staffs' knowledge, attitudes, intention and behavior and the factors that affect environmental, knowledge, attitude, intention and behavior and the predictive powers of the above factors over one another. To meet the above aims, the following research questions were formulated:

1. What type of environmental knowledge do learners and staffs' have, and what are their environmental knowledge sources?
2. How low or high are learners' and academic staffs' environmental knowledge, attitude, intention and behavior?
3. Is there any difference in terms of academic stream (Business versus Technical science) regarding environmental knowledge, attitude, intention and behavior?
4. Is there gender difference in terms of environmental knowledge, attitude, intention and behavior?
5. Is there any disparity in terms of residence background (urban-rural) regarding environmental knowledge, attitude, intention and behavior?
6. Is there any difference in terms of religion regarding environmental attitude, intention and behavior?
7. Can environmental knowledge predict learners' environmental knowledge, attitude, intention and practice?
8. Can environmental knowledge predict academic staffs' environmental knowledge, attitude, intention and practice?

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1.3 Significance of the Study

Many countries gathered their citizens views of environment to take remedial actions based on the findings. In our case, this is not the case. In fact, environmental challenges are increasing in Ethiopia .Drought and famines are already identities of the country.

Thus, the pieces of information this study bring can possibly serve to take the necessary amendments on the part of the subjects to enable them play constructive role towards environment. The study can also pave the way for other studies.

1.4 Objective of the Study

The general objective of the study is to analyze learners' and academic staffs' environmental knowledge, attitudes, intention and behavior, and to examine the factors which influence environmental knowledge, attitude, intention and practice. The specific objectives of the study are to:

I Identify learner's and academic staffs' level of environmental knowledge, attitude, intention and behavior.

II Identify gender difference of students in terms of environmental knowledge, attitude, intention and behavior.

III Identify urban-rural learners difference in terms of environmental knowledge, attitude, intention and behavior.

IV Examine Business and Technical science students' difference in terms of environmental knowledge, attitude, intention and behavior.

V Examine religious differences on environmental knowledge, attitude, intention and behavior

VI Examine the predictive power of environmental knowledge, attitude and intention over behavior.

1.5 Scope of the Study

The study is delimited to Adama University students and academic staff for it accommodates many students and academic staff coming from different regions. Information would be gathered from first year students and academic staff using stratified sampling and simple random sampling. The study focuses on first year students for they took various environmental courses during their study at high schools. They are, thus, familiar with various environmental issues, compared to senior students who specialize in specific fields.

1.6 Limitation of the Study

It would have been interesting to include other universities as the subject of the study. Besides, the study did not involve the cause and effect relationships of environmental knowledge, attitude, intention and behavior. Thus, further research is essential to determine the causal direction of the relationships among the variables

1.7 Definition of the Key Terms

1. **Environment**: According the Shorter Oxford English Dictionary it refers to "the conditions or influences under which any person or thing lives." Therefore, the environment includes the surface of the land, rivers, land, oceans, as well as soils, vegetation and animal life .It also includes the atmosphere we breathe every day (Dunlop, S and M Jackson ,1991:2)

II **Environmental knowledge**: It is dynamic, formed through social interaction, personal experience and observation. It is also context embedded which depends on specific time and space (Nonaka, Touama and Nikonao, 2000).

III **Attitude**: It expresses ones concern towards environment (Veining and Ebreo, 1992). According to Pestling (1997), it is "a learned predisposition to respond consistently in a favorable or unfavorable manner with respect to the environment".

IV. **Intention**: It refers to one's willingness to involve in various environmental actions and activities (Stern et al, 1993)

V. **Behavior**: It refers to the mental make up that is instrumental to the practical action that one undertakes towards the environment (Ibid).

CHAPTER TWO

Review of the Related Literature

In this chapter a review of literature pertaining to environmental knowledge, attitude and behavior is made.

2.1 Conceptual Framework of Environmentalism

Environmentalism, according to Harper (1996), entails both ideology and action. As many scholars spell out, it dictates lifestyle. Environmental ideologies emanate from existing knowledge, attitudes and behavior. In other words, the existing lifestyles define one's environmental perspectives. As an ideology environmentalism inculcates a set of knowledge, know how, skills and practices regarding "the desirability and possibility of changing the human relationship with the environment" (Harper, 1996:296). The above definition point out that environmentalism is a broad concept which explains the relationship between society and environment.

Environmentalism ranges from anthropocentrism pole to ecocentric pole. Domination, stewardship, partnership, participation, eco-feminism, animal liberation are some of the major environmental philosophies (Kockelkoran, Achterhuis and Wal 1993; List, 1993; Eckersley, 1992).

Anthropocentrically speaking, man is superior to other species, and he can subdue nature. Human beings are the focus. It disregards human nature nexus (List, 1993). Such a philosophy fails to understand that the destiny of man is tied to the well being of nature which, in turn, results in:

> Ecological crisis because of the power of our hierarchical and authoritarian social, economic and political structures, and the kinds of technologies we have used to provide for our wants. --- these structures and technologies permit some humans to dominate others and also to dominate nature. As a result our very survival is threatened on earth (Bookchin (1987) in List (1992:1]).

The above erroneous perception, according to Planwood (2002) in Carter (2004:325) brings about the following consequence.

> That we are so other than nature and so independent from it that we need not respect it--- serves to justify a mistreatment of the natural world that is sufficiently damaging to our planet life support systems that we ourselves are now seriously threatened by our own seemingly rational actions. As such the dominant conception of "rationality" is in actual fact, deeply irrational.

Consequently, this study adapts the new environmental paradigm [NEP] proposed by Dunlap and Van Liere[1978].They describe:

> the dominant social paradigm as involving beliefs in progress, technology, materialism, development and separation of humans from nature. NEP, in contrast, was characterized by recognition that humans are part of nature, and there are limits to physical growth and development [Barrett et al [2002:238]).

Needless to say, environment provides man with all the necessary resources: soil, forest, water, mineral, air and food. The survival of man highly depends on the environment. Nevertheless, the failure to establish "equitable system among peoples, states and nature has lead to disruption of economic, social and political frame work necessary to ensure the uninterrupted continuation of civilization" (Desalegn, 2003:32).

2.2 Environmental Problems in Ethiopia

In Ethiopia, environmental problems are increasing at an alarming rate. The degree becomes severe in the northern, central and eastern parts of the country. This is because the degrees of land degradation, deforestation, over cultivation and overgrazing are extremely intensified due to intensive agriculture and early settlement (Ermias, 2003; Desalegn, 2003; Aklilu, 2001; Gebeyehu, Yosef and Gronrall, 1992; Beletu and Yosef, 1990).

The driving forces for environmentalism are the intensifications of the above problems (Desalegn, 2003). Land degradation due to soil erosion and soil fertility decline is becoming a pressing problem (Ermias, 2003; Aklilu, 2001). According to the Ethiopian Soil Science Society (ESSS, 1998), the country looses a total of 1.5 billion tons of soil on a yearly basis. It further makes clear that it is only 20 percent of the highlands which does not face soil erosion hazards. Hurni (1987) in Akililu (2004:5) notifies that:

> About half of the highlands (270,000 km^2) are already significantly eroded, of this, 140,000 km^2 are seriously eroded and have been left with relatively shallow soils. Estimates from plot level studies have also shown that the rate of soil loss is high from currently unproductive (70t/h2) and cultivated areas (42t/h2).

Similarly, soil fertility decline is also another major problem in the agricultural areas. Based on the assessment of soil nutrient depletion in SSA, Ethiopia experiences the highest rate of nutrient depletion (Stoorvogel et al, 1993). This brutal reality has, in turn, brought about the loss of 40,000 tons of grain production annually (Azene, 2001). To put it in a nutshell, the land

> can no longer provide goods and services that the generation of present day Ethiopia need. The people are now increasingly dependent on relief food to survive. The life support systems are in real threat in Ethiopia in facing an environmental deterioration unparallel in its long history (Ermias, 2003:25).

What adds fuel to the fire is deforestation. In Ethiopia deforestation is too high. Forests are cleared for fuelwood, agriculture, livestock grazing, house construction, etc (Konemund, 2002). Forest cover has presently decreased from 16% in the 1950s to 2.5% of the total land area. Forest depletion rate is assumed to be 160,000 to 200,000 hectares annually (Ibid).

There are various factors which contribute to the acceleration of deforestation. A typical cause is energy supply. In Ethiopia, almost 96% of the energy supply comes from biomass which is a traditional energy supply. Due to population growth and lack of other options, the demand for biomass has created unbalanced ecosystem, putting pressure on biomass resources and arable land in an already deteriorating environment. The issue is severe for the demand is five times higher than the actual supply which is not, by any standard, at all sustainable [Aseres, 2002; Konemund, 2000). On top of these, the expansion of rain fed agriculture is the other cause. "Estimates of deforestation, which is mainly for expansion of rain fed agriculture, vary from 80,000 to 200,000 hectares per annum'" (FDE (1997) in Akililu [2001:6)].

Equally important, urban environmental problems such as solid waste, liquid effluents and air pollutions turn to be series hurdles to

environmental well being (Alebel and Dawit 2006; Teferi,1996). Goods and services are returned after use into the environment as waste and emissions which instigate various forms of environmental problems: resource depletion, poor quality of air, deterioration of water and soil quality, noises, etc (Ibid). Besides, environmental problems have their own effect on the socio-economic progress. They also dispossess people's quality of life, and dwellers experience health problems (Huizen and Nijkamp, 1995).

Wastes can be either solid or water. Unlike developed countries where industry waste is a headache, in Ethiopia, particularly in Addis Ababa, households (76%) contribute the lion's share of solid waste, followed by commercial establishments and industries. They jointly contribute 14% of the total solid waste .Four percent of solid waste in the city comes from streets. Thus, solid waste is the major obstacle for Addis in particular and other towns and cities in general (Alebel and Dawit, 2006).

With regard to waste water, they can emanate from industries or municipalities. Compared to municipal waste waters, industrial waste waters are highly offensive for they contain chemical pollutants and toxic substances in large amounts. To examine the seriousness of industry waste water pollution, it is essential to inspect how industries in Addis Ababa region discharge their liquid effluents. Sadly enough, they discharge their effluents directly to Akaki river which ends in Aba Samuel water body. Studies uncover that 26 industries discharge their effluents directly to the above rivers as a result of which the rivers have become sources of infections for both humans and animals (Teferi, 1996).

All in all, both rural and urban environmental problems, with brutal realism, are escalating. The present environmental crisis notifies that there is no harmony between nature and human being. Consequently, nature has already started punishing us in the form of drought, diseases and flood. At this juncture, it seems high time to re-dress our relationship with nature.

2.3. Education and Environmentalism

Given the above environmental depletion and the intensifications of the problems in both rural and urban areas, it seems imperative to have a swift and transfermotive shift in terms of values and practices to make sustainability a reality. The existing reality (our beliefs, ideals, observed facts and normative principles of the environment) are not in harmony with nature. Hence, there is a need for a new theoretical frame work for understanding the environment. According to Gillory (2000:10):

> Paradigms are comprehensive and influential within the "thinking" and "action" of actors who function within their world view. A paradigm dominates others by its capacity to define what a "fact" is and to influence not only what is seen as important to a decision, but what decisions need to be made and how.

In other words, the existing environmental crisis manifests crises of "values, ideas, perspectives and knowledge which makes it a crisis of education, not one in education" (Regnier, 2003:2). The paradigm shift, according to Edwards , Brabble, Jackson and Westney(1991:48), should:

> systematize knowledge and identify principles which enable human beings to maximize their capacity to

> manage their lives in a rational and effective manner, to develop an understanding of themselves in relation to forces and counter forces- intrapersonal, interpersonal, social and physical- that impinge on their capacity to become fully functioning individuals. It should--- build on life management studies of the interaction of human beings with their near, more immediate environments.

Education, according to the above scholars, is a medium for transmitting the "truth of things". Its goal should be sustainability. It should be geared towards a better understanding of interaction between human societies and their environment. The idea of sustainability is not linear. It is an eclectic concept which inculcates various disciplines: economic, social, political, cultural and spiritual dimensions. It requires the understanding of the above factors. The role of education is, thus, to integrate information from various fields to enhance man's understanding of nature so as to enable him/her act in a holistic manner. Change is the crux of the matter [Regnier, 2003; Edwards et al, 19914].

Presently, environmentalism calls for "inner changes, for a human and humanistic revolution mobilizing new values and aspirations backed by new levels of personal commitment and political will" (Reginer, 2003:2). Otherwise, the existing self centered values cannot resolve environmental depletion. Internal changes require rethinking: rethinking of knowledge, attitudes and practice. For Odum (1993) environment is a complex set of interrelationships and elementary cycles. Thus, there is a need to replace environmental unfriendly way of doing with environmental friendly practices.

2.3.1 Environmental Knowledge

In essence, knowledge in general is dynamic formed through social interactions, personal experience and observation. It is also context embedded which depends on specific time and space (Aonaka, Toyama and Nikonao, 2000). Entailing the above general features, environmental knowledge refers to the acquisition of wider experiences and internalization of basic understanding regarding the environment and its related problems (Roa and Reddy, 2003).

Moore (1979) in Walmsley and Lewis (1993), puts forward three postulates of environmental knowledge construction. First, "--- environmental knowledge is constructed in that individuals invent structures in order to enable them cope with reality". In this view, separation of the known from the process of knowing is hardly possible. Second, environmental knowledge is formed through the interaction of internal need and external demand. Third, environmental knowledge can be constructed in a holistic manner. In other words, there is mutual understanding between human being and nature. The above postulates display different frames of orientation towards nature: some are anthropocentric others are interactive.

With regards to types of environmental knowledge, there are four: dominion (anthropocentric), stewardship, partnership and participation. They range from anthropocentrism to ecocentrism (Kockelkoren et al, 1993). Anthropocentrism views nature as subject to man. On the other hand, ecocentrism views man as subject to nature. In between the extremes, there are two moderate environmental outlooks: stewardship and partnership.

A. Dominion. Human being is the center and the ruler of the earth. He has free disposal over all forms of planetary life. The role of nature is to safeguard human survival by providing raw materials. The relationship is master- slave type that man never ceases to extend his power. The "Either you or me" philosophy is self- suicidal which has a diverse effect upon the environment in general and human's life in particular (Kockelkoren et al, 1993; List, 1993).

B. Stewardship. It grounds on anthropocentric view, putting limit to man's demand from nature. Man is accountable to the future generation. It dictates conservative approach. As List (1993:8) points out, "It emphasized the fight against pollution and resource depletion because of concerns about the health and affluence of people in the industrial countries". Otherwise, there is a clear demarcation between nature and man in such a way that nature is designed for the well being of human being (Ibid).

C. Partnership. Interaction between nature and human being is the essence of partnership philosophy. It tries to safeguard the diversity of life, disallowing man not to interfere with the self generating capacity of nature. It gives due regard to the intrinsic value of nature. Partnership ,according to List (1993:20):

> enhances the potentialities of survival ,the chances of new modes of life, and the richness of forms. And the so called struggle for life, and survival of the fittest should be interpreted in the sense of ability to co-exist and co-operate in complex relationships, rather than ability to kill, exploit, and suppress. 'Live and let live' is a more powerful ecological principle than 'Either you or me'.

D. Ecocentrism. It is a radical philosophy which encourages anti-technical attitude, expressed by the slogan "back to nature". It requires deep and systematic alternations of philosophies. Their basic principle states that "Humans have no right to reduce --- the richness and diversity except to satisfy vital need". In principle it has grain of truth, but practically mutual predation is the pragmatist mode of biological life. Hence, traditional lifestyle which grounds on communalism and small scale craft production appears far from reality (Kockelkoren et al, 1993; List, 1993).

In relation to environmental knowledge studies, environmentalism requires high level of environmental knowledge (Inglehart, 1995a; 1995b; Arcury, 1986; 1987). In other words, high level of environmental knowledge is related to high level of education. Buttel and Flinn (1978) also point out that well educated people give due regard to the environment than their lower educated counterparts. Therefore, environmental knowledge plays a paramount role in promoting environmentalism.

2.3.2 Environmental Attitude

In the real world, according to Downs (1970a), action emanates from cognitive and affective components. The pieces of information received by the senses enable to form some sort of value and image which, in turn, serve to pass practical decision in a certain way.

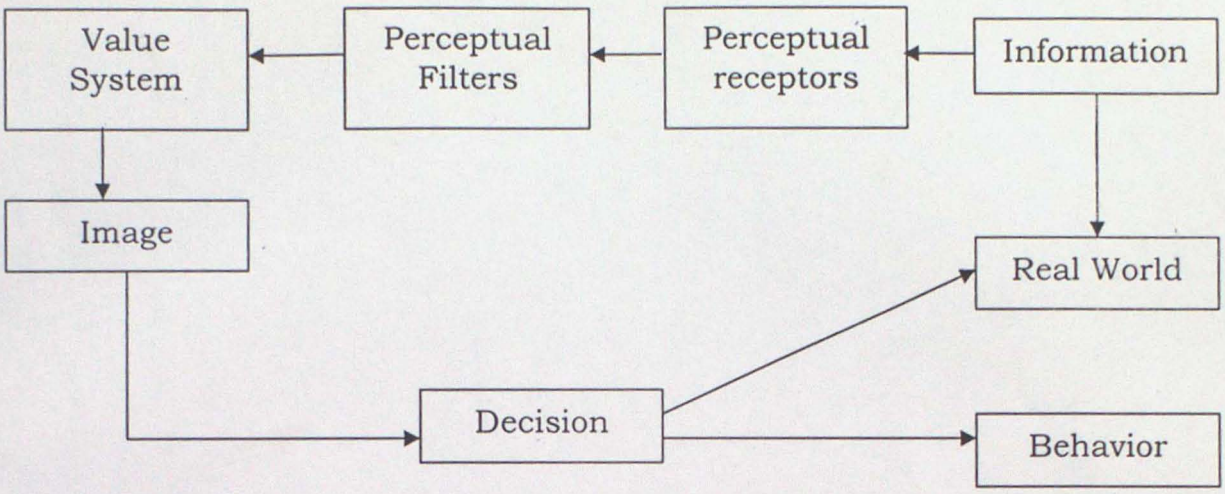

Figure 1: Environmental Perception and Behavior (Source: Downs, 1970a:85]

Environmental attitude, thus, emanates from environmental knowledge. Knowledge is the precondition for attitude. And attitude expresses one's concern towards environment (Kaiser et al, 1999; Vining and Ebreo, 1992).

Environmental attitude according to Pelstring (1997) is "a learned predisposition to respond consistently in a favorable or unfavorable manner with respect to the environment". In fact, environmental problems are linked to environmental attitude. Environmental attitudes refer to perceptions or values regarding environmental issues. Environmental issues entail land degradation, deforestation, soil erosion, pollution, society – environment relationship, environmental politics, etc. Thus, positive responses promote the well being of the environment while negative reactions facilitate the deterioration of nature (Tuna, 2004; Dunlap and Van Liere, 1978).

To elucidate the above claim with practical example, the dominant thinker view the environment anthropocentrically. To him, nature's role is simply to fulfill human's need. He does not believe in the diversity of life. Nevertheless, "Ecologically inspired attitudes--- favor diversity of human ways of life, of cultures, of occupations, and of economies "(List, 1993:20). The view of the dominant thinker clashes with environmentalism for he has an infinite need of resources and power.

The steward, on the other hand, believes in limit. Man should be accountable to the future generations, taking conservative approach. This view is anthropocentric, but considerate in comparison to the dominant thinker. The steward, nevertheless, is not environmental friendly for he encourages technocratic approach .He believes in increased production and consumption of goods which clashes with the objective reality of nature (Kockelkoren et al, 1993; List, 1993).

The partner represents the moderate and practical attitude. He encourages the joint approach of conservatism and dynamism. He believes in diversity. 'Live and let live' is his slogan. Interaction is the essence of his philosophy (Ibid).

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Finally, the ecocentric thinker fosters "back to nature" philosophy. He restricts the action of man only to the vital needs. He promotes the philosophy of small scale craft production which is, some what, utopian (Ibid).

When it comes to conceptualization, according to Tuna (2004):

> there are many theoretical and empirical approaches to investigate environmental attitudes in the literature

> (Dunlap and Van Liere, 1978, 1984; Ramsey and Rickson, 1976; Mohai and Twight, 1987; Fredenburg, 1991; Arcury, 1990; Buttel and Flinn, 1974, et al). Although conceptualization and operationalization of environmental attitudes varies in and across studies, most approaches identify environmental attitudes as a component of environmentalism.

He further summarizes studies saying:

> All review literature indicated that education is a key variable on environmental attitudes. Almost all research on environmental attitudes found that highly educated respondents always have pro-environmentalist values than lower educated respondent (Inglehart, 1995a, 1996; Arcury, 1990; Buttel and Flinn, 1978a, 1978b).

2.3.3 Environmental Behavior

Environmental behavior refers to the practical action that one undertakes on the environment (Pestling, 1997). It refers to the actual decision making process. Action, according to Cullen (1976), "is a response to the physical or social environment". Responses arise from reasoning. As Brookfield explains, "decision makers operating in an environment base their decisions on the environment as they perceive it, not as it is. The action resulting from their decision, on the other hand, is played out in a real environment" (1969:53).

Environmental attitudes are pre- conditions for ecological behavior (Dunlap and Van Liere, 1978; Van Liere and Dualap, 1981) Perception, in turn, grounds on knowledge [Ibid]. In other words, as Fig. 2 made clear, there is a link between thought and action. Behavior is influenced by intention, attitude, norms, values and factual knowledge.

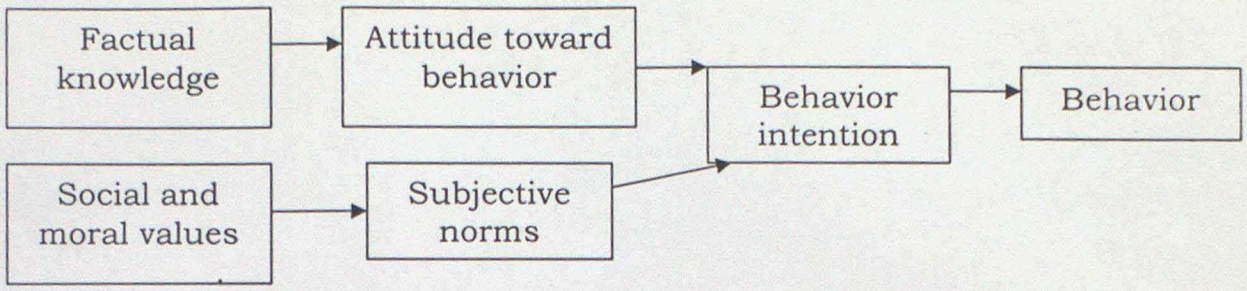

Figure 2: The theory of reasoned action (Source: Kaiser et al, 1999:3)

The rationale behind investigating the cognitive aspect is "if we can understand how human minds process information from external environments and if we can determine what they process and use, then we can investigate how and why choices concerning those environments are made "(Golledge and Rushton, 1976: viii). For Golledge and Stimson (1987) information is processed to form images and schemata. In line with this, Walmsely and Lewis (1984:95) state that

> It is widely acknowledged in the study of people environment interaction that the acquisition of environmental information and the use of that information in some form of decision making process serves as a prelude to overt or acted out behavior.

Accordingly, as Chapin (1974:9) clearly explains

> a person's behavior is the result of a complex and variable mix of incentives and constraints serving to mediate choice, often functioning in differentially lagged combinations with some activities directly traceable to positive choices, and some attributable to

negative choices in the sense that constraints overshadow opportunities for choice.

All in all, environmental behavior always manifests a specific context, best understood from the actor's point of view. It is also dynamic. "It follows from this that the study of people environment interaction needs to recognize the uniqueness of the phenomena and the necessity for eclecticism in the choice of methodology" (Walmsely and Lewis, 1984:133).

2.3.4. Research Findings on Environmental Knowledge, Attitude and Behavior

2.3.4.1 Environmental Knowledge and Attitude

According to Aklilu (2006:40), most primary and secondary school findings "on students knowledge about and attitude towards certain environmental issues indicate that students, in general, have poor, very general, and uncritical knowledge, and attitudes that cannot be rated as promising."

In the Dominican Republic a survey was conducted using a test on 12th grade students' environmental knowledge and attitudes by Roth and Perez (1989). The results of the average scores were 51 and 55 percent for knowledge and attitude respectively. They were not satisfactory. Similar studies were conducted in the Philippines (Cortes, 1991) in Singapore (Lau, 1992) and the United States (Manning, 1992) on school children environmental knowledge and commitment. The report of Lau (1992), for instance, indicated that learners' environmental knowledge performance was low, but the result for environmental commitment fared better.

Further, a survey on environmental pollution was conducted in member states of European community. The finding revealed that citizens are not conscious of pollution (UNEP, 1988).

In developing countries, the studies done on learners environmental concerns were extremely limited (Aklilu, 2006). In Tanzania (1992, 1989) studies were conducted on conservation of plants. In the eyes of the students, conservation of the environment was unessential. In another survey (1997) conducted on Nigerian learners' environmental knowledge, attitudes and practice, senior secondary students achieved low scores. "Out of a maximum possible score of 60, males obtained a mean score of 13.0, while females scored 12.2" (Mansary and Ajiboye (1997:320) in Aklilu (1998:14)).

In Ethiopia, few studies were carried out in relation to environmental education. An investigation regarding the integration of environmental education into social studies course at some selected T.T.Is of Ethiopia was conducted. The study communicated that nearly the majority of the trainees had a mastery of environmental knowledge. Similarly, the majority of the trainees manifested favorable attitude, and they also possessed encouraging environmental skills (Melaku, 1994).

Furthermore, a survey was carried out in some selected Ethiopian high schools and the study revealed that students were familiar to environmental issues. They expressed also favorable attitude toward the conservation of resources, having limited practice experience (Desalegn, 1998). On top of these, educators' views concerning the use and protection of natural resources were investigated. Interestingly, the study uncovered that "educators manifested favorable views regarding the use and protection of natural resources with an average score of 3.95 on a scale running from one to five " (Aklilu ,1998:56).

2.3.4.2. Knowledge Attitude Behavior Nexus

Many studies were conducted to identify the relationship of environmental knowledge, attitude and behavior. The findings reveal the existence of positive relationships, having differences in strength across studies. For example, Ostman and Parker (1987) in Akililu (2006) reported that there is a positive association among environmental knowledge concerns and behavior. They also made clear that education predicts environmental knowledge and behavior.

In another study which was reviewed and reported by Kaiser et al (1999:4):

> Given that factual knowledge about the environment is a precondition of one's environmental attitude, this knowledge should not be related with ecological behavior strongly because its influence is attenuated both by environmental attitude and ecological behavior intention. Hence, it is not surprising that several studies found either no relationship between factual environmental knowledge and ecological behavior (Maloney and Ward 1973; Maloney et al, 1975; Amelang et al , 1977; Schahn and Holzer,1990a, 1990b) or at least a moderate relationship (Arbuthnot,1977; Dispoto; 1977; Smythe and Brook; 1980, Stutman and Green , 1982; Hines et al,1986/87; Oskamp et al,1991).When this relationship appears to be stronger, it is knowledge about ecological behavior rather than factual knowledge . . . that is related to ecological behavior (Levenson , 1974; Sia et al, 1985/86, Smith Sebasto and Fortner, 1994).

When environmental attitude is appraised independently , the result display either a moderate association between environmental attitude and beheviour (Weigel et al., 1974; Hines et al., 1986 57; Smith et al., 1994) or a weak relationship (McGuiness et al., 1977; Sia et al., 1985/86 ,Williams, 1991) .On the other hand , five studies reveal the non existence of relationship (Arbuthnot , 1977; Van Der and Pligt,1985; Oskamp et al., 1991; Lansana, 1992; Gamba and

Oskamp,1994) and one study report a strong relationship between environmental attitude and ecological behavior (Lynne and Rola, 1988).

The most striking relationship is found between ecological intention and ecological behavior. Ecological behavior is strongly related to ecological behavior (Maloney and Ward, 1973; Maloney et al; 1975) or at worest moderately related (Symthe and Brook, 1980; Stutzman and Green, 1982). There are also studies which claim the non- existence of relationship between intention and behavior (Auhagen and Neuberger, 1994; Fuhrer and Wolfing, 1997) and still other studies in which the relationship between intention and behavior appears small (Van Liere and Dunlap, 1981).

2.3.4.3. Factors Influencing Environmental Knowledge, Attitude and Behavior

Studies were also carried out on factors which could influence students knowledge, attitude and behavior .Factors such as academic stream, sex residence ,religion, level of education and age affect environmental knowledge ,attitude and behavior . The findings are, however, conflicting and inconclusive (Akililu, 2006; Tuna, 2004; Desalegn, 1998).

Academic Stream

In higher learning institutions, natural science students result were compared to social science students environmental knowledge, and natural science students were found to have more knowledge than their counterparts (Gifford et al, 1982).

Sex

Tarrent and Cordel (1997), Stern et al (1993) and Arcury (1990) come up with conflicting findings. Tarrant and Cordel (1997) and Stern et al.

(1993) reported that female students manifest better environmental concern than males. On the other hand, Arcury (1990) found that females are less concerned than males.

Residence

Rural and urban students were compared on the bases of environmental issues: air pollution, water pollution, waste disposal and land use. According to Leftridge and James (1980) rural students were more perceptive than urban students. By contrast, according to Butter and Flinn (1978), urban students were more concerned than rural students in relation to environmental problems.

Religion

Studies pinpoint that religious affiliation has impact on environmentalism. For Cowtan (2006), for example, Christianity is associated with anthropocentrism, compared to other religions. Others associate Christianity with the rise of modern science which, in turn, brought environmental crisis (White, 1967). On the other hand, Gill (1985) spell out that man has a special privilege in the Bible. Nevertheless, he is expected to use nature in a non-adversely manner.

Age

Age produces contradictory reports. In relation to environmental attitude, younger persons exhibit favorable attitude than older people (Arcury, 1990). On the other hand, Ostmon and Parker (1987) found no relationship between age and dependent variables.

CHAPTER THREE

CONSTRUCTS AND SPECIFICATIONS OF ENVIRONMENTAL KNOWLEDGE, ATTITUDES AND BEHAVIOR

In this chapter, explanations regarding the constructs and specifications of environmental knowledge, attitude, intention and behavior are given.

3.1. Environmental Knowledge Constructs and Specifications

In this study, four types of environmental knowledge are applied. The typology is formulated by different writers such as Cohen (2000), Kockelkaren et al (1993) and List (1993). Cohen in Barrett and Kuroda (2002) (2000) and Kockelekölen et al (1993) employ different terminologies, conveying, by and large, similar meanings. Cohen (2000) uses the following four terms.

i. Prometheanism. It gives strong disposition towards science.
ii. Ecocidal Mysticism. It disregards the need for measured behavior with respect to the environment.
iii. Rational Ecologism. It focuses on technology, being aware of the protection of the environment.
iv. Arcadianism. It stresses strong skepticism about science, longing for more traditional lifestyles.

Likewise, Kockelkoren et al (1993) apply four types of environmental knowledge: dominion, stewardship, partnership and ecocentrism (see the details on pages 16 and 17). Between the above scholars, there are meaning similarities, having, of course, slight differences. The researcher utilizes Kolckelkoren et al (1993) for the terms are clear, inclusive and easily understandable.

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After identifying the typologies, various sources were consulted to identify major environmental issues. The sources entail Proceedings of the Third International Conference of the Ethiopian Economy I and II, Proceedings of Energy Conference 2002, Proceedings of the Conference on Poverty and Development in Ethiopia: Challenges and Options, Ethiopian Journal of Development Research, Proceedings of the Conference on Management of Water Resources in Ethiopia, Geography texts for Grades 9,10,11 and 12 , Enough with Famines in Ethiopia, Environmental Policy Forum for Social Science Studies on Ethiopian Environment.

Additionally, various foreign studies were examined closely to draw lessons on how to formulate environmental knowledge examinations. These include "Ecological Modernization, Environmental Knowledge and Societal Change: Attitudes and Behavior of Young People in Japan", "A Survey of Environmental Knowledge, Attitudes and Behavior of Students in Singapore", "Environmental Attitude and Ecological Behavior" and "The Impact of Environmental Ethics on Christian Ethics".

Then major environmental issues of Ethiopia are identified. These encompass land degradation, deforestation, soil fertility decline, soil erosions, wastes (solid and liquid), pollution and society environment relationship. Besides, factual physical geography issues like water resources, wildlife resources, energy sources use, mineral resources, forest resources, location and topography are incorporated.

On the bases of the above issues, environmental knowledge questions are developed to appraise respondents' knowledge. Relevant questions were adopted from other studies identifying their relations to Ethiopian context. On top of these, eleven key environmental concepts were adopted from Berett and Kuroda (2002:251) studies. They are intended

to assess respondents' familiarity with some of the most commonly used environmental concepts (refer Appendix A).

Overall, the intent of the present environmental knowledge construct examination is to discern respondents level of knowledge regarding Ethiopian environmental depletion, knowledge typologies (whether environmental friendly or unfriendly). Besides, the examination is supposed to evaluate subjects' familiarity with key environmental concepts and other existing facts of Ethiopian physical geography. Respondents' achievements are supposed to discriminate the positive environmental knowledge from the negative, the promising from the non promising which, in turn, can pave the way for further action.

To meet the above constructs, forty two multiple question items were set with the aim of measuring the following specifications.

i. Identifying the major causes of environmental degradation.
ii. Distinguishing the causes and possible solutions of soil erosion, deforestation, overgrazing, waste disposal, noises and air pollution.
iii. Recognizing the types of energy sources and their merits and demerits on other related factors.
iv. Grasping factual information of physical geography such as water resources, plant diversity, wildlife resources, mineral resources, location and geography.
v. Analyzing the types of respondent environmental knowledge.
vi. Identifying the types of human environment relationship.
vii. Checking the familiarity of respondents to key environmental concepts.

3.2. Environmental Attitude Constructs and Specifications

The NEP is the most frequently employed construct to measure environmental attitudes. It has been employed many times and its validity is confirmed by many scholars (Gwendolyn et al, 2006). The study by Dulap and Van Liere (1978) contains 12 Likert Scale items, applying a 5 point Likert type of scale. The 12 items were formulated to assess major emerging environmental issues. These are limits to growth, balance of nature and anthropocentricism. The statements of the NEP (New Environmental Paradigm) are listed below.

Table3.2 The New Environmental Paradigm

Item	NEP Statements
1	We are approaching the limit of the number of people the earth can support
2	The balance of nature is very delicate and easily upset
3	Humans have the right to modify the natural environment to suit their needs
4	Mankind was created to rule over the rest of nature
5	When humans interfere with nature it often produces disastrous consequences
6	Plants and animals exist primarily to be used by humans
7	To maintain a healthy economy we will have to develop a "steady state" economy where industrial growth is controlled
8	Humans must live in harmony with nature in order to survive
9	The earth is like a spaceship with only limited room and resources
10	Humans need not adapt to the natural environment because they can remake it to suit their needs
11	There are limits to growth beyond which our industrial society can not expand
12	Mankind is severely abusing the environment

3.3. Behavioral Intentions Constructs and Specifications

Behavioral intentions measure respondents' positive values. This study grounds on Stern et al constructs (1993, 1995a, 1995b). Behavioral intentions, according to the above scholars, can be measured by egoistic, social altruistic and biospheric values. The measurement also includes a score on political action and willingness to pay various taxes.

An egoistic value refers to a person's willingness to pay various environmental expenses using personal income. Social altruism expresses the effects of environment on other people. Biosphere values are acts that show concerns for other species and natural systems (Ibid)

Behavioral intentions measure bridges the social psychological theory gap which is missing in the NEP. The scale uses a 5 point Likert type of scale. The items are listed below.

Table 3.3 Behavioral Intentions Measure

1	Individuals can contribute to solving environmental problems
2	I am willing to co-operate to clean my surrounding
3	I am willing to talk to friends about the need for action to protect land degradation
4	I am willing to talk to friends about the need for action to protect the environment.
5	I am willing to contribute money for environmental protection.
6	I need to buy my own car in the future.
7	I am ready to take part in community environmental awareness creation activities
8	I am willing to take part in digging waste disposal pits
9	It is an individual's responsibility to take action against environmental pollution

Source: (Stern et al, 1995a, 1995b)

3.4 Environmental Behavior (Action) Constructs and Specifications

This study uses the General Ecological Behavior (GEB). Its construct appraises general ecological behavior by considering different ecological and pro social behaviors. Despite the difficulty of measuring behavior, the validity of GEB is promising (Kaiser et al, 1998).

The present study adopted 20 ecological behavioral items. Some of the items from the GEB are excluded because they are unfamiliar to Ethiopian way of life and others are redundant. The present study also replaced some of the items using vital Ethiopian environmental practices. Respondents are supposed to answer the questions on the bases of their practical actions frequency, having four options, which range from always to never (see Appendix F).

CHAPTER FOUR

RESEARCH DESIGN AND METHODOLOGY

In this chapter, explanation regarding the sampling procedures, instruments, trials and scoring rubrics is given.

4.1 The Respondents

First year students of Technical and Business faculties of Adama University were the target population for this study. Besides, academic staffs were inculcated in the study.

Technical and Business students are incorporated in the study for their duties are highly linked to the built and economic environment in particular and to the natural, health and physical environment in general.

Technical faculty has seven departments: Automotive, Construction, Drafting, Manufacturing, Surveying, Electronics and Wood Work Technology. These days, our cities have become automobile cities. Hence, noise and pollution are pressing problems. Automotive students are expected to play key roles in alleviating these problems. Similarly, Construction department students are supposed to be would be decision makers on the built environment. They will play a major role in the determination of land use and building style. Manufacturing students are also would be decision makers on industry production, processing and emissions. This reality holds true to other technical departments too.

Business faculty has also seven departments: Accounting (applied and teaching), Management, Economics, Office Administration, Purchasing Management, Economics and Business Administration. All of the above

departments deal with the economic environment. The fields of studies are highly linked with resource management, utilization and policy formulation. They are linked to the behavior of consumers and firms.

Needless to say, the quality of information, attitude and practices of the would be decision makers will play a pivotal role on the environment. Thus, it appears logical to examine the faculties' students' level of environmental knowledge, attitude, intention and behavior.

4.2 Sampling Procedure

From 1665 Technical and Business faculties of Adama University students, 200 subjects were selected using stratified sampling on the bases of academic stream, gender and department proportionally (see the Table below). The distribution of respondents is summarized by academic stream and gender as follows.

Table 4.1: Distribution of Survey Participants by Academic Stream and Gender

<table>
<tr><td>Variables</td><td colspan="3">N= 1665
n= 200 Proportion = .12</td></tr>
<tr><td rowspan="3">Academic Stream</td><td rowspan="2">Business</td><td rowspan="2">118 (986)</td><td>Teaching 81 (675)</td></tr>
<tr><td>Applied 37 (311)</td></tr>
<tr><td>Technical</td><td colspan="2">82 (679)</td></tr>
<tr><td rowspan="6">Gender</td><td rowspan="2">Business Teaching</td><td colspan="2">Male 56 (468)</td></tr>
<tr><td colspan="2">Female 24 (203)</td></tr>
<tr><td rowspan="2">Applied Business</td><td colspan="2">Male 13 (95)</td></tr>
<tr><td colspan="2">Female 25 (212)</td></tr>
<tr><td rowspan="2">Technical</td><td colspan="2">Male 67 (555)</td></tr>
<tr><td colspan="2">Female 15 (122)</td></tr>
</table>

Similarly, departments of each faculty were stratified proportionally as follows.

Table 4.2: Summary of Departments Involved in the Survey

Variables **I. Business**	**F→ N= 203, n= 24**	**M→ N=468,n = 56**
A. Teaching Business		
1. Accounting	2(13)	13(106)
2. Management	11(93)	18(155)
3. Office Administration	5(48)	9(73)
4. Purchasing Management	6(49)	16(134)
B.Applid,Business **F→N=95,n=13**		**M→N=212,n=25**
1. Accounting	4(32)	8(67)
2. Economics	4(27)	9(74)
3. Business Administration	5(36)	8(71)
C.Technical **F→N=122,n=15**		**M→N=555,n=67**
1. Automotive	1(8)	10(82)
2. Construction	2(18)	13(107)
3. Drafting	3(27)	8(66)
4. Electronics	1(8)	13(112)
5. Manufacturing	2(16)	8(69)
6. Surveying	3(26)	8(63)
7. Wood Technology	3(19)	7(56)

As to academic staff, 42 instructors were selected from the total population (350) using random sampling with the intention of examining their level of environmental knowledge, attitude and practice. Besides, age difference on environmental knowledge, attitude, intention and behavior between learners and academic staff were inspected.

4.3 Instruments of Data Collection and their Purposes

Tests were used as data gathering instruments. Tests on environmental knowledge, attitude, intention and behavior were developed giving due regard to Ethiopian environmental issues.

4.3.1 Knowledge Achievement Test

To investigate environmental knowledge of academic staff and students, thirty one items were developed (see the Appendix A) .The items were constructed after considering various issues (refer to Chapter 3). Besides, eleven key environmental concepts were included, adapting from Berett and Kuroda (see Chapter Three). The weight of each item is one point. Thus, the knowledge aspect is evaluated out of 42.

Then, the tests were handed over to environment experts to ensure the appropriateness of the tests. Incorporating their comments, the tests were piloted on 25 students at Adama University. The reliability of tests was measured by split half method and the result showed (r= .779) reliability (see Appendix B).

4.3.2 Attitude Inventory

A standard likert type of scale was used, adapting it from the NEP (see Chapter Three). It has been employed by researchers and its validity is confirmed by many scholars (Gwendoyn et al, 2006). Originally, the scale was developed by Dulap and Van Liere (1978). The scale applies a 5 point likert type of scale, ranging from strongly disagree to strongly agree. It was piloted using Cronbach method and the result exhibited (r= .8692) high reliability (see Appendix C).

Fifteen items were incorporated in the scale. Seven of the items communicated definite favorableness (3,4.6.10,11,14 and 15), while the

remaining ones conveyed definite unfavorableness (1,2,5,7,8,9,12 and 13).

In scoring favorable items, the alternatives were weighed going from strongly agree to strongly disagree, having 5,4,3,2,1 values. On the other hand, unfavorable items were weighted by reversing the above values. By doing so, the scores of the items were added to produce an individual's attitude scores. The maximum score of an individual is 75. A high score displays a highly favorable attitude, where as a low score manifests the opposite.

4.3.3 Intention Inventory

Likert scale was used to measure respondents' behavioral intentions. The construct was adopted from Stern et al (1993, 1995a, 1995b). The scale employs 5 point likert types of scale, ranging from strongly disagree to strongly agree. The construct was piloted using Cronbach method and the result manifested (r= .8417) high reliability (see Appendix D).

In the scale 9 items were incorporated: eight of the items were worded to show positive values; nevertheless, one of them was worded to show negative value (number 6). In scoring positive values, the alternatives were weighed going from strongly agree to strongly disagree, having 5, 4,3,2,1 values. In scoring negative value, the weight was reversed. The score of the individual is gained by adding the score of items.

4.3.4 Behavior Inventory

To appraise subjects' environmental behavior, the study used rating scale. The study adopted the General Ecological Behavior (GEB) scale. The rating scale applies a 4 point scale, ranging from always to never. Most of the items (1,4,5,6,7,9,10,11,14,15,16,17,19 and 20) were worded

in a desired manner, while the remaining ones (2.3.8.12. and 13) were phrased in an undesirable manner.

The validity of the test was tested by the scale developers and they found it promising. Besides, it was checked by experts. With regard to reliability, it was piloted using Cronbach method and the result displayed (r= .8128) high stability.

While administrating the test, participants were told to rate the items honestly and critically to avoid generosity and other types of errors. An individual's score is gained by adding the scores of the items.

4.4 Scoring Rubrics

The intent of the examination was notified on the cover page. To alleviate language barrier, students were told to ask the meanings of unfamiliar words. They were also told to finish the examination within 1½hours. Further, the weight of items was informed to test takers. Accordingly, test items were marked in line with the construct.

CHAPTER FIVE

Analysis of the Results

In this chapter analyses and interpretations of findings regarding the relationships and linear predictive powers of learners' and academic staffs' environmental knowledge, attitude , intention and practice are made . The study employs environmental knowledge, attitude, intention and behavior in a sequenced way to predict one another. In other words, the above factors are studied as a single component measure. Besides, survey results concerning environmental beliefs, issues and policy are reported.

5.1. Types of Environmental Knowledge

The NEP approach was utilized in the survey. As shown in Table 5.1, the majority of students (61%) and more than half of the academic staff (54%) supported partnership type of relationship with nature. This finding is consistent with Asian students whose response ranged from 51-61 % (Barrett and Kuroda, 2002). Interestingly, most students and nearly half of the academic staff held pro-environmental belief.

The remaining students expressed technological (18%), stewardship (12%) and dominion (8%) positions. As to instructors, 19%, 12% and 10% supported dominion, stewardship, technological positions respectively.

Table 5.1: Relationship between Man and Nature

Types of relationship	Students (%)	Staff (%)
Partnership	61	54
Dominion	6	19
Stewardship	12	12
Technological position	18	10
I don't know	3	5

5.2. Views about the Environment and Economy

Respondents were asked concerning the balance between the well being of the environment and economic growth. As Table 5.2 displays, 37% of students and 52% of academic staff made clear that it is quite possible to have both a prosperous economy and a health environment. This is a desirable view for it grounds on interactive principle. Likewise, a reasonable number of students (29%) and academic staff (38%) claimed that Ethiopia should concentrate on protecting the environment even if it means some reduction in economic growth. All in all, both academic staff and students expressed support for interactive principles and environment protection. This view conforms with the view of Japan students. In Japan 71% students indicated the need to protect the environment even if it means some reduction in economic growth (Barrett and Kuroda, 2002).

Table 5.2: Environment versus Economy Relationship

Views	Students (%)	Staff (%)
Ethiopia Should concentrate on economic growth even if it means damage to the growth environment	10	3
Ethiopia should concentrate on protecting the environment even if it means some reduction in economic growth	29	38
Economic growth is bound to be at the expense of the environment	17	7
It is quite possible to have both a prosperous economy and a healthy environment	37	52
I don't know	7	0

5.3. Awareness of Environmental Policy

Ethiopia enacted its environmental policy in 1997. It is a document which explains how to realize sustainable development. Respondents were asked the year in which the country formulated its policy. As can be seen from Table 5.3, most students (62%) and academic staff (55%) were unable to identify the year of enactment. This implies that there is a gap between policy developers and their audience. Policy makers should communicate their policy through the appropriate media.

Table 5.3: Year of Environmental Policy Formulation

Ethiopia formulated its environmental policy in	**Students (%)**	**Staff (%)**
A. 1990	7	7
B. 1993	30	21
C. 1995	21	24
D. 1997	38	45
E. 1999	4	3

5.4. Sources of Environmental Knowledge

To raise citizens' environmental knowledge, attitude and behavior, there is a need to know the right medium. Accordingly, a survey was carried out. For students, general education at school accounted for the highest response (41%) followed by radio and television (20%). A good number of students also selected special environmental courses (18%). The main information source for academic staff was general education at school (31%) followed by special environmental courses (19%). Only a fairly small percentage of academic staff (10%) selected radio and television as their source of information.

Table 5.4: Most Important Sources of Environmental Knowledge

NO	Sources	Student (%)	Staff (%)
1.	General Education at School	41	31
2.	Special Environmental Course at School	18	19
3.	Parks and Exhibitions	10	7
4.	Radio and Television	20	55
5.	Books and Magazines	5	10
6.	Parents and Friends	4	0
7.	Others	2	7

5.5 Descriptive Analysis

According to Edwards et.al (1991:271), though the intent of environmental science is to realize sustainable development, ".... environmental science cannot produce a sustainable world. It can only provide a base of knowledge relative to what must be accomplished to reach that goal". It is, thus, essential to appraise learners' and instructors' knowledge to check weather they have fertile environmental knowledge or not. To inspect whether respondents' environmental knowledge, attitude, intention and practice are rich enough, examinations were given.

While assessing environmental knowledge, conventional yardstick is applied. Candidates are expected to perform half of the questions (fifty percent). From the total of 42 items, an execution of 21 items is the minimum criterion for mastery of environmental knowledge. As Table 5.5 illustrates, the average scores of learners ($\bar{x}$ = 15.52) and academic staffs' ($\bar{x}$ = 23.33) environmental knowledge are not promising. Learners' score below average, where as academic staffs get slightly above average. Thus, the score of academic staff made known that they possess simply the minimum environmental knowledge. Otherwise, both groups lack

productive environmental knowledge ground. The result confirms the finding of Lau (1992). Nevertheless, this study fails to conform the findings of Melaku (1994).

Next, 15 items where used to evaluate respondents' environmental attitude. Seventy-five is the maximum score, indicating the most favorable attitude. On the other hand, a score of fifteen divulges the most unfavorable attitude. In between the extremes, a score of 45 notifies a neutral attitude. When we examine their scores, both students and instructors appear to have neutral attitude. Students' score ($\bar{x}$ = 43.43) and academic staffs' score ($\bar{x}$ = 45.88) are very close, informing neither favorable nor unfavorable attitude. Further, nine items were used to assess students' and instructors' environmental intention. Forty five is the maximum score, indicating optimal willingness to involve in environmental protection, while 27 is a neutral position. A score of nine, which is the least score signal lack of willingness to engage in environmental protection. Accordingly, as can be seen from Table 5.5, students' score ($\bar{x}$ = 36.02) revealed their willingness to take part in environmental protection. Nevertheless, academic staffs ($\bar{x}$ = 29.2) exhibited neutral position.

Last but not least, 20 items were used to evaluate environmental practice of examinees. Eighty is the maximum score, which demonstrate frequent environmental practice, followed by sixty, demonstrating casual environmental practice. A score of 40 communicates rare environmental practice. Finally, 20 is the minimum score, informing lack of involvement in environmental practice. Consequently, when we see learners' environmental practice ($\bar{x}$ =52.65), it falls between sometimes and rarely. As to instructors ($\bar{x}$ = 63.43), it falls nearly at sometimes in the rating scale. Both groups fail to frequent environmental practice which strengthened the conclusion of Desalegn (1998).

Table 5.5: Average Scores and Standard Deviations of Students and Academic Saff

Variables	Total Weight	Students			Academic Staff		
		Mean	Std	N	Mean	Std	N
Knowledge	42	15.52	5.08	200	23.33	4.21	42
Attitude	75	43.43	9.33	200	45.88	4.60	42
Intention	45	36.02	7.50	200	29.21	4.46	42
Practice	80	52.65	11.01	200	63.43	3.88	42

5.6 The Effect of Academic Stream on Environmental Knowledge, Attitude, Intention and Practice.

The environmental knowledge mean scores of Business and Technical students are 16.50 and 14.12 respectively. As Table 5.6 shows the ANOVA summary, academic stream brought statistically significant difference on their environmental knowledge (F_{cal} = 11.16, df = 198, P ≤.05). Similarly, the mean scores of Business and Technical students environmental intention and practice are ($\bar{x}$ = 36.91, $\bar{x}$ = 34.76) and ($\bar{x}$ = 55.4, $\bar{x}$ = 49.05) respectively. The scores revealed the existence of statistically significant difference on their intention (F_{cal} = 4.36, df = 198, P≤ 05) and practice (F_{cal} = 15.928, df = 198, P ≤ .05). Nevertheless, the result did not indicate statistically significant difference in their attitude as a function of their difference in academic stream. Hence, Business students outdid Technical students in terms of environmental knowledge, intention and practice.

Table 5.6: ANOVA Summary By Academic Stream

Variables	Sources	SS	df	MS	F_{cal}	$F_{crit.}$
Knowledge *Academic Stream	Between Groups	273.595	1	273.595	11.155	3.8416
	Within groups	4856.280	198	24.527		
	Total	5129.875	199			
Attitude *Academic Stream	Between groups	2.353	1	2.353	.027	3.8416
	Within Groups	17308.802	198	87.418		
	Total	17311.155	199			
Intention *Academic Stream	Between groups	223.778	1	223.778	4.036	3.8416
	Within groups	10977.097	198	55.440		
	Total	11200.875	199			
Practice *Academic Stream	Between groups	1797.439	1	1797.439	15.928	3.8416
	Within groups	22344.356	198	112.850		
	Total	24141.795	199			

SS- Sum of Square MS- Mean Square $P \leq 0.05$

5.7 The Impact of Sex on Environmental Knowledge, Attitude, Intention and Practice.

Table 5.7 displays that the difference between the mean squares of male and female students' environmental knowledge (F_{cal} = 16.114, df = 198, P ≤ 05) is not a result of sampling error. It shows the existence of statistically significant difference. However, the mean scores of male and female students did not show statistically significant differences for their attitude (F_{cal} = 3.954, df = 198, P > .05), intention (F_{cal} = 225, df = 198, P >. 05) and practice (F_{cal} = 1.53, df = 198, P> .05) as a result of their difference in their sex. Thus, males are more knowledgeable than females

which reinforced the report of Tarrent and Cordel (1997) and Stern et al. (1993).

Table 5.7 ANOVA Summary By Sex

Variables	Sources	SS	df	MS	F_{cal}	F_{crit}
Knowledge	Between Groups	386.059	1	386.059		
*Sex	Within groups	4743.816	198	23.959	16.114	3.8416
	Total	5129.875	199			
Attitude	Between groups	308.616	1	308.616		
* Sex	Within Groups	17002.539	198	85.871	3.594	3.8416
	Total	17311.155	199			
Intention	Between groups	12.715	1	12.715		
* Sex	Within groups	11188.160	198	56.506	.225	3.8416
	Total	11200.875	199			
Practice	Between groups	18.644	1	18.644		
* Sex	Within groups	24123.151	198	121.834	.153	3.8416
	Total	24141.795	199			

$P \leq 0.05$

5.8 The Influence of Residence on Environmental Knowledge, Attitude, Intention and Practice

From Table 5.8 below, it is clear that the difference between urban and rural environmental knowledge (F_{cal} = 5.957, df = 198, P ≤ 05) is statistically significant. By contrast, the variations in their mean squares of environmental attitude (F_{cal} = .156, df = 198, P>05) intention (F_{cal} = .718,df = 198, P> .05) and practice (F_{cal} = .933, df = 198, P> .05) are not statistically significant as a result of their residence. Hence, rural students out played their counterparts in environmental knowledge. This finding corroborated the claim of Leftridge and James (1980).

Table 5.8 ANOVA Summary by Residence

Variables	Sources	SS	df	MS	F_{cal}	F_{crit}
Knowledge	Between Groups	149.834	1	149.834		
*Residence	Within groups	4980.041	198	25.15	5.957	3.8416
	Total	5129.875	199			
Attitude	Between groups	13.652	1	13.652		
* Residence	Within Groups	17297.503	198	87.361	.156	3.8416
	Total	17311.155	199			
Intention	Between groups	40.447	1	40.447		
* Residence	Within groups	11160.428	198	56.366	.718	3.8416
	Total	11200.875	199			
Practice	Between groups	113.232	1	113.232		
* Residence	Within groups	24028.563	198	121.356	.933	3.8416
	Total	24141.795	199			

$P \leq 0.05$

5.9 The Impact of Religion on Environmental Knowledge, Attitude, Intention and Practice

Table 5.9 discloses the comparison of students' mean squares on environmental knowledge, attitude, intention and practice on the bases of their religious affiliation. The findings showed no actual statistically significant difference among the mean squares of learners in their environmental knowledge, attitude, intention and practice due to their differences in the categories of religions considered in the study. In other words, environmental knowledge, attitude, intention and practice are not affected by religious affiliation.

Table 5.9 ANOVA Summary by Religion

Variables	Sources	SS	df	MS	F_{cal}	F_{crit}
Knowledge	Between	75.748	3	25.249	.979	3.8416
* Religion	Groups	34.156	1	34.156	1.325	3.8416
		41.592	2	20.796	.806	3.8416
	Within groups	5054.127	196	25.786		
	Total	5129.875	199			
Attitude	Between	243.679	3	81.226	.933	3.8416
* Religion	Groups	7.032	1	7.032	.081	3.8416
		236646	2	118.323	1.359	3.8416
	Within Groups	17067.476	196	87.079		
	Total	17311.155	199			
Intention	Between	137.136	3	45.712	.810	3.8416
* Religion	Groups	45.741	1	45.741	.810	3.8416
		91.395	2	45.698	.810	3.8416
	Within groups	11063.739	196	56.448		
	Total	11200.875	199			
Practice	Between	81.445	3	27.148	.221	3.8416
* Religion	Groups	21.442	1	21.442	.175	3.8416
		60.003	2	30.001	.244	3.8416
	Within groups	24060.350	196	122.757		
	Total	24141.795	199			

$P \leq 0.05$

5.10 The Effect of Age on Environmental Knowledge, Attitude, Intention and Practice

Table 5.10 depicts the comparison of mean score of students' environmental knowledge ($\bar{x}$ = 15.52) with the mean score of academic staff ($\bar{x}$ = 23.33). Since the calculated value (F_{cal} = 86.746) is greater than the table value (F_{crit} = 3.8146), the null hypothesis is rejected. In other words, it exhibited statistically significant difference (F_{cal} = 86.746, df = 240, P≤.05). Likewise, the mean score of students' environmental intention ($\bar{X}$ = 36.02) and practice ($\bar{x}$ = 52.65) and the mean score of academic staffs' intention ($\bar{x}$ = 29.21) and practice ($\bar{x}$ = 63.43) showed

statistically significant variations as shown by the summary of variance analysis (F_{cal} = 32.128, df = 240, P≤ 05) for intention and (F_{cal} = 39.128, df = 240, P≤.05) for practice respectively as a result of their age. However, no statistically significant evidence was found concerning the difference in the attitude of both students and academic staff due to their age difference. Adults outperformed youngsters in terms of environmental knowledge and practice, but youngsters outshined their counterparts in environmental intention. This result supported the report of Arcury (1990).

5.10 ANOVA Summary By Age

variables	Sources	SS	df	MS	F_{cal}	F_{crit}
Knowledge	Between Groups	2116.316	1	2116.316		
*Age	Within groups	5855.208	240	24.397	86.746	3.8416
	Total	7971.525	241			
Attitude	Between groups	207.663	1	207.663		
* Age	Within Groups	18179.560	240	75.748	2.741	3.8416
	Total	18387.223	241			
Intention	Between groups	1610.087	1	1610.087		
	Within groups	12015.946	240	50.066	32.159	3.8416
* Age	Total	13626.033	241			
Intention	Between groups	4036.353	1	4036.353		
* Age	Within groups	24758.081	240	103.159	39.128	3.8416
	Total	28794.434	241			

P≤0.05

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5.11: Bivariate Correlations of Students

Table 5.8 shows the bivariate correlations of learners' environmental knowledge, attitude, intention and practice. The bivariate correlations depicted anticipated patterns. As can be seen from Table 5.8 learners' environmental knowledge, attitude, intention and practice are significantly correlated to one another, displaying slight differences in

terms of moderate positive relationships which range between (r =.50) and (r =.60). The relationship between attitude and practice (r =.716) exhibited strong positive relationship, followed by environmental knowledge and attitude (r=.605). The strong relation ship between environmental attitude and practice backed up the assertion that there is moderate association between environmental attitude and behaviour (Weigel et al., 1974; Hines et al.,1977; Sia et al., 1985/6, Wilhiams, 1991).

Table 5.11: Student Bivarate Correlations of the Variables

Variables	Knowledge	Attitude	Intention	Practice
Knowledge	1.00			
Attitude	.605**	1.00		
Intention	.545**	.581**	1.00	
Practice	.568**	.716**	.625**	1.00

** Correlation significant at 0.01 level (2-tailed) N= 200

5.12. Bivariate Correlations of Academic Staff

Table 5.9 displays the bivariate correlations of academic staffs' environmental knowledge, attitude, intention and practice. As can be observed from Table 5.9, all variables are significantly correlated, showing differences in terms of association. The relationship between intention and attitude (r =.398) and intention and practice (r = .401) are almost weak. On the other hand, the strength between knowledge and attitude (r = .744) and knowledge and practice (r = .794) appear strong. The relationship between intention and practice is consistent with the result of Van Liere and Dunlap (1981).

Table 5.12: Bivarate Correlations of Academic Staff

Variables	Knowledge	Attitude	Intention	Practice
Knowledge	1.00			
Attitude	.744**	1.00		
Intention	.632**	.398**	1.00	
Practice	.794**	.506**	.401**	1.00

** Correlation Significant at 0.01 level (2-tailed) N= 42

5.13 Direct Relationship

5.13.1 Learners' Environmental Knowledge as Predictor of Attitude, Intention and Behavior.

Learners' environmental attitude, intention and practice are all regressed on their environmental knowledge. The results disclosed that environmental knowledge was a significant positive predicator of attitude (β= .605, P≤ .05) and practice (β= .129, P≤ .05). Thus, students' environmental knowledge accounted for 37%, 9%, and 2.1% of the variations of students' attitude, intention and practice.

Similarly, students attitude had significant positive predictive effect on their intention (β= .396, P≤ .05) and practice (β= .477, P≤ .05) respectively. Hence, attitude accounted for 14% and 23% of the variance in students' environmental intention and practice.

On top of these, students' environmental practice was regressed on their intention. The result showed that environmental intention had positive predictive effect on practice (β= .29, P≤ .05) .As a result, 10% of the variations in the practice of students were accounted for by their respective intention.

Table: 5.13.1: Learners' Environmental knowledge as Predictor of Attitude, Intention and Practice

Variables	Attitude		Intention		Practice	
Knowledge	β	R^2	β	R^2	β	R^2
	.605	.37	.305	.09	.129	.02
Attitude			.396	.14	.477	.23
Intention					.29	.10

** P≤ .05

5.13. 2 Academic Staff Environmental Knowledge as Predictor of Attitude, Intention and Behavior.

Environmental attitude, intention and practice of the academic staff are all regressed on their environmental knowledge. Like the results of students, environmental knowledge was a significant positive predictor of attitude (β= .744, P≤ .05), intention (β= .632, P≤ .05) and practice (β= .794, P≤ .05). Consequently, academic staffs' environmental knowledge accounted for 55%, 39% and 63% of the change in the attitude, intention and practice respectively.

When academic staffs' intention and practice are regressed on their attitude, the results uncovered that attitude was a significant positive predicator of their environmental intention (β= .398, P≤ .05) and practice (β= .506, P≤ .05) respectively. The proportion of academic staffs' variation in their intention (16%) and practice (26%) were explained by the variation in their attitude.

Finally, staffs' practice was regressed on their intention. The result displayed that environmental intention had positive predictive effect on practice (β= .401, P≤ .05). 16% of the variations in the practice of staff were accounted for by their intention.

Table 5.13.3: Academic Staffs' Environmental Knowledge as Predictor of Attitude, Intention and Practice.

Variables	Attitude		Intention		Practice	
Knowledge	β	R^2	β	R^2	β	R^2
	.744	.55	.632	.39	.794	.63
Attitude			.398	.16	.506	.26
Intention					.401	.16

** $P \leq .05$

CHAPTER SIX

Discussions

The objective of environmental education is to change individuals' behavior towards an ecological friendly direction. Research findings are highly controversial regarding the relationships of environmental knowledge, attitude, intention and behavior. The controversy holds true too to factors which affects environmental knowledge, attitude, intention and behavior.

To appreciate the controversies and indicate possible model, the study employs environmental knowledge, attitude, intention and behavior in a sequenced way to predict one another. In other words, the above factors are studied as a single component measure. Linear relationship, however, has it own drawbacks: practically relations are not always straight, but it is the initial ground to carry out further investigation.

6.1 Environmental Knowledge, Attitude, Intention and Practice

Environmental knowledge stems from wider experiences and basic understanding of environmental issues (Roa and Reddy, 2000). Interestingly, most students and academic staff supported an integrated approach which is in line with Asian students' environmental knowledge (Barrett and Kuroda, 2000). Regarding the balance between the well being of the environment and economic growth, both groups held desirable view: growth should take into account environmental protection.

Environmental ideologies originate from existing knowledge, attitude and behavior. The levels of candidates' environmental score can communicate people's lifestyles. When we examine the result, it is not promising.

Candidates' score appears low: students fail to answer half of the items. Similarly, academic staffs are able to answer only half of the answers. Thus, both students and academic staffs' appear to have improper environmental perspectives. The above finding collaborates with the result of Roth and Perez (1989). They found that environmental knowledge of twelfth grade is low. This holds true to Nigerian students score too (Mansary and Ajiboye, 1997). This happens probably due to lack of wider experiences and basic understanding of environmental issues.

Next, the results of both students and instructors environmental attitude is neutral. In fact, there is a slight difference between the scores of students and academic staffs. The figures indicate average positions which fall in the middle of the score, pinpointing that candidates are neutral regarding the various attitudinal environmental issues. It is, thus, evident that subjects fail to demonstrate favorable attitudes towards the environment. The above finding confirms the study of Roth and Perez (1989).

Further, the scores of students' environmental intention display their willingness to take part in various environmental protection issues. By contrast, the mean score of academic staff makes clear that instructors are undecided to engage in environmental protection activities. The undecided response of instructors may result in retarding effect on the necessary action that need to be taken to protect the environment.

Last but not Least, the mean score of students' environmental practice falls in the rating score between rarely and sometimes. The mean score of academic staff falls close to sometimes. Hence, both groups fail to have the habit of frequenting environmental practices. In comparison, the engagement of students is low.

All in all, both groups do not manifest satisfactory result in their environmental knowledge and attitude. Consequently, their actual decision making appears infrequent. This is probably because their responses to the environment grounds on poor reasoning.

6.2 Factors Influencing Students and Academic Staffs Knowledge, Attitude and Behavior

Academic stream, sex, residence, religion, level of education and age influence environmental knowledge, attitude and behavior. (Akililu, 2006; Desalegn, 1998).

6.2.1 Academic Stream

The present study compares Business and Technical students' results of environmental knowledge, attitude and practice. The findings evince that there is significant difference in their achievement in terms of environmental knowledge, intention and practice. With regard to environmental attitude, the result fails to show significant difference. As to environmental knowledge, intention and practice, Business Students achieve better results than their counterparts.

The above findings appear to disconfirm the study of Gillfford et. al (1982). For them, natural science students outperform social science students in their environmental knowledge.

6.2.2 Sex

The present study discloses that males are more knowledgeable than females. In fact, there is by and large accord regarding the relation between sex and environmental knowledge, attitude and practice: males turn out to be more knowledgeable than females (Batterham et al,

1992).By contrast, Alaimo and Doran (1978) found no relationship between sex and environmental values.

6.2.3 Residence

As a result of their residence, statistically significant difference is shown for environmental knowledge. For the remaining dependent variables, no significant difference was shown. Rural students outdo urban students. This may be put down to the proximity of rural students to various environmental issues as a result of their agricultural lifestyles.

The above result strengthened the findings of Leftridge and James (1980). They reported that rural students were more perceptive than urban students. The outperformance of rural students over their urban classmates was also proved by Hausbeck et.al (1992).

6.2.4 Religion

The result makes clear that there is no significant difference in students' environmental knowledge, attitude, intention and behavior due to their religious affiliations. This finding is not consistent with the study of Cowtan (2006). Cowtan (2006:9) found that "Christians are more anthropocentric than non-Christians. Christians tend to rate human issues as more important than environmental issues when compared with non christians". Other studies also classify Christianity with the "dominion thesis" as a result of which Christians are considered as not having positive attitudes towards nature.

6.2.5 The Confounding Effect of Age

Age is one of the inconsistent variables, having low effect on environmental knowledge, attitude and practice (Akililu Dalelo, 2004). The present study, nevertheless, manifest significant difference between the youngsters and the adolescents in terms of environmental

knowledge, intention and practice. The difference does not include attitude.

6.3 Direct Relationships

Despite differences in strength, all the variables show positive relationship. For example, the result of students' environmental knowledge and attitude exhibit moderate positive relationship. For academic staff it shows strong positive relationships. Besides, environmental knowledge predicts learners and staffs' environmental attitude. This consolidates the claim that environmental knowledge leads to favorable attitude towards the environment for knowledge is a pre-condition for favorable attitude (Cohen, 1978; Fortner, 1978).

Similarly, there is a positive relationship between environmental attitude and intention for both groups. Nevertheless, the nature of strength differ: it is moderate for students but weak for academic staff. Interestingly, for both groups, environmental attitude predicts their environmental intention, having differences in terms of explanation power .With regard to knowledge, academic staffs show better performance. Nevertheless their knowledge does not produce strong relationship with attitude and intention. This leads to the notion that knowledge of ecology does not necessarily produce favorable attitude.

Furthermore, there is moderate positive relationship between environmental intention and practice for students. Likewise, there is positive relationship between academic staffs' environmental knowledge and practice; but the association is weak. Environmental intention predicts students and academic staffs' environmental practice which is consistent with the claim that ecological behaviour intention is strongly related to ecological behavior (Maloney and Ward, 1973; Maloney et .al,

1975; Schahn and Holzer, 1990a, 1990b; Lansana, 1992; Aughgen and Neuberger, 1994).

Finally, knowledge predicts both groups' attitude, intention and practice. However, the explanation power of knowledge differs. For students it is normal (2%). For academic staffs it is too high (63%). The findings are conflicting. Under normal circumstance, the relationship between knowledge and practice is expected to be low. This holds true too to its explanation power. It explains 63% probably because the knowledge items incorporated the what and how something can be done. In other words, the explanation power becomes too high for the items included knowledge about ecological behavior, not being restricted to factual knowledge about the environment (Levenson, 1974; Sia et. al, 1985).

CHAPTER SEVEN

Summary, Conclusions and Recommendations

7.1. Summary and Conclusions

The study was intended to identify the types, levels, relationships and predictive powers of learners, and academic staffs' environmental knowledge, attitude, intention and behavior. The study employed environmental knowledge, attitude, intention and behavior in a linear manner to predict one another.

To realize the above objectives, pertinent review literature related to environmental issues, problems, theories, education and research findings were made. To procure data, 200 Adama University students were selected using stratified sampling on the bases of academic stream, gender and department. In addition, 42 instructors were selected based on simple random sampling.

To analyze the data, percentage, mean, standard deviation, ANOVA, intercorrelation matrix, T-test, F-test and linear regression were applied. The results of the analyses communicate that

1. Most students and nearly half of the academic staff supported an interactive type of environmental knowledge.

2. Both academic staffs and students pointed out the need to protect the environment, balancing economic growth with the well being of the environment.

3. Most students and academic staffs fail to know Ethiopian environmental policy year of enactment.

4. According to the respondents, the major sources of environmental knowledge are general education at school and radio and television.

5. The achievement of learners and academic staffs' environmental knowledge is not promising. Their environmental attitude is not favorable .It is neutral. Interestingly, students are willing to engage in various environmental protection issues. On the other hand, instructors are undecided to take part in environmental protection activities.

6. Both groups experience an infrequent habit of environmental practice activities.

7. Compared to Technical students, Business students show better performance regarding environmental knowledge, intention and practice. When it comes to sex, males were found to be more knowledgeable than females.
8. Rural students are more knowledgeable than urban students. Nevertheless, no difference is shown as a result of respondents' religious affiliation for all the variables.

9. By and large, the variables display significant positive relationships, having differences in strength. For example, the relationship between students' environmental attitude and practice shows strong relationship, preceded by moderate relationship of their environmental intention and practice. Similarly, there is a strong tie between instructors' environmental knowledge and practice and environmental knowledge and attitude.

10. Learners' environmental knowledge predicts their attitude, intention and practice. Likewise, their attitude predicts their intention and practice. On top of these, their environmental intention predicts their practice. The above linear prediction works true to instructors too. Thus, respondents who have high level of environmental knowledge are likely to have high environmental attitude, intention and practice or the vice versa.

7.2. Recommendations

The following possible solutions are forwarded based on the nature of the findings and conclusions.

1. The communities of higher learning are decision makers at various levels. The study reveal that they do not possess promising environmental knowledge, favorable attitude and frequent environmental practice. Thus, it is imperative to arm them with indepth understanding of environmental issues and coping mechanisms. The education system should impart an integrated and holistic approach. The coping strategies should not simply be restricted to factual information but skills which can be acquired through self exploration, self instruction and exposure to various practical environmental problem experiences. In short, the strategies should enable to tackle pressing Ethiopian environmental problems.

2. In Ethiopia, environmental problems cannot be solved by few groups or experts. Unless people from all walks of life have deep understanding, involving in various decision making processes, the problems will stay with us. Hence, there is a need to ensure that everyone is equipped with the required environmental knowledge,

attitude and practice, reaching people through formal, non formal and informal schooling systems.

3. Most people are unfamiliar with environmental policies. In fact, policies cast best beliefs, values and practices with the view of changing nation's environmental perspectives positively. These efficient inputs should, thus, be communicated effectively, using all the available media optimally that the nation uses.

4. To change the existing reality, environment experts should probe the most eclectic environmental approach and give training to higher learning academic staff in particular and to the community in general. Universities can serve as agents of change and models provided that their academic staffs possess quality knowledge, skills and capacities in relation to sustainable development so that they in turn instill their wisdom in the mind of students through their teachings, trainings and services.

5. Foreign driven environmental experiences can supplement indigenous knowledge. Otherwise, they cannot be full fledged solutions. Local researches in the field of environment are very scanty. Consequently, it seems imperative to carry out a lot of research in how to apply indigenous knowledge to address the existing problems.

6. The study made clear that there is a linear relationship among the variables which implies the need to treat environmental knowledge ,attitude and practice in an integrated and balanced manner.

Appendix F: Environmental Behavior Measures

1	How often do you through rubbish when nobody is watching?
2	How often do you keep papers, which are printed on one side in order to write on the other side?
3	How often do you visit parks?
4	How often do you turn of the light in rooms, which are not being used?
5	How often do you plant trees or flowers on a yearly bases?
6	How often do you talk about issues related to the environment?
7	How often do you point out to some one his/her environmental unfriendly behavior?
8	How often do you use plastic during shopping?
9	How often do you reuse items such as glass bottles?
10	How often do you involve in soil protection activities?
11	How often do you talk about land degradation?
12	How often do you wash dirty clothes without rewashing?
13	How often do you use chemical insecticides in your home to kill insects?
14	How often do you offer your seat to an elderly or disabled person in a crowded bus?
15	How often do you bring back unused medicine to the pharmacy?
16	How often do you collect and recycle used paper?
17	How often do you go to an exhibition concerning the environment when there is a public exhibition?
18	How often do you put dead batteries in the garbage?
19	How often do you buy milk in returnable bottles?
20	How often do you contribute money to environmental organizations?

Sources (Adopted from Kaiser et al, 1999).

REFERENCES

Akililu Amsalu.(2001). "Natural Resource Management in Ethiopia: Making Good Use of Indigenous knowledge."Vol. 2(3).

Akililu Daleo .(2006) "Principles and Practice of Environmental Education: Focus on Ethiopia" Unpublished Teaching Material, Addis Ababa University.

_____ .(1998). "Educators View about the Use and Protection of Natural Resources in Ethiopia: The Case of Teachers and School Administration .The Ethiopian Journal of Education. Vol. **XVII.** Number 2.

Alaimo, S .J, and R. L. Doran.(1978). "A Study of Factors Influencing Environmental Values in Junior and Senior High School Students." Studies in Educational Evaluation. Vol. **12**(1).

Alebel B. and Dawit W. (2006). " Integrated Solid waste Management in Addis Ababa" In Proceedings of the Third International Conference on the Ethiopian Economy. Volume II.

Amelang, M, Tepe, K, Vagt , G. and W.Wendt. (1977). "Report about some Developmental Steps of an Environmental Concern Scale." Diagnostica .**23**,86-88

Arbuthnot, J.(1977). "The Roles of Attitudinal and Personality Variables in the Prediction of Environmental Behavior and Knowledge". Environment and Behavior . **9**,217-232.

Arcury, T.(1990)."Environmental Attitude and Environmental Knowledge" Human Organization. **13**(3).(1987) "Public Environmental Knowledge . A Statewide Survey." Journal of Environmental Education.

Asres W/Ghiorgis . (2002). " Overview of Energy Status and Trends in Ethiopia". In Proceedings of Energy Conference 2002 UNCC , Addis Ababa.

Auhagen, A.E. and K. Neuberger. (1994) "Responsibility toward Environment: A Study of Ecological Concerned Behavior" Gruppendjnamik . **26**, 3/9-332.

Azene Bekele Tessema .(2001). "Status and Dynamics of Natural Resources in Ethiopia". In Taye Assefa (ed). Food Security through Sustainable land Use . Policy on Institutional Land Tenure and Extension Issues in Ethiopia NOVIB Partners, Forum on Sustainable Land Use. Addis Ababa.

Barret,B and A. Kuroda.(2002)."Ecological Modernization, Environmental Knowledge and Societal Change, Attitudes and Behavior of Young People in Japan". International Research in Geographical and Environmental Education.

Batterham, D. et al.(1996). "Kids, Cars and Conservation: Children's Ideas about the Environmental Impact of Motor Vehicles" International Journal of Science Education. Vol. **18**(3).

Befekadu, D and Berhanu N. (2000). The Ethiopian Economic Association: Second Annual Report on the Ethiopian Economy, Addis Ababa.

Beletu M and Yosef B.(1990). A Look at the Activities of the Environmental Education Project in Ethiopia . Addis Ababa: MOE.

Bohl, W.B.(1976)." A Survey of Cognitive and Affective Components of Selected Environmentally Related Attitudes of Tenth and Twelfth Grade Students in Six Midwestern, Four South western and Twelve Plains and Mountains States" Unpublished Doctoral Dissertation. The Ohio State University.

Bookchin, L.(1987). " Deep Ecology: A Challenge for the Ecology Movement". Green Perspectives, News letter of the Green Project Program.

Brookfield , H.C.(1969) "On the Environment as Perceived". Progress in Geography **1**,51-80

Buttel, F. and H. Flinn. (1978). " Environmental Sociology: A New Paradigm?" The American Sociologist Vol. **13**-252-256.

ADDIS ABABA UNIVERSITY
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Chapman, G.P. (1974). "Perception and Regulation: A Case Study of Farmers in Bihar." Transactions of the Institute of British Geographers **62**,71 93.

Cortes, L.P.(1991). A Survey of the Environmental Knowledge, Comprehension, and Responsibility, and Interest of the Secondary Level Students and Teachers in the Philippines. New York: Garland Publishing .

Cowtan, K .(2006). "The Impact of Environmental Ethics on Christian Ethics".

Cullen.I.G.(1976). " Human Geography, Regional Service, and the Study of Individual Behavior" Environment and Planning. A8,397-409.

Dulap, R. and D. Val Liere .(1978). "The New Environmental Paradigm" Journal of Environmental Education. **9**(Summer) 10-19.

Desalegn Fufa. (1998). "A Study of the Extent to Which Senior Secondary School Students Practice Disseminating Environmental Education to the Surrounding Community with Particular Reference to Grade Eleven Students in East Wellega Zone". Unpublished M.A. Thesis , Addis Ababa University .

Desalegn Mesfin.(2003). " Global Environmental Issues and Impacts on Ethiopia". Environment and Environmental Change in Ethiopia . Forum for Social Science Studies. Number **2**

Dispoto, R.G.(1977)."Interrelationships among Measures of Environmental Activity, Emotionality, and Knowledge." Educational and Psychological Measurement .**37,** 451-459.

Dougherty, K. and F. Hauuack.(1990). Education and Society. San Diego: Harconrt Brace Jovanovich ,Inc

Easter, P. and T. Mondemaker.(1993). "Socialization of Environmental Policy Objectives: Tools for Environmental Marketing." In The Environment Towards a Sustainable Future . Boston: Klwer Academic publishers.

Edwards ,C. et al . (1991). Human Ecology Interactions of Man with his Environments . Washington : Hunt Publishing Company.

EEA (The Ethiopian Economic Association). Annual Report on the Ethiopian Economy (ed. Befekadu D. and Berhanu N.) Vol. 1 1999/2000. Addis Ababa.

Ermias Bekele .(2003). "Causes and Consequences of Environmental Degradation in Ethiopia." Environment and Environmental change in Ethiopia Forum for Social Science Studies. Number 1.

ESSS(Ethiopian Soil Science Society).(1998). " Over 15 Million Birr Needed to Restore 1.5 Billion Tons of Ethiopian Soil. Addis Tribune,06-03-98 Addis Ababa.

Eyers, V.G. (1975)."Environmental Knowledge and Beliefs among Tenth Grade Students in Australia". Unpublished Doctoral Dissertation , Oregon State University.

Fassil G.K.(2005). Enough with Famines in Ethiopia. Addis Ababa: Commercial Printing Enterprise.

FDRE(Federal Democratic of Ethiopian).(1997). Environmental Policy of Ethiopia. Environmental Protection Authority in Collaboration with Ministry of Economic Development and Cooperation, Addis Ababa.

Fuhrer,V and S. Wolfing.(1997). From the Social Basis of Environmental Concern to Responsible Ecological Action: The Social Psychological Dimension of Environmental Problems. Bern, Switzerland: Huber.

Gamba, R.and.J. Oskanpns.(1994). "Factors Influencing Community Residents' Participation in Commingled Curbside Recycling Programs". Environment and Behavior. **26**,331-335.

Gebeyehu W, Yosef B. and M. Gronvall . (1992). The Environmental Education Project of Ethiopia: Six Years of Experiences as a Pilot Project. Addis Ababa: MOE.

Gifford, R.(1982). "Individual Differences in Environmental Attitudes" The Journal of Environmental Education .Vol. **14**(2).

Gill R. (1986). "A Textbook of Christian Ethics." T and T Clarke Ltd: Edinburgh.

Gillory, J.M. (2000). Justice and Nature: Kantian Philosophy, Environmental Policy and the Law. Washington: Georgetown University Press.

Golledge, R.G and G. Rushton, (1984). "A Review of Analytic Behavioral Research in Geography." In Herbert, D.T. Johnston, R.J (eds) Geography and the Urban Environment . Vol. **6** PP.1-43.

Hajnal, A. and I. Kiss.(1988). " System Approach to Planning Integrated Development." In Innovative Approaches to Development Planning , Social Economic Studies . Paris Imprimerie: Duculot.

Harper , C.L. (1996).Environment and Society: Human Perspectives on Environmental Issues. Prentice Hall.

Hines ,J.M.et al, (1986 87) . "Analysis and Synthesis of Research on Responsible Environmental Behavior: A Meta Analysis." Journal of Environmental Education. **18**,1-8 .

Hurmi, H.(1987). "Erosion Productivity, Conservation Systems in Ethiopia". In Proceedings of the Fourth International Conference on Soil Conservation. Maracy: Venezuela.

Inglehart, R.(1995). "Public Support for Environmental Protection. Objective Problems and Subjective Values in 43 Societies." Political Science and Politics. **28,**57-72.

Ivn, C., Englee ,K. and K. Chuan .(1998). "A Survey of Environmental Knowledge , Attitudes and Behavior of Students in Singapore." International Research in Geographical and Environmental Education. Vol. **7**(3).

Kaiser, F.G, Wolfing, S. and V. Fuhrer. (1999). "Environmental Attitude and Ecological Behavior". Journal of Environmental Psychology. Vol. **19**(1-9).

Kemp, D.(1990). Global Environmental Issues: A Climatologically Approach . Bristol: MacKay's of Chatham PLC.

Kockelkoran, W.et al. (1993). "Environmental Policy in Transformation: A Philosophical Approach." In The Environment Towards A Sustainable Future . Boston: Klwer Academic publishers.

Konemund, T.(2002). "The Household Energy Crisis in Ethiopia: A Possible Way Out". In Proceedings of Energy Conference 2002. UNCC, Addis Ababa.

Lansana, F.M.(1992). "Distinguishing Potential Recycles from Non Recyclers: A Basis for Developing Recycling Strategies". Journal of Environmental Education. **23**,16-23.

Lau, T.(1992). "Environmental Issues in Singapore Student Awareness" Unpublished Academic Exercise. Department of Geography, National University of Singapore.

Leftridge, A. and R.K. James.(1980). "A study of the Perceptions of Environmental Issues of Urban and Rural High School Students". The Journal of Environmental Education. Vol. **12**(1).

Levenson, H. (1974). "Ecological Knowledge and Perception of Environmental Modifiability." American Psychologist. **29**,274-275.

List, P.C.(1993).Radical Environmentalism: Philosophy and Tactics . Belmont : Wadswoarth Publishing Company.

Lynne,G.D. and H.R. Rola .(1988). "Improving Attitude, Behavior Prediction Models with Economic Variables: Farmers` Actions toward Soil Conservation" Journal of Social Psychology. **128**,19-28.

MacNail,J.(1989). "Strategies for Sustainable Economic Development". In Managing Planet Earth. New York: W.H. Freeman and Company.

Maloney .M.P.et al.(1975). "Psychology in Action: A Revised Scale for the Measurement of Ecological Attitudes and knowledge" . American Psychologist .**30,** 787.90.

Maloney , M.P. and M.P. Ward .(1973). "Ecology: Let's Hear form the People: An Objective Scale for the Measurement of Ecological Attitudes and Knowledge." American Psychologist. **28**,583-586

Manning , S. (1992. "A Study of Student Environmental Knowledge and Attitudes in Selected High Schools in the Permain Basin Region of Texas." Unpublished Doctoral, University of North Texas.

Mansaray, A and J.O. Ajiboye.(1997). "Environmental Education and Nigerian Student Knowledge, Attitudes and Practices (KAP), Implications for Curriculum Development." Vol. **16**(3).

McGuiness, J.Jones, A.P and Cole (1977). "Attitudinal Correlates of Recycling Behavior." Journal of Applied Psychology. **62**,376-354.

Melaku Girma. (1994). "An Investigation of Environmental Education into Social Studies Courses in Some Selected Teacher Training Institutes (T.T.ls)." Unpublished M.A. Thesis, Addis Ababa University.

Miller, G. (1992). Living in the Environment: An Introduction to Environmental Science. California : Wadsworth Publishing Company

Ministry of Education.(2005a). Geography: Grade 9. Addis Ababa: Educational Materials Production and Distribution Agency.

_____ (2005b). Geography Grade 10 .Addis Ababa: Educational Materials Production and Distribution Agency.

_____.(2005c). Geography Grade 11. Addis Ababa: Educational Agency.

Mohai, P. and B.W.Twight.(1987). "Age and Environmentalism: An Elaboration of the Butter Model Using. National Survey Evidence" Social Science Quarterly.

Moore, G.T.(1979) . "Knowing about Environmental Knowing: The Current State of Theory and Research on Environmental Cognition". Environment and Behavior. **55**,33-70.

Nonaka, I, Toyama, R and N. Konno. (2002). " SECI Ba and Leadership a Unified Model of Dynamic Knowledge Creation". In Managing Knowledge: An Essential Reader . London: SAGE Publications Ltd.

Odum, E.(1993). Energy and Our Endangered Llife Support Systems. (2nd ed). Sunderland: Mass Sinauer Assoc .

Oskamp, S. Harrington, M.J. Edwards T.C, Sherwood, D.L., Okadal, S.M. and Swanson, D.C. (1991). "Factors Influencing Household Recycling Behavior." Environment and Behavior .**23**,494-519.

Ostman, N.E. and J.H. Parker.(1987). "Impact of Education, Age, Newspapers, and Television on Environmental Knowledge, Concerns, and Behaviors." The Journal of Environmental Education . Vol. **19**(1).

Perkes, A.C. (1973). " A Survey of Environmental Knowledge and Attitudes of Tenth and Twerth Grade Students from Five Great Lakes and Six for Western States". Unpublished Doctoral Dissertation, The Ohio State University.

Ramsey, C and R.E. Rickson. (1976). "Environmental Knowledge and Attitudes". Journal of Environmental Education. **25**(3).

Rao, V.K. and R.S Reddy.(2005). Environmental Education. Delhi: Roshan Offset Printers.

Regnier, M.(2003). "Sustainability as Knowledge for Action". International Student Organization for Sustainable Economics and Development.

Roth, R . E. and D, Perez. (1989). " Twelfth Grade Students Knowledge and Attitudes toward the Environment in the Domimcan Republic: An Assessment". Journal of Environmental Education **20**(3).

Schahn, J. and. E Holzer. (1990a)."Development Validation and Application of an Environmental Concern Scale." Diagnostic Psychologie **11**,185-204. (1990 b).

_____. (1990b). "Studies of Individual Environmental Concern. The Role of Knowledge, Gender, and Background Variables". Environment and Behavior. **22**,239-260.

Sia, A.P. et al .(1985 86). "Selected Predictors of Responsible Environmental Behavior: An Analysis." Journal of Environmental Education .**17**,31-40.

Smith, P. (1997). "Environmental Ethics." New Jersey: Paulist Press

Smith-Sebasto N.J and R.W Further.(1994). "The Environmental Action Internal Control Index."Journal of Environmental Education .**25**,23-29.

Smith, S.M., Haugtvedt, C.P. and Petty, R.E.(1994). "Attitudes and Recycling: Does the Measurement of Affect Enhance Behavioral Prediction" Psychology and Marketing . **11**,359-374.

Smythe,P.C. and R.C. Broot .(1980). "Environmental Concerns and Actions: A Social Psychological Investigation." Canadian Journal of Behavioral Science. **12,**175/56.

Stern, P.et al .(1993). "Value Orientations, Gender and Environmental Concern". Environment and Behavior **.25**(3).

Stoorvogel, J.J., E.M.A. Smaling, and B.H. Janssen. (1993). "Calculating Soil Nutrient Balances in Africa at Different Scales". I Supranational Scale , Fertilizer Research ,35-22-23 .

Stutzman, P.M.and S.B. Green.(1982). "Factors Affecting Energy Consumption: Two Field Tests of the Fishbone-Ajzen Model." Journal of Social Psychology. **117**,183-201.

Tarrent ,M. and K. Cordell.(1997). "The Effects of Responded Characteristics on Environmental Attitude-Behavior Correspondence". The Journal of Environmental Education. **29**(5).

Teferi Regassa.(1996). "Environmental Problems and Policies in Ethiopia: A Survey." In ?

Tekeste Negash .(1996). Rethinking Education in Ethiopia. Uppsala: Sweden.

Towler, J. and J.E. Swan.(1972). "What Do people Really Know about Pollution?" .In C. Schoenfeld (ed.) Interpreting Environmental Issues, Research and Development in Conservation Communication Madison: Dembar Educational Research Services.

Tuna , M.(2004). "Public Environmental Attitudes in Turkey". Paper Presented at the XV: World Congress of Sociology.

United Nations Environment Program (UNEP).(1988). The Public and Environment, the State of the Environment. Nairobi: Kenya UNEP.

Vining, J. and A. Ebreo. (1992). "Predicting Recycling Behavior from Global and Specific Environmental Attitudes and Changes in Recycling Opportunities". Journal of Applied Social Psychology .**22**, 1580-1607.

Van Liere, K.D. and R.E. Dunlap. (1981). "Environmental Concern: Does it Make a Difference: How it's Measured?" Environment and Behavior . **13**,651-676.

Weigel, R.H. , Vernon, D.T.A. and Tognacci, L.N. (1974). "Specificity of the Attitude as a Determinant of Attitude Behavior Contrivance." Journal of Personality and Social Psychology. **30**,724-728.

Willians, E.(1991). "College Students and Recycling their Attitudes and Behaviors". Journal of College Student Development. **32,**8688.

Appendix - A

Dear Respondent:

The purpose of this questionnaire is to examine respondent's level of environmental knowledge, attitudes and behavior. There is no need to write your name, and the information you provide is highly confidential. It only serves the research purpose. Hence, would you mind filling the questionnaire? I would like to thank in advance for your cooperation!

Department: _____ Year (1st, 2nd, 3rd) **Sex:**

Age: _____ **Religion:**

Birthplace (urban/rural) **Residence** (urban/ rural)

Section A: Choose the best answer and write your answer on the space provided

___ 1. In Ethiopia, most deforestation is caused by

A. cattle grazing B. unsustainable agricultural practice

C. urbanization D. road construction

E. home construction

___ 2. One of the following does not result from overgrazing.

A. Reduced ground cover B. Accelerated erosion

C. Loss of vegetation D. Increasing species rarity

E. Weed decrement

___ 3. In Ethiopia which energy sources are least exploited?

A. Hydro and solar B. Dung and geothermal

C. Agro residue and natural gas C. Coal and natural gas

___ 4. Which of the following is false?

A. The present wood consumption is highly unsustainable

B. Soil erosion causes a progressive annual loss in grain production

C. Land degradation results in loss of livestock.

D. Rivers and streams in the vicinity of Addis Ababa become open sewers for industries as a result of which they are one of the main sources for infection.

E. Industries contribute more than 50% of the solid waste in Addis

5. Food insecurity can, one way or another, result from

A. lack of off farm employment

B. lack of appropriate agricultural resources

C. land tenure insecurity

D. dependence on fuel wood

E. All

6. As a result of burning coal and oil, the amount of carbon dioxide in the atmosphere is

A. decreasing but will not affect the earth's environment

B. decreasing with possible serious effects on earth's environment

C. increasing but will not affect the earth's environment

D. increasing with possible serious effect on the earth's environment

E. I do not know

_ 7. One of the following is not urban environmental problems in Ethiopia.

A. Lack of basic infrastructure

B. Pollutants from wastes and emission

C. Land degradation

D. Ground water pollutants

E. All of the above exist

___ 8. Ethiopia enacted its environmental policy in

A. 1990 B. 1993 C. 1995 D. 1997 E. 1999

___ 9. Erosion is highly associated with

A. denudation B. deposition C. faulting

D. volcanism E. I don't know

10. Which one of the following is <u>false</u>?

A. The use of traditional biomass is unsustainable.

17. Human beings best relate to nature by

A. coexisting with nature by understanding and protecting it

B. wiping out all consumer's that compute with humans and their animals

C. increasing food production with the use of irrigation, pesticides and inorganic matters

D. increasing technological activities designed to control the environment E. I don't know

18. The most important cause of desertification in Ethiopia is

A. deforestation B. over cultivation C. overgrazing

D. poor irrigation E. I don't know

19. The major air pollutant (measured by weight) discharged by motor vehicles is_____.

A. carbon monoxide B. carbon dioxide

C. sulfur dioxide D. nitrogen oxide E. I don't know

___20. Deforestation is responsible for

A. the distortion of rain fall

B. the destruction of habitat and food species of wild life

C. the destruction of soil due to erosion

D. All of the above E. None of the above

21. In Ethiopia, one of the following regions is not better forest covered

A. Oromia B. Gambella C. Somali

D. Amahara E. Benshangul Gumuz

22.Minerals in Ethiopia contribute percent of the GDP.

A. 20 B. 15 C. 10 D. 8 E. 2

23. Which of the following is a renewable resource?

A. copper B. coal C. oil D. water E. I don't know

24. Depletion of water resources is the result of

A. rain fall B. soil erosion C. over cultivation

D. afforestation E. drought

25. In Ethiopia, the most important energy source is

A. electricity B. fuel wood

C. dung D. petroleum E. I don't know

26. Noise levels have increased through the following except

A. rapid urbanization B. rapid industrial development

C. rapidly ageing population D. rapid vehicle importation

E. I don't know

27. Which of the following statements is true about air pollution?

A. Air pollution is caused by man made processes only

B. Only some pollutants are harmful to health

C. Air pollution is confined to certain political boundaries

D. Pollution may give rise to irreversible changes in the environment

E. I don't know

28. Most of the major rivers basins in Ethiopia originate in

A. Lowlands B. rift valley

C. high mountains D. high lands

E. I do not know

29. In Ethiopia, seven of the eight lakes are found in

A. lowlands B. rift valley C. high mountains

D. highlands E. I don not know

30. The principal source of air pollutants in big cities are

A. homes and industries B. agriculture and industries

C. vehicles and industries D. vehicles and homes

E. I do not know

31. Which claim best expresses your **personal** environment economy view?

A. Ethiopia should concentrate on economic growth even if it means damage to the environment

B. Ethiopia should concentrate on protecting the environment even if it means some reduction in economic growth.

C. Economic growth is bound to be at the expense of the environment

D. It is quite possible to have both a prosperous economy and a health environment

E. I don't know

Section B: Familiarity with Environmental Concepts

Instruction: After reading the following environmental concepts, tick (√) 'I know' if you know what the concept means or tick (√) 'I have no heard of the concept' if you don't know the concept

Environmental concepts	**I know**	**I have not heard the concept**
1. Ozone layer		
2. Ecology		
3. Green house effect		
4. Biodiversity		
5. Carbon cycle		
6. Interdependence of species		
7.Unsustainable development		
8. Carrying capacity		
9.Intergenerational capacity		
10. Renewable resources		
11. Precautionary principles		

If you claim that you know the concepts, define them briefly in the space below.

1. _____ 2. _____

3. _____ 4. _____

5. _____ 6. _____

7. _____ 8.

9. _____ 10 _____

11. _____

Section C: Circle one response (a, b, c, d, or e) to show the extent to which you agree or disagree with the statements based on your personal attitude

1. The conservation of natural resources is totally the government's responsibility

A. strongly disagree B. disagree

C. neutral (neither agree nor disagree) D. agree

E. strongly agree

2. The earth is a planet with only limited room and resources

A. strongly disagree B. disagree C. neutral D. agree

E. strongly agree

3. Controls should be placed on industry to protect the environment from pollution, even if it means that things will cost more.

A. strongly disagree B. disagree C. neutral

D. agree E. strongly agree

4. When humans interfere with nature, it often produces disastrous consequences

A. strongly disagree B. disagree C. neutral

D. agree E. strongly agree

5. Plants and animals exist primarily to be used by humans

A. strongly disagree B. disagree C. neutral D. agree

E. strongly agree

6. Humans must live in harmony with nature in order to live

A. strongly disagree B. disagree C. neutral D. agree

E. strongly agree

7. Humans have the right to modify the natural environment to suit their need

A. strongly disagree B. disagree C. neutral D. agree

E. strongly agree

8. The problem of desertification is a problem of unsustainable development

A. strongly disagree B. disagree C. neutral D. agree

E. strongly agree

9. Mankind was created to rule the rest of nature in any way he wishes

A. strongly disagree B. disagree C. neutral D. agree

E. strongly agree

10. People would be better off if they lived a more simple life with out so much technology

A. strongly disagree B. disagree C. neutral D. agree

E. strongly agree

11. The earth's value does not depend on people: it is valuable in itself.

A. strongly disagree B. disagree C. neutral D. agree

E. strongly agree

12. We are approaching the limit of the number of people the earth can support

A. strongly disagree B. disagree C. neutral D. agree

E. strongly agree

13. Humans need not adapt to the natural environment because they can remake it to suit their needs

A. strongly disagree B. disagree C. neutral D. agree

E. strongly agree

14. There are limits to growth beyond which our industrial society cannot expand

A. strongly disagree B. disagree C. neutral D. agree

E. strongly agree

15. Mankind is severely abusing the environment

A. strongly disagree B. disagree C. neutral D. agree

E. strongly agree

SECTION D: Circle one response to indicate the frequency of your action

1. How often do you through rubbish when no body is watching?

A. always B. sometimes C. seldom D. never

EDUCATION LIBRARY

2. How often do you keep papers that are printed on one side in order to write on the other side?

A. always B. sometimes C. seldom D. never

3. How often do you visit parks?

A. always B. sometimes C. seldom D. never

4. How often do you turn off the light in rooms, which are not being used?

A. always B. sometimes C. seldom D. never

5. How often do you plant trees or flowers on a yearly base?

A. always B. sometimes C. seldom D. never

6. How often do you talk about problems related to the environment?'

A. always B. sometimes C. seldom D. never

7. How often do you point out to some one his/her environmental unfriendly behavior?

A. always B. sometimes C. seldom D. never

8. How often do you use plastic during shopping?

A. always B. sometimes C. seldom D. never

9. How often do you reuse items such as glass bottles?

A. always B. sometimes C. seldom D. never

10. How often do you participate in soil protection activities?

A. always B. sometimes C. seldom D. never

11. How often do you talk about land degradation?

A. always B. sometimes C. seldom D. never

12. How often do you wash dirty clothes without rewashing?

A. always B. sometimes C. seldom D. never

13. How often do you use chemical insecticides in your home to kill insects?

A. always B. sometimes C. seldom D. never

14. How often do you offer your seat to an elderly or disabled person in a crowded bus?

A. always B. sometimes C. seldom D. never

15. How often do you bring back unused medicine to the pharmacy?

A. always B. sometimes C. seldom D. never

16. How often do you collect and recycle used paper?

A. always B. sometimes C. seldom D. never

17. How often do you go to an exhibition concerning the environment when there is a public exhibition?

A. always B. sometimes C. seldom D. never

18. How often do you put dead batteries in the garbage?

A. always B. sometimes C. seldom D. never

19. How often do you buy milk in returnable bottles?

A. always B. sometimes C. seldom D. never

20. How often do you contribute money to environmental organization?

A. always B. sometimes C. seldom D. never

21. Have you ever been a member of environmental clubs (organization?)

A. Yes B. NO

Section E: Circle one response to express your intention regarding the following actions

1. Individuals can contribute to solving environmental problems

A. strongly agree B. agree

C. don't know D. disagree E. strongly disagree

2. I am willing to cooperate to clean my surrounding

A. strongly agree B agree

C. don't know D. disagree E strongly disagree

3. I am willing to talk to friends about the need for action to protect land degradation.

A. strongly agree B. agree

C. don't know D. disagree E. strongly disagree

4. I am willing to talk friends about the need for action to protect the environment?

A. strongly agree B. agree C. don't know

D. disagree E. strongly disagree

5. I am willing to contribute money for environmental protection

A. strongly agree B. agree C. don't know

D. disagree E. strongly disagree

7. I need to buy my own car in the future.

A. strongly agree B. agree C. don't know

D. disagree E. strongly disagree

8. I am ready to take part in community environmental awareness creation activities.

A. strongly agree B. agree C. don't know

D. disagree E. strongly disagree

9. I am willing to take part in digging waste disposal pits.

A. strongly agree B. agree C. don't know

D. disagree E. strongly disagree

10. It is an individual's responsibility to take action against environmental pollution.

A. strongly agree B. agree C. don't know

D. disagree E. strongly disagree

Section F: Write your answers on the space provided

1. Whom do you think should be most responsible for the protection of the environment?

A. Government B. Business organization

C. National council in the environment D. Nature society

E. Every body

2. Which one of the following best describes the way in which you have gained most of your knowledge about the environment?

A. General education at school

B. Special environmental course at school

C. Attending talks and exhibitions organized by the other organizations

D. Radio and television

E. Private reading of books and newspapers

F. Talking with parents and friends

G. Others (please specify)

Section G: Environmental Problems

Instruction: The following items are lists of environmental problems .Tick (√) the appropriate options which you feel is appropriate

Environmental Problems	Most serious in the world	Most serious in Ethiopia	Most concerned with personally
Land use			
Soil erosion			
Traffic accident			
Over crowding			
Soil fertility decline			
Over grazing			
Poverty			
Air pollution			
Water pollution			
Noise pollution			
Population pressure			
Rubbish disposal			
Resource depletion			
Deforestation			
Ozone depletion			
Global warming			
Acid rain			
Vandalism			
No response			

Appendix B

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		
Even(X	4	6	3	6	6	4	5	6	5	4	3	4	6	5	6	6	5	4	6	4	6	5	7	6	7	129	$\sum x$
Odd(Y)	4	5	4	7	7	4	5	6	4	4	3	4	6	5	5	5	4	3	4	3	5	4	6	5	6	118	$\sum y$
X2	16	36	9	36	36	16	25	36	25	16	9	16	36	25	36	36	25	16	36	16	36	25	49	36	49	697	$\sum x^2$
Y2	16	25	16	49	49	16	25	36	16	16	9	16	36	25	25	25	16	9	16	9	25	16	36	25	36	588	$\sum y^2$
X+Y	8	11	7	13	13	8	10	12	9	8	6	8	12	10	11	11	9	7	10	7	11	9	13	11	13	247	$\sum x+y$
(X+Y)2	64	121	49	169	196	36	100	144	81	81	81	121	225	256	121	196	100	49	121	49	144	124	256	484	225	3593	$\sum (x+y)^2$
X*Y	16	30	12	42	42	16	25	36	20	16	9	16	36	25	30	30	20	12	24	12	30	20	42	30	42	633	$\sum (x*y)$

$$r_{xy} = \frac{N\Sigma xy - \Sigma x \Sigma y}{\sqrt{(N\Sigma x^2 - (\Sigma x)^2)(N\Sigma y^2 - (\Sigma y)^2)}}$$

$$= \frac{25(633) - (129)(118)}{\sqrt{(25(697) - (129)^2)(25(588) - (118)^2}}$$

$$= \frac{15825 - 15222}{\sqrt{(17425 - 6641)(14700 - 13924)}}$$

$$= \frac{603}{\sqrt{(784)(776)}}$$

$$= \frac{603}{\sqrt{608384}} = \frac{603}{777.9897} = 0.779.9897$$

$$\approx 0.779$$

Reliability

Attitude
Appendix -C

****** Method 2 (covariance matrix) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Correlation Matrix

	VAR00002	VAR00003	VAR00004	VAR00005	VAR00006
VAR00002	1.0000				
VAR00003	.7531	1.0000			
VAR00004	.6207	.7193	1.0000		
VAR00005	.6515	.6454	.7443	1.0000	
VAR00006	.4881	.4887	.7013	.6953	1.0000
VAR00007	.2934	.0109	.4295	.3945	.6701
VAR00008	.2653	.0878	.4645	.4759	.4510
VAR00009	.2717	.0773	.3521	.5046	.2952
VAR00010	.0674	-.0287	.3984	.3060	.2702
VAR00011	.2346	.2072	.5450	.4700	.2729
VAR00012	.1616	.0597	-.0044	-.1359	.2052
VAR00013	.0471	-.1318	-.1978	-.2019	-.0371

	VAR00007	VAR00008	VAR00009	VAR00010	VAR00011
VAR00007	1.0000				
VAR00008	.8107	1.0000			
VAR00009	.6640	.8858	1.0000		
VAR00010	.6569	.8618	.8537	1.0000	
VAR00011	.5794	.7680	.7941	.8336	1.0000
VAR00012	.1774	.0061	-.0086	-.0907	-.0926
VAR00013	-.0062	-.0148	-.0842	-.1659	-.1099

	VAR00012	VAR00013
VAR00012	1.0000	
VAR00013	.6415	1.0000

N of Cases = 25.0

Statistics for	Mean	Variance	Std Dev	N of Variables
Scale	43.7200	60.9600	7.8077	12

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Reliability Coefficients 12 items

Alpha = .8692 Standardized item alpha = .8573

attitude

	particip	var00002	var00003	var00004	var00005	var00006
1	1	5	4	5	4	3
2	2	4	3	2	3	2
3	3	5	4	4	4	3
4	4	4	3	3	3	1
5	5	5	5	5	5	2
6	6	5	5	5	5	4
7	7	4	3	4	4	3
8	8	3	2	2	3	2
9	9	5	4	5	4	4
10	10	4	4	5	4	4
11	11	3	2	3	2	2
12	12	4	3	4	3	3
13	13	5	5	5	5	5
14	14	5	5	4	3	3
15	15	3	3	4	3	3
16	16	5	5	5	4	4
17	17	3	4	4	4	3
18	18	5	5	5	5	4
19	19	3	4	4	3	2
20	20	4	5	4	3	2
21	21	3	3	3	3	2
22	22	5	5	5	5	5
23	23	4	4	3	3	3
24	24	5	5	4	3	2
25	25	3	3	4	3	3

attitude

	var00013
1	4
2	5
3	5
4	5
5	4
6	5
7	4
8	5
9	4
10	5
11	5
12	4
13	4
14	5
15	4
16	5
17	4
18	3
19	4
20	4
21	2
22	4
23	5
24	4
25	5

Reliability

Intention
Appendix D

****** Method 2 (covariance matrix) will be used for this analysis ******

R E L I A B I L I T Y A N A L Y S I S - S C A L E (A L P H A)

Correlation Matrix

	VAR00002	VAR00003	VAR00004	VAR00005	VAR00006
VAR00002	1.0000				
VAR00003	.0597	1.0000			
VAR00004	.6415	-.1318	1.0000		
VAR00005	-.1359	.6454	-.2019	1.0000	
VAR00006	.2052	.4887	-.0371	.6953	1.0000
VAR00007	.1774	.0109	-.0062	.3945	.6701
VAR00008	.0061	.0378	-.0148	.4759	.4510
VAR00009	-.0086	.0773	-.0842	.5046	.2952
VAR00010	-.0907	-.0287	-.1659	.3060	.2702
VAR00011	-.0926	.2072	-.1099	.4700	.2729

	VAR00007	VAR00008	VAR00009	VAR00010	VAR00011
VAR00007	1.0000				
VAR00008	.8107	1.0000			
VAR00009	.6640	.8858	1.0000		
VAR00010	.6569	.8618	.8537	1.0000	
VAR00011	.5794	.7680	.7941	.8336	1.0000

N of Cases = 25.0

Statistics for Scale	Mean	Variance	Std Dev	N of Variables
	35.5200	44.5100	6.6716	10

Reliability Coefficients 10 items

Alpha = .8417 Standardized item alpha = .8189

Intention

	var00007	var00008	var00009	var00010	var00011
1	4	2	4	3	4
2	3	1	3	1	2
3	4	4	5	4	4
4	2	2	3	3	3
5	3	4	5	4	5
6	5	5	5	4	5
7	4	4	4	3	3
8	3	2	3	2	2
9	5	4	4	4	4
10	5	5	5	5	5
11	5	5	5	5	4
12	5	4	4	4	3
13	4	3	3	2	2
14	3	1	1	1	2
15	3	1	1	2	3
16	5	4	4	3	4
17	3	2	3	2	3
18	4	4	5	4	4
19	2	2	3	3	3
20	2	2	3	3	3
21	4	3	4	4	4
22	5	4	5	5	4
23	3	2	3	2	3
24	2	1	2	1	2
25	3	2	3	3	3

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Actual Appendix E

RELIABILITY ANALYSIS - SCALE (ALPHA)

N of Cases = 25.0

Statistics for Scale	Mean	Variance	Std Dev	N of Variables
	42.6400	50.4900	7.1056	12

Reliability Coefficients 12 items

Alpha = .8128 Standardized item alpha = .8052

Appendix F: Environmental Behavior Measures

1	How often do you through rubbish when nobody is watching?
2	How often do you keep papers, which are printed on one side in order to write on the other side?
3	How often do you visit parks?
4	How often do you turn of the light in rooms, which are not being used?
5	How often do you plant trees or flowers on a yearly bases?
6	How often do you talk about issues related to the environment?
7	How often do you point out to some one his/her environmental unfriendly behavior?
8	How often do you use plastic during shopping?
9	How often do you reuse items such as glass bottles?
10	How often do you involve in soil protection activities?
11	How often do you talk about land degradation?
12	How often do you wash dirty clothes without rewashing?
13	How often do you use chemical insecticides in your home to kill insects?
14	How often do you offer your seat to an elderly or disabled person in a crowded bus?
15	How often do you bring back unused medicine to the pharmacy?
16	How often do you collect and recycle used paper?
17	How often do you go to an exhibition concerning the environment when there is a public exhibition?
18	How often do you put dead batteries in the garbage?
19	How often do you buy milk in returnable bottles?
20	How often do you contribute money to environmental organizations?

Sources (Adopted from Kaiser et al, 1999).