

TOWARDS IMPROVING THE STATUS OF
FORMAL AND NONFORMAL
ENVIRONMENTAL EDUCATION IN JORDAN

A Dissertation submitted to Fachbereich
Erziehungswissenschaft der Universität Hamburg
for Attainment of a Doctoral Degree

by

Qasem S. Al-Newashi

Irbid, Jordan

2002

ACKNOWLEDGEMENT

The researcher wishes to express his most profound feeling of gratitude and appreciation to his thesis supervisor, Prof. Dr. Dr. h.c. Helmut P. Schreier for his encouragement, useful suggestions, constructive criticisms and guidance throughout the study. The researcher's feeling of indebtedness to him shall stand as an everlasting mark of his academic success.

He would like to express his most heartfelt thanks and appreciation to Assoc. Prof. Dr. Abdalla M. Khataybeh for his comments and continuous guidance throughout all stages of this work, as well as his ever-helpful discussions, which were of great value.

Not to be forgotten are the entire academic staff of the Educational Sciences and Art Faculty at Yarmouk University in Jordan, the academic staff of the Educational Sciences Faculty at the Qaboos University in Oman, and the academic staff at Al-Rustage College for Educational Sciences in Oman, for their invaluable comments and suggestions concerning the development of the instruments used in this study. The researcher also wishes to thank the formal educators and environmental awareness programs leaders in Jordan, for their valuable time spent in responding to the measuring criteria. The researcher expresses his gratitude to Prof. Dr. Janice Stephens for the review of language clarity of his thesis.

Finally, the task of writing this thesis was made much easier through the support and understanding of my family, especially uncle Prof. Dr. Majed, brother Ali, and my wife Etaf.

ABSTRACT

TOWARDS IMPROVING THE STATUS OF FORMAL AND NONFORMAL ENVIRONMENTAL EDUCATION IN JORDAN

As raising environmental literacy among all citizens has become one of the current international educational priorities, environmental education (EE) splits its essence in all educational systems. Therefore, the purpose of this study was to improve the current situation of EE in Jordan through surveying the status of formal and nonformal EE programs, as perceived by formal educators and environmental awareness program leaders.

The study addressed the main current question regarding teaching and learning in EE: “why some teachers are infusing EE more than other teachers to their educational settings.” A theoretical perspective is offered that links teachers' commitments to teaching EE to the beliefs and attitudes about teaching EE, as well as to significant life experiences. Therefore, the study explains the reasons such a theory may be useful in EE research and training; summarizes the synthesis and reasoning that led to the theory; and outlines the theory and its implications for further research. The study discussed three areas of existing research and theory that provide a basis for the theoretical development: the theory of planned behavior, life-span developmental theory, and field theory. Each theory is examined for its value in describing teachers' self-confidence in teaching EE and its explanatory power for use in the proposed EE Model. This model is explained in detail, and implications for future research are offered.

On the other hand, the study identified a considerable number of programs that were conducted in formal and nonformal sectors to achieve the goals and objectives of EE. Most of these efforts were isolated, limited to a single institution, and loosely connected. In addition, the results gave some insights into the constraints and opportunities relating to the implementation of EE in Jordanian schools.

Accordingly, the population of the study consisted of two categories. The first category was that of the formal educators at the Ministry of Education in Jordan. The selected sample was comprised of 347 formal educators. The second category was that of the environmental awareness program leaders. The sample was selected from 11 environmental conservation organizations. Consequently, two special instruments were developed; the basic format of the instruments was based on the guidelines for EE programs, which were developed by the Wisconsin Center for EE in the United States. After the data were collected, they were statistically analyzed, while the qualitative data and the comments of the respondents were summarized.

The results show that almost 30% of formal educators indicated that their institutions hold EE programs, and about 20% have shared EE programs with other agencies, while about 37% of formal educators in Jordan currently infuse education about the environment into their educational settings.

Males of formal educators in Jordan tend to infuse EE into their educational settings more than females do. Formal educators with higher qualifications and educational experiences tend to infuse EE into their educational settings more than those with lower qualifications and educational experiences. In relation to teaching subjects, formal educators tend to infuse EE into their educational settings in the following order: Fine Arts, Science, Religion, Arabic, English, Math, Social Studies, and finally, Sports.

The slow pace at which EE has progressed in Jordanian schools, as perceived by formal educators, is a reflection of a number of influences: inadequate support from administration; insufficient emphasis on teacher training programs in environmental issues; a lack of appropriate preparation time; inadequate funding; inadequate access to educational resources to facilitate the implementation of EE into school curriculum; and the lack of knowledge to effectively monitor EE activities.

Most formal educators, who indicated that they infuse EE into their educational settings, see that the best teaching methods are those which put emphasis on environmental values and consider that a child-centered approach is more appropriate for teaching and learning in EE. In addition, the most serious aspects of EE are the personal responsibility for the conservation of the environment; the awareness of local environmental issues; and environmental ethics.

On the other hand, nonformal EE has the potential to enhance the work of the formal education system. The results showed considerable bodies of EE programs within the nonformal education sector that have been initiated to increase environmental awareness. In general, nonformal EE programs and activities are awareness programs directed to the public and school students, publications, and a little of training programs.

Unexpectedly, less than 20% of awareness program leaders have received training on EE or on how to deliver environmentally oriented programs. In addition, the NGOs' involvement in the national public awareness campaigns should be noted, since most EE programs are undertaken by the following NGOs: Jordan Environment Society, Royal Society for the Conservation of Nature, and Friends of the Environment Society.

The findings show that formal educators and awareness program leaders need more educational resources and EE training programs. Moreover, they should work more closely together. In this regard, the researcher recommends that the presence of a national coordinating office would team up EE programs and not waste limited resources by duplicating efforts. Such an EE office should be based on the General Corporation for Environment Protection, the Ministry of Education, environmental conservation organizations and the Higher Education Council.

In addition, the researcher proposes an instructional model, which is relevant to the situation of Jordanian schools. It sets up cooperation between formal education sector on one side and community organizations on the other side. The proposed model relies on the effectiveness of first-hand experience, learning by doing, and involvement in local environmental issues. In the model, students choose an issue of personal interest, investigate that issue in depth, and develop issue-resolution action plans that are subsequently evaluated and implemented. In this occasion, school laboratories become candidates to be the homes of EE programs, and the starting points of outdoor activities.

Finally, other recommendations and proposals for improving formal and nonformal EE in Jordan, and areas for further research, are presented.

TABLE OF CONTENTS

ACKNOWLEDGEMENT.....	ii
ABSTRACT.....	iii
TABLE OF CONTENTS.....	vi
LIST OF TABLES.	xi
LIST OF FIGURES.	xiii
ABBREVIATIONS.....	xiv
Chapter One	1
INTRODUCTION.....	1
1.1 Preliminary Statement	1
1.2 The Need for the Study.....	4
1.3 The Problem.....	7
1.3.1 Statement of the Problem	7
1.3.2 Objectives of the Study	8
1.4 Definition of Terms	8
1.5 Assumptions of the Study.....	9
1.6 Significance of the Study.....	11
Chapter Two	13
BACKGROUND OF THE STUDY.....	13
2.1 The State of Jordan.....	13
2.2 The Environment.....	22
2.2.1 The Elements of Jordan Environment	22
2.2.2 Environmental Issues in Jordan.....	24
2.2.2.1 Threats to Water Resources	25
2.2.2.2 Threats to Land Resources.....	25
2.2.2.3 Threats to Urban Environment.....	26
2.2.2.4 Threats to Cultural and Natural Heritage	27
2.2.3 Jordan’s Response Towards the Issue of the Environment	29
2.3 Education in Jordan.....	34
2.3.1 Historical Background	34
2.3.2 Educational System.....	36
2.3.3 Teaching and Learning in Jordanian Schools	38
2.4 Formal EE in Jordan.....	40
2.4.1 The Implementation of EE into School System.....	41
2.4.2 Environmental Concepts in the Curricula.....	42
2.4.3 Teaching and Learning in EE.....	44
2.4.4 School Clubs for the Conservation of Nature	45

2.4.5 EE in Higher Education	46
2.4.6 The Effectiveness of Formal EE in Jordan	47
2.5 Nonformal EE Sector	50
2.5.1 Governmental Organizations.....	50
2.5.2 Nongovernmental Organizations.....	55
2.5.3 The Contributions of Mass Media in EE	59
 Chapter Three	 61
THEORETICAL POSITIONING AND RELATED LITERATURE	61
3.1 Introduction.....	61
3.2 Environmental Education: an Overview	61
3.2.1 The Concept of EE.....	62
3.2.2 The Goals and Principles of EE.....	63
3.2.3 Deep Roots of EE.....	64
3.2.4 The Formal Concern for EE	79
3.2.5 Current Trends in EE	80
3.2.6 General EE Constraints	84
3.2.6.1 Philosophical, Epistemological and Doctrinal Constraints	84
3.2.6.2 Constraints Related to the Environmental Concept.....	85
3.2.6.4 Economic Constraints.....	89
3.2.7 EE Constraints in Developing Countries	90
3.2.7.1 Social Constraints	90
3.2.7.2 Practical Constraints	91
3.3 The Status of Formal EE	92
3.3.1 The Concept of Formal EE.....	93
3.3.2 Approaches to EE in Formal Education.....	94
3.3.3 Contemporary Practice.....	97
3.3.4 Research Methodologies in Formal EE	101
3.3.5 The Literature Related to the Study Variables.....	103
3.4 Nonformal EE	114
3.4.1 The Concept of Nonformal EE.....	114
3.4.2 The Nature of Nonformal EE	115
3.4.3 The Importance of Nonformal EE.....	116
3.4.4 Approaches of EE in Nonformal Education	117
3.4.5 Teaching Nonformal EE	121
3.4.6 Working Organizations in Nonformal EE	122
3.4.7 Target Groups of Nonformal EE	123
3.4.8 Research Methodologies in Nonformal EE	124
3.4.9 Related Literature to the Current Study	124
3.5 Formal Versus Nonformal EE	126

Chapter Four.....	130
METHODOLOGY OF THE STUDY	130
4.1 Research Methodology in Formal Education Sector.....	130
4.1.1 Operational Definitions of Variables.....	130
4.1.1.1 Dependent Variables.....	130
4.1.1.2 Independent Variables	132
4.1.2 Questions Guiding the Investigation	134
4.1.3 Population and Sample.....	135
4.1.4 Formal Educators’ Questionnaire	137
4.1.4.1 Construction of the Questionnaire.....	137
4.1.4.2 Validity of the Questionnaire	139
4.1.4.3 Reliability of the Questionnaire	140
4.1.4.4 Description of the Questionnaire.....	141
4.2 Research Methodology in Nonformal Education Sector	144
4.2.1 Population and Sample.....	144
4.2.2 Nonformal EE Questionnaire	146
4.2.2.1 Construction of the Questionnaire.....	146
4.2.2.2 Description of the Questionnaire.....	148
4.3 Administration of the Questionnaires	149
4.4 Statistical Analysis	151
Chapter Five	152
FINDINGS OF THE STUDY.....	152
5.1 Findings Related to Formal EE.....	152
5.1.1 Quantitative Analysis	153
5.1.1.1 Findings Related to Question No. 1	155
5.1.1.2 Findings Related to Question No. 2	162
5.1.1.3 Findings Related to Question No. 3	165
5.1.1.4 Findings Related to Question No. 4	168
5.1.1.5 Findings Related to Question No. 5	169
5.1.2 Qualitative Analysis.....	170
5.1.2.1 EE Programs and Activities.....	170
5.1.2.2 Coordination of EE Activities with Other Agencies.....	174
5.1.3 Results of Additional Comments.....	177
5.2 Findings Related to Nonformal EE.....	182
5.2.1 Quantitative Analysis.....	182
5.2.1.1 Findings Related to the General Information	182
5.2.1.2 Findings Related to Nonformal EE Activities	184
5.2.1.3 Findings Related to the Coordination of EE Activities.....	187
5.2.2 Qualitative Analysis.....	190
5.2.2.1 Governmental Organizations	190
5.2.2.2 Nongovernmental Organizations.....	194
5.2.3 Results of Additional Comments.....	205

Chapter Six	207
DISCUSSION OF THE FINDINGS.....	207
6.1 Discussion of the Findings Related to Formal EE.....	207
6.1.1 Discussion of the Results Related to Question No. 1.....	208
6.1.2 Discussion of the Results Related to Question No. 2.....	213
6.1.3 Discussion of the Results Related to Question No. 3.....	218
6.1.4 Discussion of the Results Related to Question No. 4.....	221
6.1.5 Discussion of the Results Related to Question No. 5.....	224
6.1.6 Discussion of Additional Comments.....	230
6.2 Discussion of the Findings Related to Nonformal EE.....	232
6.2.1 Discussion of the Results Related to the General Information.....	232
6.2.2 Discussion of the Results Related to EE Activities.....	234
6.2.3 Discussion of the Results Related to the Coordination of EE	237
6.2.4 Discussion of the Results Related to the SCCN.....	237
6.2.5 Discussion of Additional Comments.....	238
 Chapter Seven	 241
CONCLUSION, SUMMARY AND RECOMMENDATIONS.....	241
7.1 Conclusion	241
7.2 Summary.....	244
7.3 Recommendations	248
7.3.1 Recommendations for the MoE.....	248
7.3.2 Recommendations for Environmental Organizations.....	257
7.3.3 Recommendations for Further Research.....	260
 REFERENCES	 263
APPENDICES	263
Appendix I: Environment Protection Law, No. (12), 1995.....	282
Appendix II: Jordan's Commitment to Environmental Conventions and Agreements.....	290
Appendix III: Status of Environmental Education in Jordan: Formal Educators' Questionnaire.....	293
Appendix IV: Status of Environmental Education in Jordan: Environmental Organizations' Questionnaire.....	301
Appendix V: Formal Educators' Questionnaire (<i>in Arabic</i>)	308
Appendix VI: Environmental Organizations Questionnaire (<i>in Arabic</i>)	316
Appendix VII: Reliability Analysis of Section Two of Formal Educators Questionnaire.....	321

Appendix VIII: Reliability Analysis of Section Five of Formal Educators Questionnaire.....	322
Appendix IX: Letter of Recommendation from the University of Hamburg.....	323
Appendix X: Authorization letter from Jordan’s Ministry of Education.....	324
Appendix XI: EE in Jordan School Curriculum: Separate Subject Approach.....	325
Appendix XII: EE in Jordan School Curriculum: Module within a Subject Approach.....	344
Appendix XIII: EE in Jordan School Curriculum: Cross-Curricular Approach.....	355
Appendix XIV: Abstract (<i>in German Language</i>).....	373

LIST OF TABLES

Table 2.1:	Nature Reserves in Jordan.....	24
Table 4.1:	Number of Respondents that Received the Questionnaire, Number of Returns and Response Rate.....	136
Table 4.2:	Number of Organizations that Received the Questionnaire, and Number of Returns and Response Rate.	146
Table 5.1:	Distribution of Respondents According to the Educational Experience (n=347).	153
Table 5.2:	Distribution of Respondents According to their Academic Qualifications (n = 347).	154
Table 5.3:	Distribution of Respondents According to their Teaching Subject (n = 347).	155
Table 5.4:	Distribution of Responses to Item 7 Regarding the Independent Variables.	156
Table 5.5:	Chi-Square Test and Contingency Coefficients (n=347).	160
Table 5.6:	Descriptive Statistics of Responses on the Items Related to the Constraint Factors that would Influence Formal Educators to Infuse EE into Educational Settings.	163
Table 5.7:	Descriptive Statistics of Responses on the Items Related to the Encouragement Factors that would Influence Formal Educators to Infuse EE into Educational Settings.	164
Table 5.8:	Frequencies and Percentages of Response to the Items Related to EE Activities and Coordination of them with Other Agencies.	166
Table 5.9:	Frequencies and Percentages of the Responses on the Items 32 and 33 (n = 129).	168

Table 5.10:	Descriptive Statistics of Responses on the Items Related to EE Aspects (129).	169
Table 5.11:	Number of Responses and Rank Order Regarding the Main EE Programs in Formal Education Sector in Jordan (n = 344).	171
Table 5.12:	Number of Responses and Rank Order Regarding the type of EE plans and manual used in Formal Education Sector in Jordan (n = 345).	172
Table 5.13:	Number of Responses and Rank Order Regarding the Main EE Outdoor programs (n = 345).....	173
Table 5.14:	Number of Responses and Rank Order Regarding the Shared EE Program(s) with the Environmental Conservation Organizations (n = 343).....	174
Table 5.15:	Number of Responses and Rank Order Regarding Shared EE Program(s) with Community Organizations or Agencies Other than the Environmental Conservation Organization (n=344).	175
Table 5.16:	Number of Responses and Rank Order Regarding Coordination with Other Schools or Higher Education Institutions (n = 343).	175
Table 5.17:	Number of Responses and Rank Order Regarding Suggestions about the Ways of Coordination between the Department (or School) and any Other Organization in Jordan (n = 343).....	176
Table 5.18:	Distribution of the Respondents According to the Years of Experience in the Organization (n = 11)...	183
Table 5.19:	Number of Responses and Rank Order Regarding Suggestions About the Possible Ways of Coordination of EE Activities (n = 11).....	190
Table 7.1:	The Proposed Instructional Model Steps.....	255
Table 7.2:	The Activities of Each Step of the Proposed Model.	255

TABLE OF FIGURES

Figure 2.1:	The Educational Ladder in Jordan.....	36
Figure 5.1:	Infusing EE into Educational Settings with Gender	157
Figure 5.2:	Infusing EE into Educational Settings with Educational Experience.....	157
Figure 5.3:	Infusing EE into Educational Settings with Qualifications.....	158
Figure 5.4	Infusing EE into Educational Settings with Occupation.....	158
Figure 5.5:	Infusing EE into Educational Settings with Teaching Subject.....	159
Figure 5.6:	Infusing EE into Educational Settings with Training Received in EE.....	159

ABBREVIATIONS

EE	Environmental Education
EECA	Environmental Education, Communication, and Awareness
EIA	Environmental Impact Assessment
EPL	Environment Protection Law
GCEP	the General Corporation for Environment Protection
HKJ	the Hashemite Kingdom of Jordan
IUCN	International Union for the Conservation of Nature
JES	Jordan Environment Society
MMRAE	the Ministry of Municipal, Rural Affairs, and Environment
MoE	Ministry of Education
NEAP	the National Environmental Action Plan
NES	National Environmental Strategy
NGOs	Nongovernmental Organizations
RSCN	Royal Society for the Conservation of Nature
SCCN	School Clubs for the Conservation of Nature
UNDP	the United Nations Development Program
WCS	World Conservation Strategy

Chapter One

INTRODUCTION

1.1 Preliminary Statement

The whole world is now suffering from many environmental problems caused by man depending on short-term developmental strategies and ignoring the importance of a healthy environment. Therefore, environmental issues have jumped to the core of international concern and have become the enterprise of many research efforts.

A number of seminars and conferences at local, regional, and international levels have been organized specifically to address the issue of environment. The most notable so far is Agenda 21 of the UN conference, which was held in Rio de Janeiro in 1992, generally known as "Earth Summit" (UNCED, 1992). Agenda 21 is an action plan for sustainable development for the world in the 21st century. So far, many definitions have been given to sustainable development, but the one most circulated is "meeting the needs of the present without compromising the ability of future generations to meet their needs" (WCED, 1987, p. 43).

Indeed, Agenda 21 focuses on environmental protection, which is linked in harmony with economic objectives and social justice. The document states, emphatically, the fact that people's level of knowledge, attitudes, values, and practices are critical to the state of their environment, and how they utilize their environment for their own well-being.

Thus, if education is to prepare the individuals for the realities of their life, as viewed by the philosopher John Dewey, we cannot ignore the importance of "sustainable living in a healthy environment" (Rooyen, 1998). In addition, the comprehensive dimensions of reality, and the prosperous future included in the concept of sustainability, have stimulated the international community, and national leaders in many countries in the world, to achieve the goals of sustainability. These goals are abroad to the extent that formal education alone cannot achieve them (Young & McElhone, 1986). Therefore, all other agencies, governmental and nongovernmental should everywhere collaborate to build effective partnerships to support education for sustainability (Haury, 1998).

On the other hand, education for sustainability has become the new focus and justification for Environmental Education (EE) (Tilbury, 1995). Consequently, educators who teach for the environment are supporting education for sustainability among individuals and communities (USDE, 1993, p. 6).

Moreover, the nature of EE includes the economic, social and environmental dimensions that are contained in the concept of education for sustainability (WCED, 1987; UNCED, 1992, p. 3). This resulted from the broad international consensus, which emerged from the principles and objectives of EE. For instance, the Final Report of the Tbilisi Conference indicated that the goal of EE is to foster clear awareness of economic, social, political, and ecological interdependence (UNESCO, 1977).

It is obvious that EE is essential in dealing with the problems which corresponding individuals and groups all over the world share. One of the earlier definitions of EE, presented by William Stapp, stated that "EE is aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these

problems, and motivated to work toward their solution” (Stapp, 1969). Therefore, if educators are going to assist students to be more effective in developing healthy environment, they must provide them with opportunities to be actively involved at all levels in working towards resolution of environmental problems (UNESCO, 1978; Motawe, 1992; Palmer & Neal, 1994, p. 24).

EE occurs in many formal and nonformal settings, ranging from school-based environmental curricula, through the activities executed by the environmental conservation organizations, to mass media conservation programs. Theoretically, the environmental beliefs and behaviors of man in natural and social contexts reflect the need for linking formal and nonformal learning experiences (Negra & Manning, 1997; Scott & Oulton, 1998).

During the previous three decades, EE has resulted in successes, but much remains to be done. A review of literature, conference reports, and case studies in international EE strategies gives some insights into the constraints and opportunities relating to EE in formal and nonformal education systems (Braus & Wood, 1993; Lee, 1997; Rickinson & Robinson, 1999). At the same time, there is an opportunity for improved collaboration, which is essential to reduce duplication and to help leverage scarce resources, especially in developing countries. All sectors of societies should work in harmony toward complimentary goals, so that EE can realize its full potential.

EE programs and activities in formal and nonformal education, whether it is governmental or nongovernmental, should be reviewed in order to invest their respective strengths and address how to better coordinate limited resources to achieve the goals of EE. If sustainability is to be achieved, educators should take a leadership role, breaking new ground to prepare society for an age of accelerating change, in a world of growing populations and changing global environment.

Finally, if educational systems are working in consort, they can establish partnerships to facilitate cooperative interrelationships between formal and nonformal educational efforts. In this case, educational community could participate effectively in preparing aware, skilled, dedicated citizens, who are committed to work, individually and collectively, to improve and sustain the quality of the environment on behalf of present and future generations.

1.2 The Need for the Study

At the 1980 Paris Conference (UNESCO, 1980), it was emphasized that EE should be developed to fit the specific conditions of each country. As a developing country, Jordan is undergoing social and cultural change, there is a big debate within the enlightened groups as to whether the current change is moving in the right direction or not.

Jordan is facing a major problem in terms of expansion of its population, which leads to another expansion in the Jordanian educational system (UAER, 1994). Meanwhile, Jordanian government has a responsibility and an obligation toward the citizens to provide free education to its population at all levels. The need to produce sufficient food and water for the increasing numbers of population led to the implementation of intensive agricultural and industrial practices (Ali & Hassan, 1994).

Consequently, several environmental problems, such as water shortage, soil degradation and air pollution came to the surface. In view of the limited natural resources of the country, attention is given to pursuing environmentally sound policies in order to avoid further resource depletion and misuse, which stresses the need to promote sustainable development in Jordan (Tell & Yaser, 1987; GCEP, 1998).

At the international level, Jordan was one of the original group, which consisted of thirty countries, to declare support for the World Conservation Strategy (WCS), which was launched in 1980 (Jreisat, 1997). Locally, Jordan has taken many steps towards the protection of the environment, which is placed on the national priority list. The main steps were the birth of the Environment Protection Law (EPL) (see Appendix I) and the establishment of the General Corporation for Environment Protection (GCEP) in 1995.

Although Jordan has made such significant progressive steps in involving governmental and nongovernmental organizations in areas of concern about the environment, there was no parallel trend in education. For example, EE programs were not mentioned in the EPL and no regulatory requirement was presented for the enforcement of EE.

Consequently, in December 1998, the Ministry of Municipal, Rural Affairs, and Environment (MMRAE) credited a National Strategy for Environmental Education, Communication, and Awareness (EECA). The strategy has clarified the challenges that faced the implementation of EE. It emphasizes the role of mass media, conferences and seminars, activities in the environmental occasions, posters and printed materials. It does not include guidelines for comprehensive or continuous EE programs (Alawneh, 1999). However, the National Strategy indicates the pressing need in Jordan for EE programs. Thus, the present study attempts to support the National Strategy through proposals and suggestions that may improve the situation of formal and nonformal EE in Jordan.

In spite of the late Educational Reform Movement in Jordan, and in spite of the integration of EE objectives within all disciplines, educational literature has pointed out that there are inadequacies in the applications of EE in Jordanian schools (Subbarini, 1989, p. 161; NCERD, 1994; Reid & Sa'di, 1997; Schreier, 1998). This situation is due, in some degree, to the absence of

EE strategy that coordinates the distributed efforts in developing and directing EE programs and activities.

Several studies indicated that there is a lack in the students' environmental attitudes in Jordan because of the lack and weakness of EE programs and activities (NCERD, 1994; Reid & Sa'di, 1997). That is, EE has not sufficiently achieved its goals and objectives in Jordanian schools because EE has not received due attention from the educational authorities in the Ministry of Education (MoE), nor from the researchers and educators at the country level.

In fact, the main feature of the dilemma of the Jordanian educational system is the shortcoming of traditional approaches for the implementation of EE aspects in school curricula, whereas EE is based on social-change objectives and strategies that are quite different from the ways in which education is traditionally conceived and conducted (Fien & Rawling, 1996). Therefore, the problem of traditional teaching and learning conditions in the school system is added to the incidental and marginal attention of the environmental issues in the curricula and classroom instruction. This situation stimulated the researcher to survey the status of EE activities in Jordan as perceived by selected formal educators and environmental awareness program leaders.

In particular, the present study has emanated mainly from two sources. The first source is the recommendations of the National Strategy for EECA, for the investigation of the status of EE programs and activities in Jordan. The second source is the recommendations of the report, which has been written by Helmut Schreier in 1998, when he was in Jordan as a short-term expert (STE). He introduced several suggestions to improve the implementation of EE in Jordanian schools, one of which was that EE in Jordan couldn't be promoted unless formal educational system and nonformal organizations are

collaborated, and to do so, nontraditional approaches and new EE programs are needed (Schreier, 1998).

As a recapitulation, the need for the study can be summarized as follows:

1. Due to the marginal concern for EE activities in formal education in Jordan, there is a shortcoming of improving the students' environmental attitudes.
2. The teacher education programs mainly ignore the EE aspects. This adds to the lack of teachers' experience in dealing with progressive teaching methods such as problem solving methods; community service learning; cooperative learning; and project-based instruction.
3. There is a lack of coordination between different agencies in the area of EE in Jordan.
4. The National Strategy for EECA does not include EE programs, but it has recommended the development of such programs.

All these features of the problem, motivated the researcher to study the status of formal and nonformal EE in Jordan.

1.3 The Problem

1.3.1 Statement of the Problem

It can be accepted that there is a problem in the status of EE in Jordanian schools. This problem can be summarized as follows:

In spite of the late Educational Reform Movement in Jordan; in spite of the formal and nonformal EE activities; and, in spite of the presence National Strategy for EECA, EE has not achieved sufficiently its goals and objectives in Jordanian schools.

1.3.2 Objectives of the Study

Upon completion of the study, it is expected that it will be possible to identify current EE programs, barriers, and the ways of coordination between formal and nonformal EE activities in Jordan. Therefore, the present study attempts to achieve the following objectives with regard to the situation of EE in Jordan:

1. To survey the status of formal EE programs in Jordanian schools as perceived by selected formal educators.
2. To survey the status of nonformal EE programs in Jordan as perceived by selected environmental awareness program leaders.
3. To identify possible ways of coordination between formal and nonformal EE activities in Jordan as perceived by both formal educators and environmental awareness program leaders.

In order to simplify the investigation of these objectives, they were formulated, in Chapter 4, as guiding questions.

1.4 Definition of Terms

For the purpose of the present study, the following terms have been defined as follows:

1. ***Formal Educators:*** The formal educators are persons who have expertise and responsibilities in the field of schools and curriculum within the MoE. They include teachers, supervisors, heads of supervision, curriculum developers in the *Department of Curricula*, and educational activities officials in the *Department of Educational Activities*. The selected independent variables in the present study that related to the formal educators would be: *gender; educational experience; academic qualifications; occupation; teaching subject; and training received in EE.*

2. ***Environmental Awareness Program Leaders:*** They are people who lead and control nonformal EE activities at governmental and nongovernmental, environmental conservation organizations in Jordan.
3. ***Ministry of Education (MoE):*** It is the main agency that regulates and controls education that provided by various other agencies in all Jordanian schools.
4. ***EE Programs:*** They provide the target groups with environmental knowledge, attitudes, and skills (input), which are then transferred through various means and techniques of communication, such as printed materials, public meetings, campaigns, walks, seminars, workshops, nature clubs, demonstrations, mass media programs, internet networks, etc (process). This process will work at producing environmental responsible citizenry (output) (Heimlich, 1993).

For the purpose of the present study, EE programs are sets of environmental activities that are designed to organize formal or nonformal educational actions, in order to implement and promote EE in Jordan.

1.5 Assumptions of the Study

The present study was built on the following assumptions:

1. The MoE in Jordan is interested in improving both the classroom instruction and EE.
2. The goals of EE are the same for people everywhere, but the objectives and the ways of achieving the objectives different from one country to another.

3. There is a shortcoming of EE programs in improving the students' environmental attitudes and behaviors in Jordan. Therefore, the Jordanian students do need to acquire environmental knowledge, attitudes and values to help them participate in environmental protection and conservation.
4. The job of formal educators is not to feed the information to the students in a direct manner, but to facilitate the learning/teaching process. Therefore, special teaching approaches and techniques, such as values-based, community-based instruction, and child-centered approaches, are needed to develop teaching practices and to promote EE curriculum and instruction in Jordanian schools.
5. EE is the responsibility of all. Therefore, every educated person can be an instructor (facilitator) of EE via assimilation, teaching by doing, teamwork, or any other instructional method he is passing through a training program. In addition, the Jordanian supervisors who enrolled in inservice education programs possess proper educational skills to perform a short-term training program on EE, if they are given the suitable self-instructional materials and manuals.
6. The trials to develop EE in Jordanian schools should be based on surveying the status of EE in Jordan, and the international trends in EE curriculum and instruction.
7. For the purpose of the present study, the selected sample of formal educators and environmental awareness program leaders is a representative sample.

1.6 Significance of the Study

The researcher recognizes that deep environmental concern and awareness have been achieved in Jordan. Moreover, he appreciates all the efforts exerted by the MoE, national organizations (governmental and nongovernmental), and international organizations, which work toward improving EE in Jordan. These efforts have succeeded in many areas but they still have limited effects in the EE at school level.

On the other hand, the educational system in Jordan, with its limited resources, cannot afford funding to provide instructional kits and equipment for a great number of schools. Economically speaking, it is easier to educate the students using the community services rather than to provide the schools with expensive extra kits and equipments (Mocker & Spear, 1982). Thus, the present study is an attempt to maximize the outcomes of teaching and learning methods, by rearranging favorable methods and introducing factors that will contribute in the development of the school-community collaboration.

In general, the identification of the status of formal and nonformal EE in Jordan would improve EE in Jordanian schools. Upon completion of the present study, it is hoped that it will contribute to:

1. Identifying the status of formal and nonformal EE in Jordan, as perceived by formal educators and environmental awareness programs leaders, in order to gain a baseline for improvement of EE in Jordanian schools.
2. It is expected that the results of the present study will support the National Strategy for EECA and will be useful to the educators, legislators, and other decision-makers, in order to expand and coordinate EE programs in their communities and schools.
3. The results of the study may increase understanding of environmental awareness issues in Jordan among policy makers,

private sectors, school children, government and nongovernmental program managers, opinion leaders, local leaders and religious preachers.

4. The Educational Reform Movement in Jordan involved a wide curriculum modification and teacher training programs. Therefore, surveying the status of EE will assist in assessing the results of the movement outputs.
5. Generating knowledge in the field of EE may be of concern for improving the educational practices and the lot of humankind.
6. It is expected that the present study would provide baseline data to the individual EE components such as teacher training, NGOs programs, and EE in school curricula.
7. All educational and environmental agencies in Jordan, should look for programs and strategies that assist in preparing the students for the new millennium in which they will be decision-makers, and provide them with environmental knowledge, attitudes and skills. This study is an endeavor to achieve these goals.

Finally, the present study is an attempt to describe the efforts that are underway in Jordan, in order to determine significant marks and indicators that may help in improving the implementation of EE in Jordanian schools, and to locate what interventions would serve to minimize EE constraints and barriers in nonformal education sector.

Chapter Two

BACKGROUND OF THE STUDY

EE programs and activities should be developed according to each country's specific cultural, political, environmental, and educational conditions (UNESCO, 1980). If the development of international EE is desired, cross-cultural studies should be conducted to clarify various issues in EE across cultural backgrounds.

Since the seventies, environmental problems have been surfacing in Jordan, implying potential economic and social impacts that could no longer be overlooked nor disregarded. Much has been done, by formal and nonformal education sectors, towards recognizing the importance of public awareness and participation in protecting the environment.

This Chapter aims at describing the present state of EE in Jordan. It gives an overview of the state of Jordan; the status of the environment; the situation of the education system; and the level of concern of formal and nonformal sectors toward EE.

2.1 The State of Jordan

Jordan is a small country of only 96,000km², in the southwest corner of Asia, but it has a great variety of natural life. This variety reflects its geographical position, being at the junction of several large continents, and its diversity in wildlife, landscape, weather conditions and natural resources (Patai, 1958, p. 2).

Historical Background: The history of Jordan can be dated from 1921 when Britain recognized the Emirate of Transjordan as an independent state under its protection with Abdullah I as its Emir. The mandate gave the British virtually a free hand in administering the territory, although in September 1922 it was explicitly excluded from the clauses regarding the establishment of "a Jewish national home". Between 1922 and 1939 the Jewish population in Palestine had risen from 83,790 to 445,457 (30% of the total inhabitants). As Eastern Europe fell under German supremacy, and especially when the systematic tightness of the Jews of Europe began in 1942, many more Jews sought refuge in Palestine by illegal immigration (Harris, 1958, pp. 3-5).

On May 25th 1946, Britain gave up its mandate on Transjordan and the name of the state was changed to the Hashemite Kingdom of Jordan. On May 15th 1948, the day after the Jewish Agency proclaimed the independent state of Israel, Jordan joined its Arab neighbors in the first Arab-Israeli war. The Arab forces, which at this point were vastly better equipped than the Israeli forces, occupied the areas in the south and east, which were not yet controlled by the Jews, and unsuccessfully laid siege to Jewish Jerusalem (Peretz, 1978, p. 316).

When the Jordan-Israel armistice was signed on April 3rd 1949, the West Bank and East Jerusalem -about 2,100 square miles- came under Jordanian rule, and half-million Transjordanians were joined by almost half a million more Palestinian Arabs. This territory was formally annexed by the kingdom in April 1950. These agreements left Israel in possession of all the areas it had won by conquest. The incorporation of the West Bank, with 400,000 Palestinians, into Jordan, as well as a large refugee population, brought with them severe economic and political consequences. Meanwhile, the departure of hundreds of thousands of Palestinian Arabs to Jordan had left Israel with a substantial Jewish majority (Peretz, 1978, p. 319). On July 20th 1951, King

Abdullah I was assassinated in Jerusalem while praying. King Talal succeeded to the throne a few months, then Hussein Ibn Talal, became King on May 2nd 1953.

Popular demonstrations in the West Bank prevented Hussein in 1955 from signing the pro-Western mutual defense treaty between Great Britain, Turkey, Iran, and Iraq known as the Baghdad Pact, which he had helped initiate. The emergence in the late 1960s of the Palestine Liberation Organization (PLO) represented a potential threat to Jordan's sovereignty on the West Bank. As a result of June 1967 war, Israeli forces had overrun the entire territory west of the Jordan River, capturing Bethlehem, Hebron, Jericho, Nablus, Ram-Allah, Janin, and the city of Jerusalem. Jordan suffered heavy casualties and lost one-third of its most fertile land, and its already overburdened economy was faced with supporting some 200,000 new refugees (Peretz, 1978, p. 324).

Relations with Israel were thus inseparably linked to the future of the Palestinians. Somewhat unrealistically, Hussein sought the return of all the territory lost to Jordanian rule, but he was not prepared to sign a peace treaty with the Jewish state. The two nations were thus no longer enemies and cooperated against PLO activities, but there was little progress toward a lasting peace. King Hussein chose not to join Egypt and Syria in their surprise attack on Israel in the war of October 1973 (Peretz, 1978, p. 328). The election of the right-wing Likud party with Menachem Begin as Israeli prime minister in May 1977 brought relations between Jordan and Israel to a low level.

From late 1977 until 1984 Jordanian contacts with Israel came to a virtual halt. Hussein became increasingly alarmed at the rise in popularity in Israel of the view that Jordan was, in fact, the Palestinian state. The situation changed dramatically in December 1987 with the outbreak of the intifada, a Palestinian uprising on the West Bank. King Hussein response was to support

the intifada publicly and to offer aid to families of victims of Israeli reprisals in an effort to deflect hostility to his regime. The intifada brought to a halt Jordanian and Israeli plans for an economic path to peace (Abu Diah, 1988, p. 61).

In 1991, the Gulf War forced Hussein to lean toward the Iraqi Saddam Hussein. About 300,000 refugees from Kuwait were expelled back to Jordan. However, by the end of 1991 the United States and Israel were again seeking Hussein's support for an American-Israeli peace initiative. During that time, King Hussein was concerned over issues relating to Jordan's economic links with the West Bank and the future status of Palestinians in Jordan. About one year later, on October 26th 1994, Jordan and Israel signed a full peace agreement, in which King Hussein was recognized as the custodian of the Muslim holy sites in East Jerusalem. It was supposed that such an agreement would promote economic cooperation and speed up further political detente (Rosan, 1997, p. 137). On February 7th 1999, Abdullah II Ibn Al-Hussein became King.

Geography of Jordan: Jordan is located in the heart of the Middle East region and the Arab countries. It is bordered by Syria to the north, Iraq to the east, and Saudi Arabia on both eastern and southern fronts. Jordan's western boundary is defined by the Jordan River (Palestine and Israel). The Gulf of Aqaba, located in the southwest of Jordan, is the country's only outlet to the Red Sea. Although Jordan's area is limited, the landscape reveals great diversity within short distances (Hadidi, 1985, pp. 4-7).

The Climate: The climate of Jordan is predominantly Mediterranean, marked by sharp seasonal variations in both temperature and precipitation. Temperatures below freezing are not often known in January, the coldest month, but the average winter temperature is above 7.2° C (45° F). The areas below sea level are warm in winter and very hot in summer. The average

summer temperature in Amman is 25.6° C (78° F). Precipitation is confined largely to the winter season and ranges from about 660mm in the northwestern corner to less than 127mm in the extreme east (GCEP, 1998, pp. 73-74).

Population: The population of Jordan according to 1997 estimate is 4.52 million with a growth rate of 3.5% per year. The rapid Population growth came as a result of the following factors (GCEP, 1998, pp. 83- 84):

- The compulsory influxes of migration caused by the Israeli occupation of Palestine in 1948 and the Israeli occupation of the West Bank in 1967.
- The consequences of the 1991 Gulf War that led a large number of Jordanians and Palestinians nationals who had been working in the Gulf States to return back to Jordan.
- While fertility remained constant at a very high level for a long period of time, the mortality level declined fairly rapidly from a crude death rate of 16 per thousand between 1980 and 1990.

Jordan's population is a challenge that presses on its limited natural resources.

The only sizeable ethnic minorities in the country are the Caucasians and the Armenians; each group accounts for less than 1% of the population. More than 50% of Jordan's population is Palestinian Arabs. Jordan's population is young - 42.2% are 14 years old or younger, while 31.4% fall between 15 and 29 years (GCEP, 1998, pp. 84- 85).

Economy: Jordan is developing industrially, poor in water and other natural resources. The major part of its territory is too arid for agriculture. Therefore, Jordan is partially self-supporting but has to rely heavily on foreign aid.

Unemployment has also increased due to the subsequent influxes of unemployed Palestinian refugees (UAER, 1994; Kharoof, 2000).

Political System: Jordan is a constitutional monarchy. The present ruler is King Abdullah II Ibn Al-Hussein. The legislature is bicameral, with a Senate and House of Representatives. After the electoral laws were revised, 80 legislative seats were contested in the 1989 election. Nine seats are reserved for Christians, six for Bedouin, and three for Circassians. By the way, the political system gives a great deal of concern towards the issue of the environment. In his letter of Designation to the Prime Minister in June 19, 1991, his Majesty the late king Hussein said:

The conservation of the environment is not a luxury but a human duty because of its direct connection with humanity's livelihood, progress and even survival. Therefore, we must accord it the priority it deserves in all state activities and make it one of the components of our national culture.

(Jordan Times, 1991)

Religion: The majority of the people in Jordan are Muslims. The second religious community in Jordan is Christians. Beside that, there are also a few other religious sections. The constitution recognizes Islam as the state official religion and allows other religions, since it safeguards the individual freedom and secures freedom of worship. Arab Muslims and Arab Christians in Jordan share almost the same habits, traditions, attitudes, and hopes (Attamimi, 1991; Ghonaimi, 1996, pp. 7-11). Therefore, all religious and ethnic groups live in harmony in Jordan.

For the purpose of the present study, the following basic principles of the Islamic theology would help us to have a concise idea of Islamic thought (Attamimi, 1991; Ahmed, 1996, pp. 26-31; Ghonaimi, 1996, pp. 7-11):

1. Oneness of God (Allah). He is the only creator; everything else is created by Him, God is unique, nothing is like Him, He has the absolute qualities of goodness, mercy, forgiveness, justice and the like.
2. Unity and equality of mankind, this principle is stated in the Holy Quran (HQ) as follows:

O mankind! We created you from a single (pair) of a male and a female, and made you into nations and tribes, that ye may know each other (not that ye may despise each other). Verily the most honored of you in the sight of God is (he who is) the most righteous of you. And God has full Knowledge and is well-acquainted (with all things).

(HQ, Al-Hujurat: 13)

All human beings have the same origin; they were created from Adam. So according to Islam there is no discrimination due to color, language, race, or religion before the law. Islam stresses both the dignity of the individual and dignity of the society as complementary to each other.

3. Unity of religion: all prophets, beginning from Adam, and ending with Mohammad have the same beliefs. This principle stated in the HQ as follows:

Say ye: 'We believe in' God, and the revelation given to us, and to Abraham, Ismail, Isaac, Jacob, and the tribes, and that given to Moses and Jesus, and that given to (all) Prophets from their Lord: We make no difference between one and another of them.

(HQ, Al-Baqarah: 136)

Islam views the history of mankind in the field of religion as a kind of wave motion; the crest of the wave is the era of the prophet, then the humanity deviates from the true religion; they descend towards the bottom of the curve. After that, God sends another prophet. Therefore, the history of religion is a kind of sinusoidal curve relationship (Attamimi, 1991).

4. The principle of purposefulness in the whole universe. Islam considers every thing or event in the universe is functioning towards its particular purpose. In the HQ: *“We created not the heavens, the earth, and all between them, merely in (idle) sport. We created them not except for just ends.”* (HQ, Ad-Dukhan: 38-39). According to this perception, God subjected all the creation to serve mankind. As a result, mankind has not complete freedom to do whatever it wants. The HQ stated: *“and do no mischief on the earth after it has been set in order: that will be best for you”* (HQ, Alaraf: 85).
5. The principle of responsibility: the human being is responsible in front of God about his conduct in his life. He will be either rewarded or punished according to his deeds. The HQ stated that:

Mischief has appeared on land and sea because of (the meed) that the hands of men have earned. That God may give them a taste of some of their deeds: in order that they may turn back (from Evil).

(HQ, Al-Rum: 41)

Social System: The family is still an important unit of the social system in Jordan. Jordanian family, as a social agency, provides economic and social assistance to the individual throughout his lifetime, but the social control is not practiced really by the family. The economic cooperation and mutual protection are not as strong as they were thirty years ago (Harris, 1958, p. 23). The tribe is the dominant type of most families in Jordan. Because of Western acculturation many changes are occurring, the social system that had started in the abundance of the extended family leans to accept instead the nuclear family (Khoury, 1996).

Value System: Most Jordanians speak Arabic and their religion is Muslim. Thus, about nine out of ten Jordanians share a Muslim Arab body of traditions

(Attamimi, 1991). Therefore, the cultural background and the value system of the Jordanian society are essentially reflections of the Islamic ideology. In fact the traditions and Islamic values cannot be distinguished from each other, since virtually “all tradition is religious and, conversely all religion is surrounded with tradition” (Patai, 1958, p. 222).

The value system firmly establishes sound and sensible environmental behaviors. Thus, Islamic values are considered the programs of action capable of rebuilding life in the right way, which God wanted as a means to ensure justice, restoration and development on this earth (Subbarini, 1993). The position of man in the environment has been established firmly and has been limited with restrictions and conditions, which God has defined: *"It is He Who hath placed you as viceroys (trustees) on the earth"* (HQ, Al-An'am: 165) and *"It is We Who have placed you with authority on earth, and provided you therein with means for the fulfillment of your life"* (HQ, Al-A'raf: 10).

Educators should reflect on the question of trusteeship, or what is currently called stewardship, because it will define man's rights and duties towards his environment. The duty of being a trustee (or viceroy) requires that the created follow what the owner (God) of this environment had commanded, which imply that any individual is not entitled to dispose of what he owns as he pleases, because his ownership is relative and temporary (Subbarini, 1993).

Keeping in mind these key elements of the value system and taking into consideration the ethnic and religious groups and the ecological connotations, a value-system can be developed to serve as foundation of EE in Jordan.

2.2 The Environment

The issue of the environment in Jordan is diverse. It involves various disciplines and sectors of the society, economy, education, and many organizations and ministries.

2.2.1 The Elements of Jordan Environment

Water Resources: Jordan's fresh water resources are very limited. The average total quantity of rain that falls on Jordan is approximately 8425MCM* per year. About 92.2% of the rainfall evaporates. Unsteady rainfall is the norm while the future depends on the availability of water resources, thus making it difficult to rely on natural water sources in future planning (Ramadan, 1990, p. 52). The estimates of projected water allocated show that a minimum of 1342MCM per year is needed to satisfy Jordanian needs in the year 2005. (Kharoof, 2000).

Animals of Jordan: In 1992, the number of animal classifications recorded in Jordan includes 77 species of mammals, 380 birds, 73 reptiles, 4 amphibians, 1000 marine fish and 18 freshwater fish. There is a decline in Jordan's wildlife, mainly in its large mammals, which have suffered greatly from excessive hunting and habitat destruction (GCEP, 1998, pp. 135-137).

Plants of Jordan: Jordan's flora is rich and highly diverse. In 1992, 2500 species of vascular plants have been recorded, within 152 families, representing about 1% of the total world flora. An estimated 100 species are endemic, approximately 4% of the total, which is relatively high by world standards. Many species are known to be rare or endangered including several orchid species and medicinal plants, but the status of many species remains unknown (Juneidi, 1999, p. 6).

* MCM: Million Cubic Meters.

Industry and Mining: With the expansion in chemical industries, since the seventies, pollution is beginning to surface in regions with a high industrial density. The Jordan Petrol Refinery produces about 4.5 million tons of fuel per year. Cement factory produce dust that has to be controlled; dust traps being one of the methods presently being installed. The phosphate mining and fertilizer industry with mines located in desert areas where the fine dust produced amounts to about 10% of total production. However, numerous efforts for the control of dust emissions have been undertaken with a considerable degree of success (Kashakesh, 1998, pp. 82-86).

Energy: Total energy used in Jordan is estimated to be equivalent to three million tons of crude oil. This includes renewable sources (wind, solar, and hydroelectric). Thermal electrical power plants account for a major share of gaseous emissions. Twelve million tons of gaseous fumes are produced by the power plants. Electricity networks cover almost all of the populous areas in Jordan. As for renewable energies, solar water heating is not being widely used, while there are pilot projects to harness the wind energy. Throughout the past three decades, there have been tremendous national efforts to search for local oil and gas resources. These efforts culminated in the discovery of low capacity Hamza oil field in 1984, and the Risha gas field in 1989 (UAER, 1994).

Sewage Collection and Treatment: Sewage collection and treatment networks were introduced in Jordan in 1980 (MMRAE, 1989). Only 28% of the adopted sewage discharge methods are network dependent. Of these 39.5% are constructed in urban areas and 0.7% in rural areas. The most used method of sewage discharge is septic tank treatment covering 69.8% of the housing units in Jordan, 60% of which lie in the urban area, and 39.6% in the rural areas (Tell & Yaser, 1987).

Nature Reserves in Jordan: Since 1975, Jordan has established seven Nature Reserves, covering 1289km², under the management of the Royal Society for the Conservation of Nature (RSCN). Table 2.1 summarized the general information regarding the reserves in Jordan (HKJ, 1996).

Table 2.1: Nature Reserves in Jordan

Reserve (Year Established)	Location	Area km²	Habitat	Description
Wadi Rum (1989)	South Jordan	560	Rugged desert	Rosy mountains
Azraq Desert (1987)	Azraq	320	Marshland	Desert oasis
Wadi Mujib (1987)	East shore of the Dead Sea	212	Rugged and flowing rivers	The lowest nature reserve on earth
Dana (1989)	South Jordan, near Petra	150	Mountains and wadis	Helping nature, helping people
Shaumari (1975)	East desert, near Azraq	22	Flat desert scrub	Home of the Arabian Oryx
Zubia (1988)	North Jordan, near Ajloun	13	Evergreen oak forest	The Evergreen Forest
Azraq (1977)	East desert	12	Marshland	Wetland

Source: Jordan Country Study on Biological Diversity. GCEP (The General Corporation for the Environmental Protection), 1998, p. 161.

2.2.2 Environmental Issues in Jordan

Jordan's environment is exposed to a number of local environmental issues. The main environmental issues were identified as follows (GCEP, 1998, pp. 155-168):

2.2.2.1 Threats to Water Resources

On a global scale, Jordan has limited quantities of renewable fresh water available to the population. The current demand for municipal, industrial, and agricultural water in Jordan exceeds sustainable water supply, and ground water resources are being tapped beyond their renewable yield (HKJ, 1996, pp.13-17).

Water depletion threatens future sustained use. The limited ground and surface water resources are further endangered by pollution from untreated municipal, industrial, and agricultural sources, which, in effect, makes less water available for use and lowers the quality of remaining water (Ali & Hassan, 1994, pp. 16-18). Until now, there is no long-term water master plan for the country.

The water shortage problem is being exacerbated by under pricing water, particularly for agriculture, and inefficiency in collecting water charges. Economical instruments are essential for institutional development and management of the water sector in Jordan (Kharoof, 2000).

2.2.2.2 Threats to Land Resources

Jordan is a mostly arid and semi-arid country. Almost 90% of the land area receives less than 200mm of rainfall annually. This is reflected in its soils, in the land cover of range grasses and forest, and in the way Jordanians use their land. Most of Jordan's economic activities covers 10% of its lands, and competition between different user groups for these lands is, therefore, intense (Jreisat, 1997).

Three main environmental issues related to the use of land in Jordan are considered: (i) land degradation, which primarily includes the physical deterioration and ultimately loss of land, (ii) land contamination, essentially a

result of chemical impacts, and (iii) coastal zone degradation (HKJ, 1996, pp. 18-22).

2.2.2.3 Threats to Urban Environment

Over 77% of Jordan's population lives in urban centers (communities larger than 5,000 inhabitants). Annual growth of the urban population currently is about 5% (Jreisat, 1997).

In general, Jordan has coped well with urban development: housing was made available, drinking water, electricity, educational and health services were extended. Municipal waste collection is functioning well. However, waste disposal barely meets sanitary requirements. Except in some areas, it tends to pollute land and groundwater. Industries are located in and around urban areas, especially in Amman, Zerqa, Irbid, and Aqaba, which complicates the separate collection of domestic and industrial wastes. With the increase in motorization and the concentration of motor vehicles in urban centers, air quality may become seriously affected (HKJ, 1996, pp. 22-23). The negative effects of urban and industrial development are likely to increase with increasing urbanization and industrialization, unless pollution control and prevention measures are taken.

There are three main environmental issues in urban environment:

- 1. Waste Management:** includes: (i) Waste Water Treatment: Plans are that by the year 2020 efficient sewage systems will be available to the vast majority of the population. (ii) Municipal Solid Waste: None of the existing solid waste disposal sites is properly designed and their locations are grossly undermining the objectives set for a safe environment. The health of the people living near these sites and groundwater are at risk (Kashakesh, 1998, pp. 92-95). (iii) Hazardous

waste: The most important chemicals that are imported and that generate hazardous waste are paints, plastic residue, inorganic waste with heavy metals, cyanide, pesticides and solvents (Ahmed, 1989, pp. 12-15).

2. ***Air Pollution:*** The major sources of air pollution are industry, transportation vehicles, solid waste disposal sites, smells from uncollected waste, wastewater treatment plants, energy production, high sulfur content of fuel, and natural pollution (mostly dust) (Kashakesh, 1998, pp. 220-224).

3. ***Uncontrolled Urban Expansion:*** Existing master plans of urbanized areas do not plan urban expansion realistically nor reflect actual market demands. The non-availability of approved national land use plans is identified as the major factor contributing to: (i) unacceptable interaction between industrial zones and urban areas and (ii) inability to combat the permanent damage to agricultural lands which are being converted into urban areas (Jreisat, 1997).

There is a lack of specialists trained in the wide range of urban environmental issues. The shortcomings are at the managerial level as well as at the professional and technical levels, in such fields as hazardous waste management, air quality control, and industrial safety. The need to provide adequate EE should be of immediate concern to Jordan universities (Ahmed, 1989, p. 7; HKJ, 1996, pp. 24-27).

2.2.2.4 Threats to Cultural and Natural Heritage

Jordan is well endowed with cultural and natural heritage. This legacy is a major asset for recreation, education, tourism and their protection is of

major concern. The environmental issues related to the national heritage include:

- 1. Cultural Heritage Degradation:** Jordan's cultural heritage includes such international famous archaeological sites as Jerash, Petra, Umm Qais and Madaba-Mount Nebo. Other historically significant sites include Ummayyad palaces, and Crusader and Mameluke castles of national and international importance. Degradation of archeological and historical sites is compounded by dilution of cultural identity, loss of traditional arts and crafts, and loss of local values and lack of community participation. The presumed lack of worth of traditional village houses, especially in rural areas, makes their destruction casual and common. (HKJ, 1996, p. 26; Jreisat, 1997).
- 2. Natural Habitat Degradation:** Jordan has a diversity of habitats ranging from deserts to wetlands, including coastal and marine ecosystems. Although Jordan has established several Nature Reserves, wildlife habitats are lost due to several reasons, such as wetlands are drying up, land is being over grazed, there is extensive damage from forest fires, plowing of marginal land, hunting, pollution and water mismanagement (HKJ, 1996, p. 27; GCEP, 1998, pp. 155-159).
- 3. Coastal Zones and Marine Resources:** Jordan's coastal zones are very limited; they comprise 55km along the eastern shore of the Dead Sea, and about 27km of the coast along the Gulf of Aqaba. However, unchecked urban growth, tourist development, and pollution from industry and shipping currently threaten this fragile coastal zone (GCEP, 1998, pp. 161-164).

In general, the national heritage has been affected by the lack of a land use policy, depletion of water resources, land degradation, and urban development (Kharoof, 2000).

2.2.3 Jordan's Response Towards the Issue of the Environment

Jordan realizes that the issue of the environment affects all nations, and threatens the attainment of a better life within a healthy environment. In addition, Jordan realizes that the development process and the environment are inter-linked, thus, Jordan subscribes to the total concept of sustainable development in its conscious effort to protect the environment. This can only be realized through the efficient utilization of natural resources, combating desertification, and enhancing biodiversity (HKJ, 1992). However, in Jordan, as in the rest of the Arab World, the issues of environmental protection and natural resources conservation are taking on very disturbing dimensions because of their precarious economic situation and traditional educational systems.

Nevertheless, Jordan has signed many conventions and agreements, on national, regional, and international levels, aimed at the protection of the environment (see Appendix II) (Jreisat, 1997; Kashakesh, 1998, pp. 257-63). In 1982, the large number of institutions involved in environmental issues made it necessary to establish the Department of Environment at the MMRAE (Tell & Yaser, 1987; Jreisat, 1997).

The protection of the environment in Jordan is considered a comprehensive process interfaced with all aspects of sustainable development. According to the Article 6 of Environment Protection Law (see Appendix I), there are several governmental and nongovernmental

organizations which are involved in monitoring the various aspects of environmental pollution. The environmental missions of these organizations are explained in the next pages of this Chapter.

Since the Stockholm Environmental Conference in 1972, Jordan has taken the following remarkable procedures toward the protection of the environment:

The National Environmental Strategy (NES)

In 1991, through agreement with the International Union for the Conservation of Nature (IUCN), and with funding from the U.S. Agency for International Development, the Jordanian government approved and published a national strategy for the conservation of the environment within the framework of WCS. It suggested actions in the field of environmental protection and conservation. It initially proposed that the ultimate safeguard for Jordan's environment should be the public awareness, support and activism, which should be instilled or expanded in the minds of all Jordanians regardless of age, sex, income level, place of residence, or academic qualifications (NES, 1991).

Environment Protection Law No.12/1995 (EPL)

It is safe to say that there was no environmental law in Jordan until 1995. Environmental elements were treated as economic resources to be dealt with not as a coherent whole, but on an ad hoc basis (Al-Omary, 1994). Therefore, when the Department of Environment was founded, it was entrusted with the task of preparing draft law for the protection of the environment. In the end, the EPL considerably changed the situation and provided a comprehensive approach to the issue of preservation of the environment (Jreisat, 1997). The main feature of the EPL is the establishment of the General Corporation for Environment Protection (GCEP).

The EPL is considered milestone legislation for enhancing general awareness of the need to protect the environment and for elevating related activities to higher prominence among many competing public policy issues (Kashakesh, 1998, pp. 31-36). According to Article 2 in this law, *Environment* is defined as "the medium, which supports all living things, i.e. humans, animals, plants, and includes water, air, earth, and all that influence this medium" (see Appendix I).

No one can deny the power of knowledge in shaping people's attitudes (Machado, 1997), yet the EPL does not give the Jordanian citizens their right to get environmental information. Thus, the availability of environmental information within the environment sector concerning water quality and quantity, solid waste, pollution, desertification...etc, is not satisfying users' needs (Jreisat, 1997).

Environmental Impact Assessment (EIA)

Environmental Impact Assessment (EIA) is a prerequisite to all major developmental projects. This responsibility is currently implemented at the Ministry of Trade and Industry in cooperation with MMRAE. In principle, all industrial plans require a strong environmental impact assessment component. However, in the past 30 years, industrialization was centered in the middle of Jordan, with the existing manpower availability and existing infrastructure. Furthermore, new problems have emerged, such as that of handling and safe disposal of hazardous wastes and industrial discharges.

The National Environmental Action Plan (NEAP)

The NEAP was produced in 1995, through multi-stakeholders committees, to the prioritization of the numerous issues raised in the NES, with strong emphasis on public awareness programs. The plan gives more emphasis that reliance should be placed on educating the public in prudent use of

scarce resources, rather than overstraining the economy by imports or investments to meet the demands for resources (HKJ, 1996).

The National Agenda 21

In 1996, based on the resolutions of the 1992 Earth Summit in Rio de Janeiro, the National Agenda 21 was developed in cooperation between GCEP and the United Nations Development Program (UNDP). It addresses all aspects of sustainable development and its effect on the environment, the economy and the individuals.

The National Strategy for EE, Communication and Awareness

In December 1998, the MMRAE credited a National Strategy for EE, Communication and Awareness (EECA) that was prepared by the General Corporation for Environment Protection (GCEP). This strategy has clarified the challenges that faced the implementation of EE programs and generated a public awareness and national vision for the anticipated EE programs.

The strategy includes: a brief description of environmental awareness programs; some indicators of success for the strategy; the target population; how to avoid the risk of the programs; areas of international cooperation; proposals for further EE programs, but did not fully consider the constraints in the educational system; and recommendations for the development and evaluation of EE programs in Jordan. What clearly notable is the strategy emphasis on the role of mass media; press conferences and seminars; activities in the environmental occasions; and posters and printed materials (JES, 1999).

A consultative seminar on the national strategy for EECA, which was held in Ma'een/Madaba during the period 26-28, December 1998, highlighted the following points:

- There are many considerable efforts and EE programs on EECA in Jordan, mainly sponsored by the NGOs, but the outcomes are less than the desired level, due to the absence of the coordination between the agencies, in addition to the deficiency of continuous EE programs.
- The decline of qualified human resources in the area of EECA.
- The most important obstacle that faces the National Strategy is the lack of literature on EE activities and programs in Jordan. Therefore, it is recommended to encourage the researchers to conduct studies that pursue, monitor and evaluate the EE programs.

(GCEP, 1999, pp. 4-11)

Some criticisms have been forwarded toward this strategy. The strategy doesn't include guidelines for a comprehensive or sustainable EE program, therefore, the target population of the National Strategy, as it is assumed, is the whole population. It ignores the EE on school level, except, denoting the participation of school students in the environmental activities within the flourishing, national and international, environmental occasions (Alawneh, 1999).

In addition to the previously mentioned responses towards the issue of environment, most institutional structures and legislation have consorted with the aspects of sustainable development, such as the municipalities, which used to be responsible for urban planning, solid waste collection and other issues related to environmental control. Government institutions also introduced legal codes for the environmental control of pollution, the public health law and agricultural and water management laws (Kashakesh, 1998, pp. 10-11).

In contrast, the activities of most agencies in Jordan, that have a concern toward the environment, reveal that there are no national agreements or cooperative activities to conserve the environment in Jordan, except the 1998 coalition for paper recycling that has been assigned by three societies, namely

Jordan Environment Society (JES), Arab Women Society, and the Royal Society for the Conservation of Nature (RSCN) (JES, 1999).

Jordan, today, is faced with various problems concerning environmental issues, such as organizational difficulties, scarcity of resources and lack of funding for any new programs. Recently, Jordan has received additional infrastructure and investment, as a consequence of the peace process, which increased the pressure on its natural resources, and, at the same time, increased the emitted toxic chemicals and hazardous waste into Jordan's environment (Jreisat, 1997). Therefore, to deal wisely with such situations, long range planning should begin with education. At formal education level, the worth noting response towards the issue of the environment is the implementation of EE concepts into school curricula.

2.3 Education in Jordan

The philosophy of education in Jordan, according to the Education Law No. 27 of 1994, has included several national, religious, and social bases, which emphasize the importance of EE in providing students with knowledge, skills, and proper attitudes, in order to live successfully in a healthy environment in the new millennium (MoE, 1994).

2.3.1 Historical Background

The present educational system in Jordan is inherited from the colonial era. The objective of British colonialism was to educate a group from the elites to work as clerks and employees, who should be able to carry out the tasks assigned to them by the colonial administration. The educational system in the colonial era gave the teacher the authority and the student the passive role, to listen and carry out orders (Harris, 1958, pp. 7-8).

By the time of independence, the indigenous system of education was focused on memorizing, due to the material education that was established and run mainly by the British. The group of clerks and employees who were educated in the colonial system of education were at the top of the educational system in the beginning of the independence era, which started in the late 1940's.

To cope with the independence era, the government made wide changes in curriculum in the 1950's. The change was mainly to different textbooks and in the content of curriculum. The MoE still felt that the educational system was not achieving its goals, so it underwent another curriculum change, in the 1960's. This time the change was focused on generating good citizens; capable of serving the Jordanian society and leading sound family lives. Although the objectives were changed, the methods of teaching and teacher behaviors in the classroom did not change (Massad, 2000).

The MoE came to realize that changing the curriculum, as such, was not effective in achieving its goals. In the period 1987-1989, several educational conferences were conducted in Jordan and committees were shaped to achieve the national goals, which finally led to concrete a comprehensive educational development.

The late king Hussein, who was the speaker in the opening ceremony of the first educational development conference in August 1987, sought to develop and improve the educational practices in schools utilizing and integrating Jordanian community needs, international educational innovations, technological developments, global changes, and the opportunities of sustainable development (Alekh, 1989).

Therefore, the government launched a ten-year educational reform package in 1989, which cost approximately one billion US\$. This project is now bearing fruit in the form of new school buildings, computers and software, laboratory equipments, curricula and textbooks, instructional aids, and teacher education programs.

2.3.2 Educational System

Educational system in Jordan consists of three stages. The compulsory stage consists of ten years, the secondary stage consists of two years, and the higher education consists of two years, which its institutions called community colleges. Education in the universities is not the responsibility of the MoE. Figure 2.1 summarizes the educational ladder in Jordan.

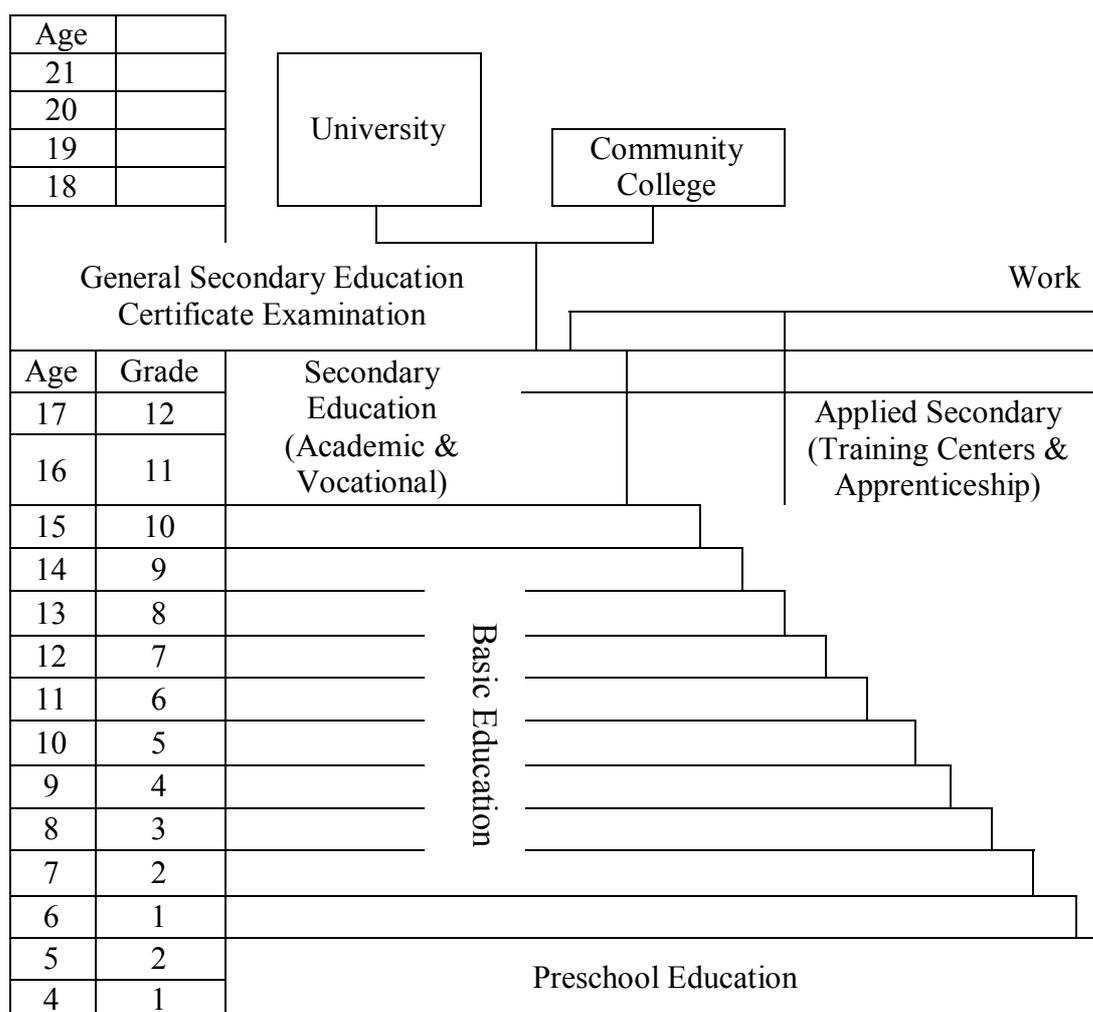


Figure 2.1 The Educational Ladder in Jordan.
Source: Educational Statistics Yearbook, MoE, 1998.

In Jordan, access to basic education has been emphasized in all the country's development plans. The government has, as a matter of policy, provided every village and community, with 10 or more school-going children, with a school. As a result, the rapid spread of facilities enabled citizens in poor and remote areas to gain access to education. Education is free for all primary and secondary school students, and compulsory for all Jordanian children through the age of sixteen.

Most of the secondary schools are preparing their students for higher education. Academic education is divided into two streams: the scientific stream and the literary stream. Pupils who pass the General Secondary Examination, which is called "Tawjihi," at the end of 12th grade, are entitled to enroll in higher educational institutes either inside the country or abroad.

The educational system in Jordan can be described as a highly centralized system. The responsibility of policy planning and implementing is vested in the central body of the MoE in Amman. It formulates and implements the educational policy for the whole country. The MoE is responsible for recruiting, promoting, transferring, and dismissing teachers. It constructs the plans of curriculum, and chooses the textbooks. In general, it has overall control and policy delineating power over the educational organization in the country as a whole.

Regarding higher education, Jordan has eight public universities*: Yarmouk University and Jordan University of Science and Technology in Irbid, Al-Albaeit University in Mufraq, Hashimiya University in Zarqa, the University of Jordan in Amman, Mu'tah University in Al-Karak, Al-Balqa' Applied University in Salt, and Al-Hussein University in Ma'an. Besides that, there are fifteen private universities. The quality of higher education in Jordan has attracted a large number of foreign students. In addition, Jordan has been

* The universities arranged with regard to their location in Jordan from north to south.

a popular choice among students around the world who want to study Arabic in hospitable and friendly environment (GCEP, 1999, p. 12).

During the 1990s, the higher education institutions, with cooperation of the MoE, introduced new programs to qualify inservice teachers with educational skills. These programs generally are designed for teachers having a diploma or a bachelor degree with a major in the field in which they teach. These programs provide many educational science courses and supply some training. At the end of these programs, teachers having diplomas were promoted to Bachelor degrees and those having Bachelor degrees were promoted to Master degrees.

Finally, the educational system in Jordan faces difficult obstacles in coping with the rapid change in society and economy. The main problem is the country's burgeoning youth population, which demands continual expansion of the educational system.

2.3.3 Teaching and Learning in Jordanian Schools

Along with the previously mentioned quantitative expansion and development in Jordan's educational system, Jordan seeks to improve the teaching skills of its teachers. However, what is now happening concerning the educational objectives, classroom instruction and teacher management with these developments and new teaching methods and strategies? In fact, there is a dilemma in Jordan's educational system today. By taking a short visit to any Jordanian school, one will find traditional classroom instruction, where the teachers disseminate facts by lecturing with little laboratory demonstration (Schreier, 1998). In addition, they formally approach the textbook contents as a whole curriculum and the only teaching resource. It is believed that the excessive use of the textbook is one of the most harmful factors in current teaching practice.

Regarding the general climate in schools, most schools have recently begun highly academic programs of study and focused on traditional school subjects, in which the latter are typically highly discipline-oriented in character. This is because, many of the schools have been set up in the last decade, and often seek to establish credibility through a focus on such programs and subjects.

In spite of the present teacher training programs, including preservice and inservice programs run by the universities or MoE, most teachers in Jordan are viewing the current trends in teaching methods and strategies, such as group work, hands-on activities and community-based learning, as non-workable teaching methods. This idea has been generated due to several educational problems, such as the crowded classrooms, insufficient instructional materials, unclearness of supervisors' role, high teaching load, and low teachers' income (Massad, 1995). These problems prevent teachers from transferring the progressive educational methods and strategies from theory to practice.

The philosophy and methods of traditional education lead to the alienation of students from their peers and teachers, and alienation from their society and environment. This alienation results from a climate that is impersonal and unrelated to student interests, experiences, and needs.

The larger proportion of the schools in Jordan is still not provided with adequate material facilities, and there is an absence of many basic services for all students. The main problem in these schools is that the teachers must teach in spite of the lack of physical aids and suitable instructional materials. The practical work is normally demonstrated by the teacher, while the students are not actively involved (Abdallah, 1990, p. 286). The case is the same with respect to the instructional materials. Instructional materials revolve around the use of chalk, walk and talk, while, equipment, tools, aids, services and

facilities mean money, and the schools have insufficient budgets; in addition to that, most parents cannot contribute, due to low incomes.

Finally, the educational system in Jordan over the last twelve years has achieved many developmental applications in all areas of education. There is no explicit textbook in which EE is presented. Socially relevant and cross-curricular subjects, such as EE, have often been viewed as largely peripheral. Therefore, the next section will present a detailed diagnosis of formal EE in Jordan.

2.4 Formal EE in Jordan

School students comprise 34% of Jordanian population, and form an excellent target audience. Many efforts were directed at school students based on the importance of education about the environment (GCEP, 1998, p. 83).

In August 1987, the recommendations of the first educational development conference invited improvement in the educational practices in schools, to assist in controlling global change and to achieve sustainable development. Consequently, an educational environmental strategy was adopted and approved jointly with UNICEF, on January 27, 1991. The Jordanian educational strategy regarding “Education for the Environment” is based on the following principles, which include:

1. The relationship between the human race and the environment is positive; there is a social and moral obligation for every citizen to protect the environment and limited resources of the country and to maintain a balanced ecosystem.
2. The objectives of EE are to educate, orient, and encourage the students at school level to participate and make decisions that will protect and safeguard the environment.
3. EE and public awareness cannot be comprehensively integrated into the daily life of the citizens without correct data, information, human resources and implementation programs and plans, as well as international cooperation.

(HKJ, 1992)

2.4.1 The Implementation of EE into School System

Incorporating EE into school curricula had been achieved through a gradual process that involved three main stages (Rabadi, 1996; Al-Faysal, 1997, p.3):

Stage 1: Transferring the Facts: Systematic EE should enable students to identify key elements of the environment and understand the interactions between them. It is no exaggeration to say that ignorance of the basic concepts and facts of environmental relationships is the main problem facing the dissemination of environmental public awareness in Jordanian society.

Stage 2: Understanding Environmental Issues and Problems: For example, if the student understands that water is an important component of the environment, he will become aware of the different ways in which it can be stored, treated, and distributed, before it reaches his house. EE should enable students realize that many problems, such as pollution, over consumption and illegal use, can affect all living things.

Stage 3: Taking Action: This is the ultimate aim of EE in Jordan. By this stage, the student is able to apply knowledge and understanding to tackle the problems and he/she feels empowered and motivated to do so. The curricula revealed that solving problems does not always require advanced technology and an abundance of money. Many solutions involve simple techniques and behavioral changes, such as switching lights off when leaving a room, rationing water, using fewer plastic bags, etc...

These stages point out that EE mainly integrates with other disciplines in school curriculum, according to the infusion model. MoE in Jordan has published new materials for the school curricula, related to the environment.

There is a range of approaches for the infusion of EE into school curriculum. In Jordan school curriculum, three different approaches are adopted.

1. *Separate subject approach* is adopted in 11th and 12th grades for scientific stream. The title of these textbooks is *Earth Sciences and Environment* (see Appendix XI).
2. *Module within a subject approach* is adopted in limited cases. There is a unit, for example, in *Biology* Textbooks for 9th and 10th grades. Another example is a unit from *Social Sciences* Textbook for 5th grade. The title of the unit is *Environmental Concepts*. Some selected pages of these units are shown in Appendix XII.
3. *Cross-curricular approach* is adopted in all teaching subjects for all grades, mainly for 9th, 10th, 11th, and 12th grades. Some selected pages from Jordanian textbooks that adopt this approach are shown in Appendix XIII.

2.4.2 Environmental Concepts in the Curricula

Environmental concepts are disseminated amongst all subjects for both the basic and secondary levels. The concepts of EE have crystallized in several major domains, which are: Ecosystem Depletion; Population Ecology; Biotic Communities; the Environmental Imbalance; Environmental Pollution; Desertification; Environmental Resources; and Environmental Protection.

Each of these domains comprises basic concepts relevant to that domain; 325 environmental concepts were clearly introduced into the curricula, and each basic concept consists of a number of sub-concepts that can be depicted in the form of hierarchical levels. A simplified connotation of the concept is

given to the lower grades, and then a further complex and abstract presentation is steadily given to the higher grades, comprehensively, and profoundly (Ghazleh, 2000).

In the first grade to the fifth, the children are taught about the water, air and weather cycles, life in the oceans, and how man benefits from his environment - the interdependency among the different inhabitants of this planet. Within the following grades, the concepts become more complex and abstract, with the curricula including: understanding the ecosystem and the environment, safeguarding the environment, energy sources and substitute resources, water treatment for drinking and industrial use and problems in today's environment (NES, 1991, p. 6).

In this regard, Al-Faysal (1997) found that the content of the earth and environmental science textbook for the secondary level in Jordan covered most of the environmental literacy elements, with special emphasis on some of them. The knowledge domain comes first, followed by skills, then affective and behavioral domain. Since the EE concepts themselves are interrelated, they are also interrelated with the concepts of the other sciences, in order to accomplish the objectives of a very diversified topic. It is on the basis of this principle of integration that the Jordanian curricula and textbooks have been prepared, handling the concepts of one discipline throughout different grades and the concepts of different disciplines in the same grade (Al-Faysal, 1997, pp. 64-65).

Some concepts may appear in two different subjects for the same class; however, the way the concept is presented and handled in one subject is different from the way it is handled in the other subjects. In addition, the same concept may appear in the same subject for different grades. Nevertheless, most EE concepts and challenges have been introduced

emphatically in the science textbooks, claiming that EE is a part of science education (NES, 1991, p. 8).

2.4.3 Teaching and Learning in EE

The outlines of the curricula, regarding EE, have laid much emphasis on extra-curricular activities to enable them to cope with the changing world and adapt themselves to its accelerating developments. The functional and applied aspects of such topics have been asserted, as well, through practical activities, which reinforce the content of the school curriculum and link it with the environmental life.

Most textbooks in Jordanian schools contain instructions on how to conduct outdoor activities, such as visiting parks, factories, museums, as well as on how to make direct contact with nature, measure certain environmental factors, record data, and participate in local environmental campaigns. Such activities are mainly applied via summer camps and centers, sports, social and cultural clubs and students' associations, scientific trips to historical, economic and tourist sites, along with personal voluntary involvement in environmental campaigns, such as cleanliness oriented and traffic oriented activities.

Students also take part in fieldwork, and participate in scientific and handicraft exhibitions, in addition to sampling and using the environment's raw materials in activities and teaching media. In addition, there are some activities which invite the students to collect some environmental subjects or to search for some environmental information (Ghazleh, 2000).

EE is not so identified in the teaching-learning process in Jordanian schools (Reid & Sa'di, 1997). In addition, it is easy to see how the objectives of EE may become diluted to fit the objectives of other subjects. Most

teachers still equate EE with science education, and they think that if they have a unit on an ecosystem, they have satisfied their EE requirement.

In EE practices, teachers often provide long-term assignments to search for information about environmental issues. Those teachers are always science teachers, or those who are committed to the issue of the environment. In addition, the homework tasks generally focus on writing reports; the students explore the school libraries and they go to the community organizations that have responsibilities for the issue of environment.

2.4.4 School Clubs for the Conservation of Nature

MoE encouraged the establishment of School Clubs for the Conservation of Nature (SCCN) in Jordanian schools. These clubs were initially created in 1986, by the Royal Society for the Conservation of Nature (RSCN) (JES, 1999, pp. 3-4).

The SCCN mission is to promote the protection of the world's ecosystems and the Jordanian local environment through education. The SCCN also help to develop the values and skills necessary for students to understand their relationship with the environment and to assess its importance to their everyday lives. The main purpose of the SCCN is to provide a fun way for students to get to know and conserve their environment.

Despite there being about 906 clubs in schools throughout the country, SCCN are not found in all schools, they are concentrated in the urban areas. SCCN are well established in some schools, especially those located in Amman. Some clubs conduct nominal research, publish irregular brochures and participate in public campaigns to pick up litter from the compound (Schreier, 1998). Any school that would like to start a club should first apply to RSCN through MoE. The regional coordinator in their area will then inform RSCN, and a member of the Public Awareness staff will visit the

school to explain how to get the club started and to provide a starter kit of information and materials.

Each club is run by a teacher in the school, called the club supervisor, who organizes a program of activities for the students. Clubs' supervisors communicate through the network and work together to develop their club's activities. In this way, the supervisors feel part of a national movement and have access to support and guidance when they need it. Club meetings are used to organize the work teams for the following week. The average number of members in each club is between 30 and 35 students. The participant students in the SCCN have to memorize the following oath:

I swear to preserve nature in my country and work to protect its soil, air, water, flora and fauna, so that it may stay beautiful and rich for my generation and generations to come.

(Ghazleh, 2000)

Teachers also offer environmental activities at each meeting (Ghazleh, 2000). The wide range of educational activities, that SCCN runs, includes:

- Environmental projects like paper recycling, studies of wild flowers and animals, investigating local environmental problems.
- Practical projects like tree planting and clean-up campaigns.
- Visits to nature reserves and museums.
- Making exhibitions and editing magazines.

2.4.5 EE in Higher Education

Graduate environmental programs offered by public universities in Jordan are only at the Master's level (no Ph.D. programs). The offered graduate programs are mainly in civil and environmental engineering, environmental management and environmental health.

Most public universities have introduced EE courses in both undergraduate and graduate degrees. For example, there is a course titled “Environmental Education” taught in the Elementary Education Department and another optional course under the same title at Master degree level in the Science Education Department of various universities. Some EE proposal programs for a Master’s degree (M.A.) at schools of education have already been prepared in some universities, such as Yarmouk University, but no one has yet been actually established.

The nature of the available material is an interdisciplinary course format, with courses in chemistry, biology, engineering and other related topics, such as earth sciences and nature. An environmental specialization at a degree level is, also, not yet to be established (Kashakesh, 1998, pp. 37-38; GCEP, 1999, pp. 15-17). The Applied Sciences University is the only private university that offers a program leading to a degree with an option in environmental engineering.

Finally, it is safe to say that universities have not yet established EE programs, neither at degree level nor at undergraduate level. Therefore, there is no central institute for EE within the Faculty of Education or the teacher education programs.

2.4.6 The Effectiveness of Formal EE in Jordan

Due to the numerous efforts and procedures within the Educational Reform Movement, such as integrating EE into school curricula, it is expected that these reforms would improve the students’ environmental literacy. In addition, the EE process was supposed to be a leader in pushing for interdisciplinary education, critical thinking, problem solving and other integral components of the movement that was set up in 1987.

Despite the fact that most textbooks contain instructions for conducting activities out of school, what is performed in reality is very slight. Most school students are not equipped to conduct EE activities on their own initiative, and teachers have no time to instruct the students to perform these activities (Subbarini, 1989, p. 161). On the other hand, teacher education programs do not pay sufficient attention to the EE aspects (Schreier, 1998). This situation is due in some degree to the large body of the general curriculum contents, and because of the lack of learning activities for EE in particular.

There are inadequacies in the applications of EE in Jordanian schools. This situation is due, in some degree, to the absence of the EE programs. The MoE has spent a lot of money, time, and effort to improve the educational system in Jordan, such as the construction of school buildings, teacher education programs, equipment, curricula, textbooks, instructional materials, and teaching practices in all disciplines, but little has been achieved in developing the curriculum and instruction in EE specifically.

There is a lot of literature concerning the students' learning in the field of EE in Jordan. In 1994, a national survey of environmental knowledge and awareness of 8th and 10th Grade students in Jordan was conducted by the National center for Educational Resources and Development (NCERD) and supported by a grant from UNICEF. The results revealed that the students' knowledge and awareness of environmental issues are rather modest (54.5% correct on the average). Student performance varies significantly with respect to gender - male students, in general, scored higher than female students. Student performance also varies according to school location, where urban students scored higher than rural students.

On the other hand, Mutlaq (1997) studied the SCCN clubs through the assessment of student's awareness, beliefs and knowledge, regarding water

conservation issues. The results indicated that water conservation awareness was high for both teachers and students; specific knowledge about water issues (source, shortage, pollution...etc.) was not high for either boys or girls, even though the school curriculum included these issues; and personal sense of responsibility for water conservation was much higher for girls than for boys.

Reid and Sa'di (1997) and Abu Zaid (1997) emphasized that there is a lack in the students' positive environmental attitudes in Jordan as result of the weakness of the EE programs. Abu Zaid (1997) has assessed the environmental attitudes among the 9th and 12th grades students in 13 Arab countries. The results showed that Arab countries were classified into four levels according to the students' environmental attitudes. The first level includes Saudi Arabia, Kuwait, United Arab Emirates, Yemen and Qatar; the second level includes Tunisia and Morocco; the third level includes Egypt; and the forth level includes Jordan, Iraq, Palestine and Syria.

In addition, Reid and Sa'di (1997) have assessed the pupils' attitudes towards the environment in Jordan and Britain. The findings showed that EE programs produce only slightly positive attitudes. Consideration is given to further research required to enhance such EE programs. Also, the Jordanian pupils scored significantly lower than the British pupils. It might be expected that these differences could be explained in terms of the differences in the formal EE of the two societies. For example, it might be argued that Britain has a more clear and specific framework for EE, in that it is a cross-curricular approach in the National Curriculum. In contrast, EE in Jordanian primary schools is not so identified and its objectives are integrated within other disciplines (Reid & Sa'di, 1997).

However, without evidence of differences in the actual delivery of EE in both countries, this remains speculative, in particular, as British educational

opinion sees cross-curricular approach as the least successful aspect of the National Curriculum. In both countries, it is clear that EE is producing only limited positive attitudes among those who receive it. In addition, it is evident that environmental attitudes are developed outside as well as inside the classroom (Massad, 2000).

The previous studies revealed that there is a lack of students' environmental knowledge and slightly positive attitudes towards the environment in Jordan. That is, EE has not achieved sufficiently its goals and objectives in Jordanian schools.

2.5 Nonformal EE Sector

Since the seventies, much has been done in Jordan towards understanding the environment and recognizing the importance of public awareness and participation in protection of the environment. Several public environmental awareness programs were promoted through governmental and nongovernmental organizations (NGOs). Unfortunately, no single study explored the status of nonformal EE in Jordan.

The following is a general description of the organizations that have responsibilities for the protection of the environment, according to the Article 6 of the Environmental Protection Law, No. 12/1995 (see Appendix I). These organizations are one of the two target groups of the current study.

2.5.1 Governmental Organizations:

The General Corporation for Environment Protection (GCEP)

GCEP is an independent unit governed by the Council of Environment Protection, which is comprised of the minister of MMRAE as the president, Director of GCEP (vice president) with a membership of concerned government officials and NGOs (GCEP, 1999, p. 35).

The main goals of GCEP are to protect the environment, improve its different elements and to implement this policy in collaboration with the specialized parties. The EPL permits the GCEP to do whatever it deems necessary to protect the environment.

GCEP conducts studies and research in relation to the environmental affairs; also, it monitors the public and private establishments and parties, including companies, and projects for investigating their commitment to the approved environmental specifications and standards.

The GCEP is entrusted with a significant legal mandate, empowering it to issue rules and regulations for achieving its objectives. Its functions include setting specifications for acceptable levels of air pollution and establishing centers for observing the quality of air and the sources of pollution.

In addition, the GCEP monitors operations of solid waste disposal, determines standards and oversees implementation. Regarding the GCEP activities and achievements, Jreisat (1997) stated: "I could not determine the dimensions of any future plan of activities nor could I discern the existence of a dependable system of priorities directing current operations."

Ministry of Agriculture (MoA)

The MoA prepared its National Strategy for Agricultural Extension in Jordan in 1996. The strategy focused on the role of agricultural extension in agriculture and rural development. The Agriculture Extension and Information Department (AEID) provides agriculture extension services and seeks solutions to the technical and economic problems facing farmers, by introducing new technologies and establishing linkages and exchanging information with institutions concerned the farmers matters

and issues. AEID also provides training opportunities to farmers' groups and upgrades their abilities and skills, in order to improve their productivity, and enable them to utilize innovations and technologies (Ghazleh, 2000).

Royal Scientific Society (RSS)

The RSS was established in 1970 in accordance with a royal decree. The RSS is a nonprofit institution enjoying financial and administrative independence. It aims at conducting scientific and technological research with special attention to industrial research and services in Jordan. It also aims at disseminating awareness in the scientific and technological fields and at providing specialized technical consultations and services to the public and private sectors (GCEP, 1999, p. 24).

Among its many departments, the Environment Research Center has proved to be very effective in contributing to the protection of the environment on the road to environmental sustainability. The Center has specialized in water and air laboratories and conducts much technical research on industrial pollution control, wastewater treatment, and many other topics related to the environment (Kharoof, 2000).

Ministry of Health (MoH)

The MoH is responsible for all health affairs in the country, including the supply of medication, medical services, vaccination programs against epidemics, public awareness campaigns concerning health issues and health insurance to government officials. In addition, it monitors and controls drinking water to ensure its suitability for human use (GCEP, 1999, p. 20).

The Health Education Division at MoH, in cooperation with the Jordanian Association for Family Planning and Protection (JAFPP), has carried out population and family planning education and communication activities on

a limited scale. MoH has been constrained by the lack of population and family planning policies, while JAFPP lacks the resources to fully exploit its potential in this regard (Ahmed, 1989, p. 3).

The Ministry of Municipal, Rural Affairs & Environment (MMRAE)

The MMRAE is responsible for setting the essentials, or basis, upon which the process of regulating the organization of urban and rural areas in accordance to government social and development policies, in order to enhance the development of local societies, and for preparing a national environment strategy and implementation of it, in coordination and collaboration with national public and official concerned parties.

It is worth noting that the early task of the first administrative unit on the environment, created in the Ministry of Municipal and Rural Affairs (MMRA) in 1980, was to initiate planning for a national environmental strategy (Tell & Yaser, 1987). During the same year, the word "environmental" was added to the name of the Ministry and it was changed to the Ministry of Municipal, Rural Affairs and Environment (MMRAE) (Jreisat, 1997).

Ministry of Water and Irrigation (MWI)

Through the implementation of national water policies, the MWI is fully responsible for water and wastewater in the country. The Jordan Water Authority is responsible for surveying all water resources, conserving them and determining the optimum use for water in accordance with national priorities. In addition, MWI organizes the use of water, regulates its consumption and sets means for water conservation. For example, it produces some environmental conservation programs especially for schools. The output has included some television spots, announcements, posters and lectures in schools (Ghazleh, 2000).

Ministry of Energy and Mineral Wealth (MEMW)

The MEMW is responsible for cooperating and coordinating with all concerned parties on the issue of prevention and protection against radiation. MEMW put forward national plans, conducted studies, and drafted laws in order to protect water and public health against dangerous nuclear and radioactive waste. In addition, it monitors and inspects the licensed corporations to ensure that they have effective preventative and protective systems against radiation (Ahmed, 1989, p. 5).

Ministry of Planning (MoP)

The MoP primary functions are to develop national economic and social plans including environmental affairs. MoP coordinates, with donor agencies and facilitates provides grants for environmental projects. In addition, it coordinates all environmental related activities between the MoP and other concerned ministries. MoP overviews all development projects, from proposals to execution, to ensure that environmental impact has been considered in the design and the implementation (GCEP, 1999, p. 23).

Ministry of Tourism (MoT)

The Department of Antiquities at MoT is responsible for the implementation of archeological policy of Jordan concerning: identification, supervision, protection, maintenance, registration and restoration of archeological sites and monuments. Its duties also include the promotion of such sites on national and international levels, and to create public awareness about them in accordance with prevalent laws and regulations. In addition, MoT officials have the judicial authority to protect public archeological sites (Kashakesh, 1998, pp. 45).

2.5.2 Nongovernmental Organizations:

Jordan Environment Society (JES)

A group of Jordanian citizens became aware of the dangers faced by the environment, and they realized the impacts of this problem, which exceed the boundaries of Jordan to cover all parts of the world, without exception. These people were certain that Jordan could not be isolated from the rest of the world and that people should think globally and act locally. In 1988, this conviction led several university professors, engineers, medical doctors, lawyers, agricultural specialists and professionals from other sectors of the society to establish a nongovernmental, nonprofit, private voluntary society that would work side by side with government institutions. This society was first established under the name “The Jordanian Society for the Control of Environmental Pollution,” and then its name was changed to “The Jordan Environment Society” (Kashakesh, 1998, pp. 44).

One of the main goals of JES is: ”to promote environmental awareness in all sectors of the society and help to create individual and national commitment in dealing with issues of the environment, and rationalizing the use of its elements.” JES attempts to achieve this goal through increasing environmental awareness and educational programs and activities that promote public awareness of the importance of conserving the environment. For instance, JES invites concerned people, and specialists in environmental fields, to participate in JES’s activities; it organizes conferences, workshops and seminars and participates in events related to environmental protection and concerns on the local and Arab levels; it exchanges information and experiences with specialized societies and agencies and issues periodicals related to environment (GCEP, 1999, p. 25-26).

Financial and technical cooperation is taking place between JES and several regional and international agencies and funds, such as the United States Agency for International Development (USAID), the Canadian International Development Agency (CIDA), the German GTZ, International Union for the Conservation of Nature (IUCN), the United Nations Development Program (UNDP) and the Development Alternatives Incorporation (DAI) (JES, 1999).

JES also cooperates with national NGOs, and private sector organizations, such as the Jordanian Society for Controlling Desertification, the Badia Development, the Friends of the Environment Society, the Jordan Women's Federation, the Jordanian Cement Factories Co./Fuheis, Al-Amal Social Work Center/Aqaba, Al-Hussein Youth Camps and the Eidoun Women's Society.

Royal Society for the Conservation of Nature (RSCN)

The RSCN is an independent, voluntary, nongovernmental organization, devoted to the conservation of natural resources in Jordan. It was created in 1966. His Majesty, the Late King Hussein, was the Honorary President of the RSCN. The RSCN has been given responsibility by the Government of Jordan for protecting the country's wildlife and wild places. It is one of the few voluntary organizations in the Middle East, which has been given such a public service mandate (Kashakesh, 1998, pp. 41). The main objectives of the society are:

- To develop projects to preserve the fauna and flora of Jordan; propose the establishment of nature reserves for wildlife conservation; and implement plans to maintain wildlife in its natural environment.
- To reintroduce endangered and locally extinct species to their natural habitat.
- To promote public awareness of environmental issues, concentrating on issues with special relevance to the wildlife of Jordan.
- To protect old buildings, and sites that are considered part of the national heritage of Jordan.

- To promote environmental conservation in cooperation with the Ministry of Education, with special emphasis on the national school curriculum.

(Kashakesh, 1998, pp. 42-43)

The Friends of Environment Society (FoE)

FoE is an independent, non-profit, nongovernmental organization formed in 1995, and specializing in environmental issues, especially EE. The main objective of FoE is to create an environmentally aware generation using modern educational methods that encourage creativity, innovation, and enhance teamwork (GCEP, 1999, p. 46).

Members of the society are volunteers interested in encouraging the younger generation to take an active part in conserving and improving their natural environment. The society focuses on encouraging the private sector to become more aware of its environmental responsibilities. FoE is funded by donations from the private sector, individuals, national and international organizations, as well as membership fees.

National Environment and Wildlife Society (NEWS)

NEWS was established in 1996 (former name, Friends of Plants Society) as a nongovernmental, non-profit organization. NEWS consists of a team of volunteers addressing different environmental issues, who create, refine and disseminate environmental knowledge to help policymakers, and the general public, protect the environment and wildlife, and manage and use natural and environmental resources wisely, and in a sustainable way (Juneidi, 1999, p. 2).

The main objectives of NEWS are to promote the nutritional, environmental, health, and commercial values of plant resources in Jordan, and to encourage people to utilize them in a proper and

sustainable manner; to encourage public participation in protecting the environment and nature, and to adopt environmentally sound initiatives; and to work towards the establishment and application of policies, standards and actions for the protection and improvement of the Jordanian wildlife (Juneidi, 1999, pp. 3-5). It is engaged in activities in different areas concerning protection of the environment, wildlife issues and the promotion of sustainable development.

Arab Women's Organization of Jordan (AWO)

AWO was founded in 1970. It aims at promoting the gender issue, environment, and family planning. It has 1170 individual members and 80 institutional members. AWO has 17 women centers (Ghazleh, 2000).

The National Society for the Protection of Animals (NSPA)

It was founded in 1990, affiliated to SPANA, London (The Society for the Protection of Animals Abroad). The President of the Society is Her Royal Highness Princess Zein Bint Al Hussein.

The Jordanian Society for Cultural and Tourism Awareness (JSCTA)

It was established in 1995, to promote tourism and awareness and to educate communities towards preservation of sites of cultural value, as well as maintaining a clean environment. It aims at promoting social and economic development of communities at tourist locations. The Society consists of 50 members and 15 volunteers (GCEP, 1999, p. 48).

Fertile Crescent Environmental Society (FCES)

This Society is established under the name “Fertile Crescent Environmental Society” with its headquarters now in Amman. FCES may open branches in all countries, which are participants in the Fertile Crescent System. The main objectives of the Society are to activate the role of public participation in order to develop a national sense for

interacting with the environment, and using its elements in a better way. In addition, it aims at intensifying the public environmental awareness, so that positive environmental behaviors become part of the citizens' overall behavior (FCES, 1999).

The Jordanian Society for the Control of Desertification and Badia Development

It was established in 1990, as nonprofit, nongovernmental organization, to increase environmental awareness against the practices posing that accelerate the desertification process. The Society is also concerned with enhancing public awareness to help overcome serious environmental problems. The society means to achieve its objectives, which include carrying out studies and research to determine the causes and mechanism of desertification, in coordination and cooperation with specialists from Jordan and the Arab World, and from international organizations. In addition, it holds seminars, conferences and workshops on desertification and Badia development (Kashakesh, 1998, pp. 62).

2.5.3 The Contributions of Mass Media in EE

As a method of nonformal education, mass media in Jordan has made many contributions in developing public environmental awareness. There are four main newspapers, five weekly magazines, Jordan Radio, Jordan Television local channels and a satellite channel. An estimated 95% or more of Jordan's population is exposed to television and nearly 100% to radio. According to the UNICEF Situation Analysis 1990, the mass media in Jordan played a major role in creating awareness and changing attitudes during the Expanded Program of Immunization, but health auxiliaries come first as the source of information and advice (GCEP, 1999, pp. 19-20).

Currently, among the programs transmitted on JTV, there is a special program on environment, which is considered the first regular weekly program on environment on JTV. Actually, the presenter was very anxious and excited to work on this program, and eventually started to prepare scientific material useful for the viewers, covering local and international environmental issues. In addition, he made field visits to public parks to monitor the behavior of some people concerning environment. This clearly explains the Jordanian mass media understanding of environmental issues, since each media channel (press, radio, TV) in Jordan allocates a special space for environmental programs. Public awareness programs, which are promoted through mass media, have all made important accomplishments in making environmental protection an issue of concern for every citizen in Jordan. The Jordanian environmental media is positive, but it is not up to the required level if compared with what other Arab environmental media have been achieved (Tubasy, 1996).

However, Jordan is still a beautiful country with many natural treasures, but, increasingly, its environment is under threat. Pollution of air and water is increasing; wildlife is disappearing; and unplanned development is spoiling many of our resources. Fortunately, there are considerable numbers of environmental conservation organizations in Jordan and the growing understanding of the importance of nonformal education has stimulated the researcher to study what may prove useful to involve these organizations in the process of EE in Jordanian schools.

In this Chapter, the background of the study regarding the state of Jordan, education, environment, and EE in Jordan, has been discussed in detail. In the next Chapter, the theoretical position and literature related to the present study will be described.

Chapter Three

THEORETICAL POSITIONING AND RELATED LITERATURE

3.1 Introduction

This Chapter reviews the literature related to formal and nonformal EE and highlights the current EE trends and constraints, in order to represent the theoretical positioning of the present study.

There are many significant EE issues, expressed in the literature, related to the current thinking about EE, but the emphasis here will be on those current issues in debate that could serve the objectives of the present study.

The taxonomy that is widely used for educational settings is the concept of formal, nonformal, informal and self-directed learning (Heimlich, 1993). This Chapter focuses on formal and nonformal EE as distinct activities, but only for the purposes of study and analysis. This procedure, hopefully, will result in discovering the best ways to resolve the segregation between formal and nonformal EE in Jordan.

3.2 Environmental Education: an Overview

In spite of the observed progress in EE all over the world during the last three decades, there is a renewed debate over the general status of EE, whether it was in formal or nonformal settings. However, the literature reveals that the scope of EE varies from moving into new meadows of knowledge and challenge existing paradigms (Horton & Hanes, 1993), to restructuring human values, norms, and identities (Payne, 2001).

Below is a description of the deep roots of EE; the concern and the concept; goals and principles; current trends; and EE constraints, in general, and constraints in developing countries, in particular.

3.2.1 The Concept of EE

Definitions of EE have changed over time, and have been influenced by the interests of those doing the definitions. Several definitions have been raised, such as:

EE is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among people, their culture and biological and physical surroundings.

(IUCN, 1970)

EE is a process that develops a citizenry that is capable and willing to work towards solutions to environmental problems.

(UNESCO, 1980)

EE is learning to see the whole picture surrounding a separate problem like air pollution history, the values, perceptions, emotions, techniques and traditional processes that cause the problem and suggested action to cure it.

(Meadows, 1990, p. 5)

EE is a process that has cognitive, affective, conative (action) and skills objectives, as well as an interdisciplinary nature.

(Greenall Gough, 1993, p. 292)

These definitions list specific abilities that EE should help citizens obtain: environmental awareness, concern, knowledge, attitudes, values, behaviors, commitments and skills. Learners require various programs, curricula and resource materials in order to acquire these specific abilities.

On the other hand, EE has commonly been defined through the following three approaches (UNESCO, 1977):

- Education *about* the environment includes the basic environmental knowledge and the understanding of the environmental matters
- Education *through* the environment represents the use of the environment as an educational resource with emphasis on inquiry and investigation and students' first-hand experiences.
- Education *for* the environment concerned with values, attitudes and positive action for the environment.

In general, EE is a critical tool to help people understand and deal with environmental problems and help create a more sustainable society. Moreover, EE has recently become a process based on social-change objectives and strategies. This is because EE provides a critical perspective on traditional approaches to development and the social values and structures that support EE (Fien & Rawling, 1996).

3.2.2 The Goals and Principles of EE

The nature and the scope of EE are to promote the development of responsible environmental behavior (Gigliotti, 1990; Howe & Disinger, 1991). Thus, the internationally accepted goals and objectives of EE are providing a well-built foundation to support the work we are doing now and need to do in the future.

The goals and principles of EE have been documented clearly in the international reports. As for the goals, the Final Report of Tbilisi Conference in 1977 set out three main goals of EE:

- To foster clear awareness of, and concern about, economic, social, political and ecological interdependence in urban and rural areas;
- To provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment; and
- To create new patterns of behavior of individuals, groups and society as a whole, towards the environment.

(UNESCO, 1977, p. 18)

As for the principles, some of them could be derived from the previous definitions of EE. The following is a selection of guiding principles of EE, which were created in the Final Report of a UN seminar on “*EE and Teacher Education in Asia and the Pacific*,” which was held in Tokyo, in 1993 (UNESCO, 1993). The main guiding principles for EE are:

- EE recognizes the value of local knowledge, practices and perceptions in enhancing sustainability;
- EE encompasses the physical environment and resources, in addition to culture, history and social systems;
- EE considers the environment in its totality (economic, ecological, historical, political, cultural, technological, sociological, moral and aesthetic);
- EE develops awareness of the importance of beauty and wonder that is, and can be, found in these aspects of the environment;
- EE explores not only the physical qualities of the human relationship with the environment, but also the spiritual aspect of this relationship;
- EE is a response to the challenge of moving towards an ecologically and socially sustainable world;
- EE is interdisciplinary and can be used to enhance all subjects in the curriculum;

(UNESCO, 1993)

In the light of the previous stated goals and principles of EE, we expect that EE programs will empower the individuals to make effective change to ensure that all species have a healthy environment.

3.2.3 Deep Roots of EE

The starting point of EE depends, more often, on philosophical and cultural perspectives rather than on landmark actions or distinct historical events (see Stapp, 1974; Marsden, 1997; McCormick, 1998). The deep roots of the concern about the environment in general, and EE in particular, were exemplified in different ways: in literatures and poetry; religious teachings and rites; social insights and traditions; curricular philosophies - in both traditional and progressive education; and, later, in the scientific input into nature study (Attamimi, 1991).

The understanding of historical roots often serves to reassert and reintroduce some guiding principles into the current EE debate (Marsden, 1997). On the other hand, it is our obligation to the old generations to make considerations to their knowledge and experiences. The following is a presentation of some enlightened contributions, throughout human history, regarding public environmental awareness that may empower, somehow, the problem of the present study.

Contributions of Literatures and Poets

What contributions might literature and poetry make to environmental understanding and commitment? To use them in promoting EE, Stables (1996) sees that the best way is through the use of texts to illustrate a principle, rather than to encourage the kind of creative thinking about an issue that originates in aesthetic response.

Some of the old romantic poets reflected serious concerns about the environment. For example, William Shakespeare frequently resorted to the natural environment to express his feelings. Shakespeare's use of gardens, landscape and flora and fauna in his plays carries some strong messages for those committed to EE (Stables, 1996).

On the other hand, William Wordsworth (1770-1850) under the title of “*Lines Written in Early Spring*” says:

*Through primrose tufts, in that green bower,
The periwinkle trailed its wreaths;
And 'tis my faith that every flower
Enjoy the air it breathes.*

*If this belief from heaven be sent,
If such be nature's holy plan,
Have I not reason to lament
What man has made of man?*

(Abrams, 1979, p. 152)

In “*An Evening Scene on the Same Subject*,” he says:

*And hark! how blithe the throstle sings!
He, too, is no mean preacher,
Come forth into the light of things,
Let Nature be your teacher.*

(Abrams, 1979, p. 154)

One quotation from Arab history clarifies how much old nations were concerned about the environment. ‘*Mosa Bin Maymoon*’ (1135-1204), the famous Egyptian physician, said in his oath:

I swear to do my best to use the skills of my job to contribute in making all living creatures live in peace, as I believe, as well as those that honor man himself.

I do believe that fulfilling these objectives should secure the necessities of life, such as healthy food, fresh air, clean water, good clothes and shelter, in addition to the right to enjoy the natural and artificial beauty as well as the right to education. Besides, everyone should get the opportunity to achieve the objectives of his existence. He should be able to improve his skills and creativity. He should get the necessary physical and intellectual abilities.

I swear to struggle, through my work, to minimize harm, noise and to attempt to maintain the purity of the earth and to avoid the pollution of water and air.

I swear to stand against the destruction of natural beauty, the loss of the elements of the minerals and natural life.

(Al-Zerekly, 1989, pp. 329-330)

The texts cited above can be seen to convey the environmental message rather than to elicit a response. The approach of ‘reading the environment as a text’ acknowledges that both thought and feeling form our response to the environment, our understanding of the environment and our actions in relation to the environment (Stables, 1996). If it is valid to regard environmental features as texts, then the study of environment and environmental features should be analogous to the study of other kinds of text.

Religious Contributions

In the progress of modern times, people became less trustful of and less interested in culture and religions. Throughout history, if we erased the contributions of religion in constructing human cultures, the remainder would not be worth noting. Thus, we cannot deny the reality of religion and its importance in shaping the attitudes of generations, in clarifying ethics and values, and in modifying behaviors (Attamimi, 1991).

Obviously religions need to be involved with the development of more wide-ranging worldview and ethics to lend a hand in solving the environmental crisis. Therefore, it is the responsibility of the educators to create a common ground for dialogue and creative partnership in visualizing and implementing long rang solutions to some of the most pressing environmental problems.

This is vital because the concepts, attitudes and the values that shape people understanding and appreciation of nature come primarily from religious worldviews and ethical practices. One of the great challenges to contemporary religions, then, is how to respond to the environmental crisis which some believe has been gone out of use by the enormous attacks of materialism and secularism in contemporary societies.

It is obvious that the environmental crisis presents a serious challenge to the world's religions. This is especially true because many of these religions have traditionally been concerned with the paths of personal rescue, which frequently emphasize other worldly goals and reject this world as undignified. How to adapt religious teachings to this task of revaluing nature so as to prevent its degradation marks a significant new phase in religious thought.

Some nations have worshiped environmental subjects. For example, the dogma of hallowing cows and other animals by Hindus is considered, in a

way, as a sort of praise to some components of nature. Furthermore, Hindu teaching bans meat eating and converts the great majority of Hindu people into vegetarians. The implementations of these religious beliefs have led to the protection of Indian fauna from killing and extinction definitely, and in return, the Indian flora has flourished increasingly. Similarly, ancient Egyptians hallowed the Ibis (a large wading bird) because it was their guide to fresh water (Asopa, 1992).

The adoption of the Buddhist religion by a number of Mongol tribes expanded the Buddhist monasticism among them, which minimized begetting and progeny, and over time diminished the occurrence of famines (Abdeljawad, 1996, p. 37).

More recently, Piraja Park, in Salvador, was a place where the Afro-Brazilian religion, called Candomble, celebrated its rites, and because of their practices, the area flourished. When practices of the religion fell into disuse, conditions in the park area became appalling; young people are now exposed to violence, infant mortality is high; there is a high rate of drug use and racism; and many youth have dropped out of schools (UNESCO, 1998).

In an essay entitled: "*The Revealed Religions as Agencies to Conserve the Environment*," Attamimi (1991) showed that the three divine religions consider the conservation of the environment as a religious injunction, and therefore, all people should attain environmental literacy.

What does Judaism say about nature and the environmental crisis? Any discussion of the Jewish view of the natural world must begin with the concrete and specific commandments binding upon all practicing Jews (Katz, 1994).

The worldview of Judaism would be a mere abstraction from the specific rules and principles of Jewish life. In Judaism, philosophical meaning arises

out of the procedure of concrete daily activity. Katz (1994) pointed out that the very next line from Genesis restricts humans to a vegetarian diet, hardly the privilege of one who has dominion, control, and possession of all the living creatures in nature. The Torah thus limits the human right to subdue and use nature. Indeed, Jewish scholars throughout history have gone to extraordinary lengths to disavow any idea that Genesis 1:28 permits the subjugation of nature by humanity.

It is possible to summarize the specific regulations of Judaism concerning nature as that nature has a value independent of human interests, as an expression of the creative power of God. This divinely inspired value thus inspires respect and requires obedience on the part of humanity, the servants and stewards of God's creation.

The universe is God's creation, and that is the undeniable and fundamental starting point of the Jewish view of nature. Understanding the universe as an outgrowth of God's power is the most important aspect of the value of nature in the Jewish worldview. It gives the natural world a force that cannot be ignored (Katz, 1994).

Judaism considers the relationship between man and the environment as a relationship between a master and his servant, respectively. In addition, the man has all the rights to do whatever he wants because the earth is the place of sin, since Adam's original sin. The Lord called unto Adam: "...*Since thou (Adam) ate of the tree that I (the Lord) forbid you it, the earth is cursed.*" (Takween Tome, 3:12 cited in Saqqaf, 1994, p. 78-79). Despite this harmful anthropocentric approach to EE, man must learn how to control the natural resources without offending himself and other people. That is, he can do whatever he wants, but at the same time, he must protect the health of the environment (Ahmed, 1996, pp. 17-18).

What does Christianity tell people about their relations with the environment? The Christian dogma of creation, which is found in the first clause of all the Creeds, has another meaning for our comprehension of today's ecologic crisis. By revelation, God had given man the Bible, the Book of Scripture. But since God had made nature, nature also must reveal the divine mentality. The religious study of nature for the better understanding of God was known as natural theology. In the early Church, and always in the Greek East, nature was conceived primarily as a symbolic system through which God speaks to men: the ant is a sermon to sluggards; rising flames are the symbol of the soul's aspiration. This view of nature was essentially artistic rather than scientific.

However, in the Latin West by the early 13th century natural theology was following a very different bent. It was ceasing to be the decoding of the physical symbols of God's communication with man and was becoming the effort to understand God's mind by discovering how his creation operates.

Marsden (1997) showed that the common three divisions of EE -*about* (the content), *through* (the educational process), and *for* the environment (the social purpose)- have deep roots in biblical teaching. For example, regarding education *about* the environment, we can find in the Holy Bible "*The earth is the Lord's, and everything in it, the world, and all who live in it.*" (Psalm 24: 1). In the Holy Bible, the environment is seen as a victim of human greed, and people are reminded that they are God's stewards and should, therefore, take care of his creation.

On the contrary, In 1967 Lynn White, professor of history at the University of California at Los Angeles, wrote an article contending that the current ecological crisis in the western societies was primarily due to "the orthodox Christian arrogance towards nature" (White, 1967). This arrogance, he

argued, was rooted in a domineering attitude that could be traced back to Genesis, especially Chapter 1:28:

"God blessed Adam and Eve, saying to them, Be fruitful and multiply, fill the earth and conquer it. Be masters of (dominate) the fish of the sea, the birds of the heaven and all living animals on earth".

In the pagan worldview, animals, trees, and streams are seen as endowed with the sacred, so it is evil to harm them without good cause and after going through proper rituals. Sometimes forgiveness is asked from the animal. In the Christian worldview, according to White, Christianity made it possible to exploit nature in a mood of indifference to the feelings of natural objects (White, 1967, Pojman, 1998, p. 12).

At the end of his article, White, himself a Christian, recommended that Christians follow the medieval monk St. Francis of Assisi (1181-1226), who preached to the birds and fellowshiped with the foxes.

White's article immediately created an uproar. White was denounced as "a junior anti-Christ." Radical and even some moderate environmentalists wholeheartedly embraced his position. Some Christians were awakened by his essay and resolved to take more notice of a theology of nature. Others, like Patrick Dobel, agreed that there was much insight in White's analysis but that the biblical picture was not as crudely domineering as White claimed. Human beings were to serve as stewards of Earth, which was God's gift for our careful use.

Indeed, White's analysis was too simple and that a complex web of forces-including democracy, technology, urbanization, and an aggressive attitude toward nature accounted for the ecological mess in which we now find ourselves. To suppose, as White does, that Christianity is the sole cause for our crisis is to support a thesis that lacks evidence (Pojman, 1998, p. 13).

A necessary exercise is the investigation of sacred texts and traditions in search of statements about the relationships, not only between humans and nature, but also between the divine and nature. Christian and Jewish students may read, for example, the Genesis texts where God shows the inherent value of nature through its relationship to the divine (Bratton, 1990).

What does Islam tell people about their relations with the environment? In Islam, all the individual components of the environment were created by God (Allah), and that all living things were created with different functions. These functions are carefully measured and thoroughly balanced by the Almighty Creator (Allah). Although the various components of the natural environment serve humanity as one of their functions, this does not imply that human use is the only reason for their creation.

The Islamic legal and ethical reasons for protection of the environment can be summarized as follows (Deen, 1998):

1. The environment is God's creation and to protect it is to preserve its values as a sign of the Creator.

2. The component parts of nature are entities in continuous praise of their Creator, but humans may not be able to understand the form or nature of this praise.

3. All the laws of nature are laws made by the Creator and based on the concept of the absolute continuity of existence. All the phenomena of nature happen according to the natural law of God, and human beings must accept this as the will of the Creator.

4. Humankind is not the only community to live in this world. Humans may currently have the upper hand over other creatures, but they are beings and, like us, are worthy of protection and kind treatment.

5. All human relationships, either within the human society or with other creatures, are established on justice and equity.

6. The balance of the universe created by God must also be preserved. This is because everything with the God is measure.

7. The environment is not in the service of the present generation alone. Rather, it is the gift of God to all ages, past, present and future.

8. No other creature is able to perform the task of protecting the environment. God entrusted humans with a duty that so heavy and troublesome since no other creature would accept it.

Ahmed (1996) held a study to uncover what might be considered the principles and guidelines of EE in Islamic teachings. His findings can be summarized as follows (pp. 41-46):

1. The whole environment has been created by Allah for man, as Allah says, in the Holy Quran: "*It is He Who hath created for you all things that are on earth*" (HQ, Al-Baqara: 29).
2. Man is part of the environment, in this regard, Allah says: "... Allah has produced you from the earth..." (HQ, Nuh: 29).
3. The environment is controlled by balance and created with exactness. Allah says: "*Verily, all things have We created in proportion and measure.*" (HQ, Al-Qamar: 49).
4. The elements and systems of the environment are communities as well as the human community, and they have their own languages, sensations, and feelings. In this regard, Allah says: "*There is not an animal (that lives) on the earth, nor a being that flies on its wings, but (forms part of) communities like you. Nothing have We omitted from the Book...*" (HQ, Al-Anam: 38).

Therefore, Ahmed (1996, pp. 111-13) recommended that EE should reap benefits from religious education, to specify its goals and intentions. In addition, he has raised the need in Jordan to pay much attention to the social side of EE, as well as to the religious viewpoints.

The prohibition of alcoholic drinks in the Islamic world encouraged Moslems to plant a wide variety of fruit trees and crops. In addition, Islam has decreed strict rules to control the slaughter and sacrifice of animals. This indicates that Islam places emphasis on rationalization in dealing with all genres of animals (Subbarini, 1993).

Through exploring the Holy Quran, the researcher found two main concepts in this regard. The first is making the best investment of environmental components, using moderation and rejecting of extravagance. In this regard, Allah says: "*render the dues that are proper on the day that the harvest is gathered. But waste not by excess: for Allah loveth not the wasters.*" (HQ, Al-Anam: 141). The second is the prevention of corruption in general, and in the environment, specifically. Allah says: "*Do no mischief on the earth after it has been set in order*" (HQ, Al-A'raf: 85), and "*Mischief has appeared on land and sea because of (the meed) that the hands of men have earned. That (Allah) may give them a taste of some of their deeds: in order that they may turn back*" (HQ, Ar-rum 41).

This argument does not seek to support dogmatic beliefs, but we should reject the general public attitude, which considers the man who is driven by religion, no matter what, tend to lose all logic. In addition, it is an invitation to analyze the educational components of rites, and religious teachings, in order to come up with guidelines to develop environmental values and behaviors within the empirical and reasoning approaches of the present human generations. Dalin and Rust (1996) showed that in Europe and North America, values are typically derived from Judeo-Christian and humanitarian

traditions. In this new century, it is imperative that these traditions enter into a dialogue with other religious communities so that schools can embrace more comprehensive values and religious traditions (p. 163).

The greatest need, at present, is for those who train the teachers, to develop advanced environmental ethics courses and programs and to raise a generation of religious educators knowledgeable in environmental affairs (Bratton, 1990). In addition, we may conclude that there is importance in developing a unified environmental strategy, under the guidance of the religious teachings that will contribute, with a conscious positive belief, to the protection of the environment, and moreover, in reconstructing religious education to highlight environmental values, ethics, and behaviors.

Indeed, what is necessary is a wide-ranging review of human-earth relations if the human is to continue as a viable species on an increasingly destructed planet. Therefore, how to make use of the insights of the world's religions is a task of alarming urgency. Therefore, the formulation of a new ecological theology and environmental ethic is already emerging from several of the world's religions. Clearly each of the world's religious traditions has something to contribute to this discussion.

Finally, humanity has reached a stage where it now has a greater need for a return to the precepts of religions and their positive guiding principles, which are geared to firmly establishing environmental awareness. The generations in the Middle East and North Africa live in a region where the three divine religions were initiated. Therefore, the researcher's point of view is to invest in teaching religion in order to establish a firm base for peace and human rights, as well as for EE. This is true to a degree in most cultures. It is of paramount importance in societies that are deeply influenced by Islamic

teaching, such as the Jordanian society, because the divine religions consider the conservation of the environment as a religious injunction.

The contributions of Science and Technology

In the past, the major responsibility of EE had been given to geographers, but lately it would seem that scientists have been more dominant than geographers. Geography is an ideal disciplinary vehicle for EE. Non-geographers are rarely aware of the vast geographic interest, research and literature related to the environment (Saqqaf, 1994, p. 80). In addition, geography was to study "the glorious works of Almighty God," to help us to be "more fitted to dwell with God " (Bowring, 1838 cited in Marsden, 1997).

From the scientific inputs into nature study, we can derive the spirit of EE in Dewey's *Democracy and Education*, when he cautioned against teaching nature study as "an inevitable deadness of topics . . . which are so isolated that they do not feed the imagination" (Dewey, 1980, p. 221). Objects of nature are too often studied in isolation and not as part of a broader ecological system. Dewey wrote:

...to make nature study a study of nature, not of fragments made meaningless through complete removal from the situations in which they are produced and in which they operate. When nature is treated as a whole, like the earth in its relations, its phenomena fall into their natural relations of sympathy and association with human life.

(Dewey, 1980, p. 221)

Dewey's words on the conservation of natural resources, written in 1937, are applicable even now. He wrote:

Conservation of not only the public domain but restoration of worn out land to fertility, the combating of floods and erosion which have reduced vast portions of our national heritage to something like a desert, are the penalties we have to pay for past indulgence in an orgy of so called economic liberty.

(Dewey, 1987, p. 251)

Everywhere today, around the globe, whether in Japan or in Guatemala, all significant successful science and technologies are Western in style and method, whatever the pigmentation or language of the scientists.

According to Pojman (1998), the western science is the inheritor to all the sciences of the past, especially to the work of the great Islamic scientists, for example Al-Razi in medicine; Ibn Al-Haytham in optics; or Omar Khayyam in mathematics. Indeed, not a few works of such geniuses seem to have vanished in the original Arabic and to survive only in Medieval Latin translations that helped to lay the foundations for later Western developments.

Since both our technological and our scientific movements got their start, acquired their character, and achieved world dominance in the Middle Ages, it would seem that we cannot understand their nature or their present impact upon ecology without examining fundamental medieval assumptions and developments.

The leadership of the West, both in technology and in science, is far older than the so-called Scientific Revolution of the 17th century or the so-called Industrial Revolution of the 18th century. These terms are in fact outmoded and obscure the true nature of what they try to describe significant stages in two long and separate developments (Pojman, 1998).

The typical Western tradition of science, in fact, began in the late 11th century with a huge movement of translation of Arabic and Greek scientific works into Latin.

Out of criticism arose new observation, speculation, and increasing distrust of ancient authorities. By the late 13th century Europe had seized global scientific leadership from the faltering hands of Islam.

The most monumental achievement in the history of automation: the weight-driven mechanical clock, which appeared in two forms in the early 14th century.

More recently, many intellectual people continued to listen to nature while it suffered silently. For example, the widespread use of DDT and other long-lasting poisons in agricultural control programs had alarmed Rachel Carson (1962) and her scientific colleagues to the issue of the environment. In her book that entitled *Silent Spring* (1962), she raised the environmental concern all over the world and supports the environmental movement that has made "ecology" a part of everyone's vocabulary.

Silent Spring was a scientific book, but it was also an emotional response to nature. The implications of *Silent Spring* are broader than the immediate environmental crisis with which it dealt. For school students' levels, the following passages of *Silent Spring* are more relevant: "*the obligation to endure; elixirs of death; earth's green mantle; needless havoc; and rumblings of an avalanche*" (Carson, 1962). It is recommended to select such passages and introduce them, as reading articles or as further readings, in teaching languages and sciences. It is the researcher's belief that teaching EE will succeed in this manner, since the youngsters often are defenders of what they read, especially when the passage is an invitation to rightness and forbids mischief, as achieved by Carson, in an indirect manner.

The deep roots of EE make clear a high degree of continuity everywhere concerning the components of EE. This is because EE is a human imperative that has deep roots in the long human history. There were no terrible environmental problems in the past, like those from which we now suffer, but old generations were having care and concern to their environment. This should mean a lot to the present generations, who usurped the environment. And, hopefully, we may draw lightened themes, which guide us in developing

our EE perspectives and practices, just as saying goes: applying past experience empowers us to manage better in similar circumstances next time.

Finally, the researcher believes that environmental educators should be already culturally aware of their community values and structure. They should believe cultural self-awareness and sensitivity to one's own cultural heritage is essential in implementing EE within schools and the general public. In addition, if they are culturally skilled, they will be aware of how their own cultural background and experiences have influenced attitudes, values and concepts about the issue of environment.

3.2.4 The Formal Concern for EE

Throughout the development of EE in the modern history, we can recognize the following five remarkable stages (McCormick, 1998, pp. 154-158, 251-256):

1. Recognition of the Role of EE in Environmental Protection: Stockholm Conference, 1972.
2. Defining the Concept, the Goals and Objectives, the Target Groups, the Approach, and Basic Contents of EE: Belgrade Charter, 1975.
3. Adoption of Guiding Principles and Goals for EE: Tbilisi Declaration, 1977.
4. Laying Down of an International Strategy for EE and Training for the 1990s: Moscow Congress, 1987.
5. Call for Reorienting EE towards Sustainable development, Increasing Public Awareness and Promoting Training: Rio Declaration, 1992.

Before 1972, there was no noteworthy formal concern toward EE. By contrast, after Rio Conference (UNCED, 1992), EE has split its essence in all

formal education systems and, became one of the international educational priorities (Corral-Verdugo & Frias-Armenta, 1996; Wals & Alblas, 1997).

There is a widespread agreement that the concept of raising environmental awareness, attitudes and behaviors of the population is a central element for developing a sustainable environment. The formative contributions have participated in developing the international concern for the environment. For instance, Palmer (1993) investigated the development of personal concern about the environment. Two hundred and thirty two environmental educators were asked to provide an autobiographical statement of life experiences and formative influences, which have contributed to their present concern about the environment and interest in EE. The influential experiences mentioned by environmental educators were: outdoor experiences; formal education courses; parents and close relatives; organizations-including childhood, youth, and adult organizations and clubs; mass media; friends and other individuals; traveling abroad; disasters and negative issues; reading books; becoming a parent; keeping pets; religion; and other experiences that have minor importance.

However, the late century represents the formal foundation of EE in the shadow of a series of independent responses to local issues, in different countries at different times. People began to come together to form local groups responding to different issues. These groups developed gradually to national movements, which, subsequently, combined to become an international movement, and have today become a comprehensive and complex global movement (Subbarini, 1997; McCormick, 1998, pp. 1-4).

3.2.5 Current Trends in EE

The most discernible feature of the development process in EE is the clear boundaries between trends in EE research before and after Rio. Before Rio,

the research efforts were concentrated on the scientific and technological aspects of EE, whilst after Rio, they were generally directed to the humanitarian horizon and focused on the sociological elements. The concern and research in the field of EE produced several trends, which ultimately formed the following branches of EE:

Education for Sustainable Development

The major shift marked in the modern history of EE was the incorporation of the notion of sustainable development as the finality of the human-environment relationship (Fien & Tilbury, 1995). In education for sustainable development, the need is to design EE activities which focus on both the human development and the immediate relevancy to the environment and everyday life of the learner (Wals & Alblas, 1997). Unfortunately, the practices of EE in school systems are still unable to accept new ideas of EE and mainly are 'out of the sustainability date' (Gayford, 1998).

By contrast, other environmental educators, such as Bob Jickling (1992), rejected the "education for sustainability" in school settings. He believed that there is a contradiction between the purposes of education and those of sustainability. Jickling's rejection of education for sustainability is based on autonomous thinking about environmental issues. According to his opinion, education would become training to acquire skills and abilities that can technically occur through repetition and practice without leading to understanding. In fact, education for sustainable development is not associated with conditioning, where a repetitive process is applied to the students in order to achieve desired behavioral results.

Environmental Training

This branch of EE harmonizes mainly with one of the main objectives of EE, which denoted that EE is to educate the individuals at a sufficiently

high technical level in order to provide them with tools to solve and prevent environmental problems (Mansaray & Ajiboye, 1997). Environmental training has been accepted as a methodology of its own. The reason for calling it training instead of education might be because the term ‘training’ has a higher status than the term ‘education’. Training is usually employed as a contrastive concept to education, and it is often more prestigious to be an environmental trainer rather than an educator (Carlsson & Mkandla, 1999).

Environmental Communication

Environmental communication is considered as a “two-way social interaction process enabling people concerned to understand key environmental factors and their interdependencies and to act upon related problems in a competent way.” (OECD, 1997, p. 6). The principal function of environmental communication is the communicating of environmental information and messages among individuals and groups (Carlsson & Mkandla, 1999). On the other hand, a more charitable interpretation would be that environmental communication is more preoccupied with the techniques and technologies of EE (Heimlich, 1993).

Environmental Citizenship¹

Environmental Citizenship aims at creating environmentally responsible citizens, through creating awareness and knowledge of the environment and environmental problems, which leading to environmentally responsible attitudes and actions (Palmer et al., 1995). The environmental citizenship approach targets the outdoors, using partners to assess the needs of certain groups in society and develop custom-made information strategies with specific environmental citizenship messages. There is some evidence that providing students with opportunities to apply environmental

¹ For more details, see; www.envirocitizen.org, 1997.

citizenship action skills successfully in the community may also influence factors, such as *locus of control*² and personal responsibility, that have been shown to be influential in an individual's participation in environmentally responsible behavior (Hungerford & Volk, 1990; Ballantyne & Packer, 1996). It is clear that environmental citizenship overlaps with the philosophy and goals of traditional EE.

Environmental Stewardship³

Nature is continued to be the victim of human greed, and people were reminded that they were God's stewards and should take care of his creation (Marsden, 1997). In this regard, the preventive paradigm seeks to move businesses into environmental stewardship thinking and practice (Simpson & Budd, 1996). Therefore, environmental stewardship is an attitude of care and an uncompromising commitment to life and its preservation (Orr, 1992, p. 133). Simpson and Budd (1996) defined the environmental stewardship as the highest end of environmental attitudes that educators attempt to achieve. To achieve this end, students will need to be able to systematically assess a business in terms of optimal organization to achieve preventive goals. In addition, students will need a strategic context that enables them to show how actions can be taken on a structural and continuous basis. Finally, students will need to be able to discuss value changes, such as the appropriateness of business actions, relative to the environment (Simpson & Budd, 1996).

Generally, EE is fixed firmly, in many parts of the world, within the educational entitlement of all peoples. In addition, these branches of EE

² *Locus of control* refers to the individual's perception of the ability to bring about changes in society through behavior. People with an external locus of control believe that they are powerless to make changes in society. Conversely, people with an internal locus of control are more likely to take action because they expect that their activities will be somehow rewarded.

³ For more details, see Keniry, J. (1995) *Ecodemia: Campus Environmental Stewardship at the Turn of the Twenty First Century: Lessons in Smart Management from Administrators, Staff and Students*. Washington, DC, National Wildlife Federation.

recognize the current EE thinking since they are close to sociological as well as to scientific and technological aspects.

3.2.6 General EE Constraints

In spite of the EE movement during the past three decades, environmental degradation was progressed with problems that are far more than we can imagine. So why has not more been accomplished through EE? In fact, EE is confronted by many constraints and problems, which minimize its effectiveness and make it difficult to realize its goals.

Researchers in EE highlighted a number of potential constraints that vary from philosophical and doctrinal, through structural, to practical constraints imposed by economic, educational and social systems (Rovira, 2000). Below are descriptions of some constraints that often relate to both formal and nonformal EE:

3.2.6.1 Philosophical, Epistemological and Doctrinal Constraints

The relation between man and environment is related to the philosophical, epistemological and doctrinal constraints bases (Subbarini, 1997). Several studies indicated that formal educators are not familiar with the goals of EE and do not prepare to effectively incorporate EE into their courses (Stone, 1989; Wilson & Smith, 1996). Such a situation should encourage environmental educators to hold up philosophical foundation, which is based on the recognition of Agenda 21, that all human beings are entitled to a healthy and productive life in harmony with nature (Subbarini, 1990).

Saqqaf (1994, pp. 16-31) reviewed the development of EE from the philosophical, epistemological and doctrinal perspectives. He found that the need to alter the attitudes and behaviors towards the environment, as an educational activity, must be based on well-determined philosophical

considerations for EE. For instance, he found that the nature of environmental awareness, attitudes and behaviors, are related to the man's culture as factors determining his aims and ultimate goals.

Regarding the epistemological perspective, and, despite the considerable attention that EE has attracted around the world, Saqqaf has highlighted that these efforts often were not accompanied by success commensurate. No real, concrete changes occurred within formal education.

On the other hand, the belief systems of educators influence the way educators teach, cope with new programs and relate to other people. Therefore, environmental educators should advocate doctrinal bases to be considered as standards for EE programs that emphasize man as a distinct part of the web of life, with the consequence that whatever he does to the web he does to himself. In addition, man has a unique position among other living and nonliving components of nature, but this relationship should be one of stewardship and not tyranny (Yaziz, 1985; Saqqaf, 1994, pp. 8-10).

3.2.6.2 Constraints Related to the Environmental Concept

A group of constraints arises from the holistic perspective of the environment, and the complexity of environmental crisis. So, the scope of EE has become vast, due to the great concept of the environment. This is a particular challenge to any educator or those who plan the curriculum. There has been considerable criticism of the educators' tendency to focus on the scientific and technological aspects of the environment to the exclusion of the sociological elements (Subbarini & Al-Hamad, 1994, p. 183; Smyth, 1995). This problem is considered a serious factor that determines the ways in which EE is incorporated into school curriculum (Gayford & Dillon, 1995).

EE in its fullest sense - social, political, aesthetic and spiritual dimensions - indicates that the constraints that confront EE depend on the complex multifaceted nature of environment (Rooyen, 1998).

Therefore, EE can achieve its goals through methodologies that prompt the learner to take concrete actions to improve the quality of the environment such as issue-oriented community service, and interdisciplinary approaches (UNESCO, 1987). Thus, educational programs should imply policy for infusing EE into all school subjects, at all levels of education. In this way, the educational system will be posed to achieve a level of EE popularization across the school curriculum (Adara, 1996).

Subbarini (1997) suggested that such constraints could be overcome by planning and training programs about the interdependence between all living things, the stability of ecosystems due to diversity, and complexity and finite resources which organize the structure of nature and maintain the natural balance. Consequently, environmental issues and problems should be manipulated in relation to the natural state of the laws of nature.

Since environmental awareness cannot be merely made from one discipline, the “environmental culture” should connect with a postmodern thought, which tries to conquer “modern science culture” (Firth, 1995).

3.2.6.3 Constraints Related to the Educational Affairs

In spite of the high level of international support to EE, several constraints and barriers confront the implementation of EE programs within formal education. EE curriculum and instruction should enhance the understanding of historical development, the root causes and the scope of the environmental crisis. In addition, the EE content should take into consideration the pedagogical practices in the different approaches of EE (Payne, 1999).

In order to decide what can realistically be accomplished within the context of school curriculum, there is a need to tackle the challenges and ambiguities of EE curriculum and instruction. Since 1987, Robottom indicated that inquiry orientation of EE curriculum is a challenge to habitual patterns of teaching; its interdisciplinary character is a threat to conventional disciplinary curricular structures; and its emphasis on outdoor education presents problems for existing organizational patterns.

Chen (1997) expected that environmental educators will never be satisfied with the claim that EE can be infused into the current curriculum or taught through school subjects that deal solely with environmental issues, because most students are bombarded with too much content already. He highlighted the need to design a new curriculum, which emphasizes the aspects of sustainable development, which, of course, includes EE, if we are to avoid existing piecemeal therapy technique. In other words, a green curriculum is needed to match the call for sustainable development. This will also involve many closely related advocacy education components, such as global education, citizenship education, democracy education, peace education, AIDS education and Science-Technology-Society-Environment (STSE) approach.

There is a gap between the theory of curriculum development of EE and what happens in school realities (Lee, 1997). Samuel (1993) indicated that the fundamental factors that lead to the difficulties of EE in schools are: (i) the EE misconception of educators (teachers, administrators, and supervisors); (ii) the weak philosophy and hesitating objectives of schools; (iii) the absence of the coordination of EE programs between teachers; and (iv) the differences between the perceptions of teachers and administrators.

Robertson and Krugly-Smolka (1997) classified the constraints and difficulties that teachers face in implementing EE programs into three categories: (i) practical issues, such as constraints posed by time, materials and schedules; (ii) conceptual issues, such as the confusion among researchers and resources, about the nature of EE; and (iii) issues of whether or not teachers feel they have permission to carry out the EE activities.

Wals and Alblas (1997) recommended that if a school wants to improve in EE then it is important to survey the situation the school is in, how it arrived at that situation as perceived by all actors involved jointly, and define the imagined outcome of the educational change process and the route that could transform the present situation into a more desirable one.

In most school systems of the world, teachers feel constrained by the apparent number and complexity of tasks to be done, such as overloaded timetables, which are common complaints of most teachers; deficiencies in teacher preparation for EE; teachers feel they are answerable for their actions, which result in deterring them from going beyond the boundaries of the curriculum; the lack of a mandate to explain what environmental researchers expect. This reality in schools results from a conflict between teachers and researchers. The researchers want teachers to provide EE programs, also, researchers have in mind exciting ideas, such as socially critical action projects, despite the fact that teachers want to provide EE programs, they are not as knowledgeable and skilled as the theorists would have it (Robertson & Krugly-Smolka, 1997).

Finally, there is a great body of evidence indicating that the main EE barrier is in the practical classroom practices of many teachers, which stress traditional teaching methods, that ignore the 'value transformation and social change in EE' (Robottom, 1987). Researchers and curriculum developers

need to consider more carefully the teaching practices when advocating how EE should be taught, and what should be taught in schools.

3.2.6.4 Economic Constraints

Starting from the assumption that it is easier to deal with the negative environmental effects of development than with the negative environmental effects of poverty (Batanouny, 1998), we recognize that poverty and riches are the two economic causes of the problems that face EE (IUCN/UNEP/WWF, 1980).

It is not reasonable to ask a hungry man to follow the rules put down by environmental agencies, when he sees rich countries exploiting these resources. In rich countries, people have used more than their share of the world's natural resources to achieve welfare and luxuries (Batanouny, 1998).

Negative environmental effects of development have yielded some constraints of a wide implementation of EE. For example, in most European countries many elements can be described such as the lack of official governmental recognition of EE; lack of a nationwide EE strategy that incorporating initiatives for formal and nonformal teaching; and lack of effective EE programs that can form the basis for long-term strategies (Filho, 1996).

On the other hand, the negative environmental effects of poverty yielded greater constraints for EE efforts, especially in developing countries. These constraints will be explained in the next section.

3.2.7 EE Constraints in Developing Countries

The most critical constraints confronting the EE programs in developing countries are:

3.2.7.1 Social Constraints

The social aspects in developing countries that represent constraints to EE include:

1. Education became a way to achieve status and position rather than an instrument for problem solving (Subbarini, 1897). The people in developing countries have been taught that the more developed the country, the more it is able to exploit the resources at a high rate. In addition, the history of nations is usually taught as a history of wars and conflicts. This planted in the minds of people that the power to destroy makes heroes (Batanouny, 1998). It is necessary to change these concepts.
2. Population explosions in developing countries contribute to environmental degradation, which in turn endangers values of individual integrity and freedom from outside intrusion (Agib, 1992).
3. In arid zones of developing countries, environmental problems represent a burden on education (Subbarini, 1997). There are marked inequalities in the provision of education for urban, arid, rural areas in many developing countries. This phenomenon creates severe obstacles for education (Vulliamy, 1988; Agib, 1992).
4. Educating mothers represents an indirect investment of the fundamental education of the succeeding generation (Batanouny, 1998). In addition, the education level of women has a paramount influence on family size and birth rates (Srinivasan, 1983, pp. 69-

74). Despite that woman participate in numerous economical activities beside men in many developing countries; they do not have the same opportunities for access to education as their brothers.

However, teaching and learning in EE should be a strategy for altering the aspects of social structure that cause environmental crisis and trap society members in self-defeating patterns of belief and behavior (Vulliamy, 1988). For instance, the positive social aspects in developing countries should be examined by the light of environmental impact and how human beliefs and behaviors affect all species (Bowers, 1993; Evernden, 1992).

3.2.7.2 Practical Constraints

EE in developing countries suffers from the following range of practical constraints (Batanouny, 1998; Agib, 1992; Subbarini, 1997):

1. Scarcity of financial resources needed for the functioning and continuance of EE programs, so consequently, there is a lack of proper resources in terms of equipment, supplementary materials and Internet access.
2. Inadequacy of the academic qualifications of trainers. They either lack competencies required for conducting EE programs or they are rigidly specialized.
3. The modest level of interaction between educators, environmental scientists, the mass media, legislators and social groups.
4. The treatment by the mass media of environmental problems and issues is sensational and abysmally poor in technical details.
5. Transfer of methodologies, concepts, teaching aids and technologies of EE from developed countries without proper modification for

developing countries. The aspects of EE should arise from the environment where they are to be adopted, and maintain respect for different ecosystems and human cultures of the earth.

6. It has been observed that educationalists are using technical terms, which are difficult to assimilate. This may be a result of translating these terms from foreign languages without deep knowledge of the local language. Simple and concise definition of these terms, or the use of simpler terms is of great importance.
7. Lack of necessary scientific information to provide curriculum developers and teachers with the basic data used in EE.
8. There are minor roles of the universities, professional societies, sports clubs, mass media, religious and political associations in the field of EE.

Agib (1992) recommended that the solutions of such practical constraints should include the allocation of necessary funding, developing the capability of national human resources, diversification of EE programs in terms of environmental issues, and promotion of coordination and interaction between institutions and environmental interest groups.

Finally, EE constraints resulted mainly from the limited financial resources and limited EE training programs. Therefore, it is possible to abate the pressure of these constraints by establishing collaboration between formal education sector and other community organizations, in implementing EE programs.

3.3 The Status of Formal EE

As the issue of the environment has become highly complex, the formative EE movement in the late century has had no small effect. Since

1972, international agencies have invested heavily in EE in formal settings. Currently, EE has become a recognized component in educational systems in most countries.

What is not in dispute is that EE, in the formal setting, finds itself in a very competitive and fluid situation. In spite of the fact that EE is thirty years old, its nature and goals are not distinctly understood among teachers, administrators, supervisors, community leaders and even environmental educators (Mcleish, 1993; Rooyen, 1998).

Since EE in formal settings is often not a separate discipline, it should be approached in transitional stages. Therefore, many controversial aspects related to formal EE are in debate amongst the environmental educators.

3.3.1 The Concept of Formal EE

Formal Education settings are, simply, the schools, which are hierarchically structured, with chronologically graded systems, running from kindergarten through university, and including full time technical and professional training (Etling, 1998).

In the race to conserve the environment, educators see formal education as a vital agency in this process, since it controls both the objectives and the means of learning (Rauch, 2000). Since 1971, Elizabeth Wallace has demanded that every teacher must be "a paradigm of environmentally responsible behavior" (Wallace, 1971, p. 496). EE is mainly infused into the formal education system through mandates in schools and in teacher education programs (Heimlich, 1993).

On the other hand, the idea of '*schools in the service of survival*' is crucial and vital for everybody in this world. Within this dimension, there are a number of issues that merit special consideration as humanity faces the new

century, such as world peace, health education and coping with poverty, as well as EE (Dalin & Rust, 1996, pp. 119-124). Undoubtedly, EE is considered an essential requirement for future survival of humanity. Therefore, it should be given a central place in all formal education settings.

3.3.2 Approaches to EE in Formal Education

The final report of Paris Conference (UNESCO, 1980, p. 35) stated that: “there is no universal model for the incorporation of EE into educational process.” Therefore, EE in formal education has the following range of approaches:

Separate Subject Approach

A separate subject that deals specifically with environmental matters could take different forms, such as environmental studies at primary level, education for sustainability at middle level, and an optional environmental subject at secondary level (Rooyen, 1998). This approach could serve as education about the environment, and it would take responsibility for the holistic nature of the EE, because it is regarded as an ecology subject field (Gough & Reid, 2000).

This approach emphasizes the ‘route learning’ and prepares the students for the examinations. Therefore, teaching practices, within this approach, would have less emphasis on improving students’ environmental attitudes, values and behaviors (Motawe, 1992, pp. 65-66; Ballantyne & Packer, 1996).

In Jordanian school curriculum, for example, this approach is adopted in 11th and 12th grades for scientific stream. The title of these textbooks is *Earth Sciences and Environment*. Some selected pages of these textbooks are shown in Appendix XI.

Module Within a Subject

This approach is adding a section (or module) dealing with EE concepts and ideas to an existing subject. This approach is relatively easy to introduce into school subjects (Hungerford et al., 1988, pp. 3-4). For instance, science subjects could include modules on environmental implications such as energy consumption and chemical wastes; social sciences could include a component on the history of environmentalism as a social movement; and languages could include reading articles like those discussed in section 3.2.3.

By the way, in Jordanian school curriculum, for example, this approach is adopted in 9th and 10th grades in biology textbooks and in Social Sciences Textbook for 5th grade (see Appendix XII).

Cross-Curricular Approach

Environmental perspectives are incorporated within all school subjects, so that environmental understanding is developed in the context of all disciplines, the courses, subject materials and activities (Lee, 1997). In fact, this approach draws on the particular subject content to provide educational experiences for students without manipulating subject integrity (Rooyen, 1998).

Although cross-curricular approach is suitable in raising students' motivation to investigate local and global environmental issues, its impact has been restricted to the participating students. In addition, it emphasizes education about the environment, but does not exceed the knowledge domain (Palmer & Neal, 1994, pp. 62-69).

Cross-curricular approach is the most popular EE approach in many countries. For example, in the United States it was supported by the numerous resource books that deal with various environmental issues.

These books have been published mainly through many EE projects such as WILD, CLASS and “Learning Tree” (Chen, 1997). This is because environmental educators would like to spread their message in schools by having their subject become an integral part of the formal curriculum (Chapman, 1999).

Appendix XIII shows some selected pages from Jordanian textbooks that adopted the cross-curricular approach.

Environmental Problem Solving Approach

This approach involves the students in a group investigation process that focuses on real environmental issues and links the curriculum with social and biophysical aspects of the community (Wals et al., 1990). It is considered effective cooperative learning strategy for helping students develop problem solving skills and the ability to work together (Wals, 1994). In addition, it focuses on local environmental issues (Layrargues, 2000); engages teachers in action research towards continual improvement of curricula through involvement with their immediate environment; and generates new learning sources such as people, community organizations and institutions (Rooyen, 1998). Moreover, this is the only approach that is a candidate to meet the equilibration amongst the threefold divisions of EE (*about, in, and for* the environment) that not yet comes under attack (Marsden, 1997).

Most of these approaches of EE in formal education can be characterized as education *about* and education *in* the environment (Thomas et al., 1999). However, there is a need to make a shift to include education *for* the environment, because, the threefold division of EE are not yet implemented in schools in a balanced manner (Fien, 2000). On the other hand, the policy options for EE in formal education are bounded by culture norms and traditions of the local community (Payne, 2001). Therefore, change takes

place very slowly, so the adoption of certain EE approaches in formal education settings depends upon the school environment.

3.3.3 Contemporary Practice

In many cases, schools are concerned with EE as a response to the social climate or the materialistic economic thinking, but not as a response to the awareness of the role that human activities play in compounding environmental degradation. (Robertson and Krugly-Smolksa, 1997). Therefore, there is a disagreement among environmentalists about what happens in classroom settings and outdoors.

Several studies investigated the effectiveness of formal EE in improving students' environmental knowledge, attitudes and behaviors. Briefly, some indicated the presence of positive effectiveness, such as Szagun and Mesenholl (1993), Rovira (2000), and Ballantyne and others (2001). A focus on these studies reveals that formal education is strongly successful, while other studies suggest that this is a mistaken assumption, such as Barnes and Ferry (1992); Membiela and others (1993); Ahlawat, and others (1994); and Walter (1996).

Many schools, especially in developed countries, have made available to EE a variety of facilities such as teaching aids curriculum materials, laboratory analysis equipments and kits (Subbarini & Al-Hamad, 1994, p. 247; Holtz, 1996; Rode, 1997). On the contrary, in developing countries, EE often lends the instructional materials from science curriculum, due to the absence of prepared EE facilities (Vulliamy, 1988).

Teaching and learning in EE depends on the classroom conditions, such as the number of students in a class, their cognitive level, their motivation level, the teacher-student relationship, the quality of the group dynamics in a class,

the professional training of the teachers, and the teaching style of the teacher. These conditions influence teachers' abilities to engage in covering the knowledge component of their teaching subject (Wals & Alblas, 1997; Ballantyne et al., 2001).

At the international level, Lee (1997) has studied curriculum development for EE in Hong Kong schools. He found that, in spite of the efforts made to develop national EE guidelines, there is a gap between the rhetoric of the 'Guidelines' and actual practice. He denoted that the environmental emphasis has been subject-based and institutional commitment to EE in schools has been unsatisfactory.

In Germany, Rode (1997) examined the aspects of EE conducted by teachers and schools that participated in special EE programs, compared to those teachers and schools that did not. He found that special attention is paid to the development of EE in everyday school life since educational practice does not automatically follow inclusion of topics in textbooks. Thus, he pointed out that the representation of EE in German governmental publications and regulations seems to be much brighter than when it is viewed on the basis of empirical findings concerning school reality.

In England, Littledyke (1997) conducted a survey of formal educators to assess the relationships between experience, attitudes and practice in science and EE. The results indicated that the group had positive attitudes to EE, emphasizing ethics and awareness of issues in other countries. He found that educators whose styles were less child-centered and had less emphasis on process and values showed low interest in EE. They also had low interest in environmental issues, which they regarded to be relatively unimportant (Littledyke, 1997).

Generally, not all European countries have formally prepared policies on EE, and although there are countries where the development of EE has been happening without such policies, the lack thereof, leads to difficulties in securing funding for projects, provisions for teachers' training, and the systematic production of resource materials (Filho, 1996).

In the United States, Holtz (1996) mailed a questionnaire to EE coordinators in some U.S. schools to collect data in order to reveal a generalized picture of EE requirements, guidelines, resource materials and teacher education requirements. He found that many teachers teach very few satisfactory EE lessons even in states where it is required. The results clearly indicated that only a small number (28%) of states claimed to have a manual to help educators develop an EE program, but, he found that no more than one third of teachers in their states are adequately prepared to teach EE. Although many states (55%) claim to have prepared EE materials, most of these materials are not comprehensive. They may provide good EE lessons (e.g., Project WILD and "Project Learning Tree"), but they cannot be considered complete EE programs.

On the other hand, Wilson and Smith (1996) examined the extent of publication of material on EE in the school curriculum in the United States. Findings indicated that readers could not readily find information on how to infuse EE into the school curriculum. Thus, teachers, teacher educators and students in teacher-education programs cannot use the literature as a source for information and ideas on how to incorporate EE into the school curriculum. In addition, they indicated that there is considerably less EE material in current educational journals than those of 20 years ago. On the other hand, Holtz (1996) found that the environmental journals, which are distributed to the U.S. schools periodically, are not used effectively in the school curriculum.

Regarding education for sustainability, Gayford (1998) found that the committed science teachers in the United States have a noticeable increase in the breadth of understanding of the ideas related to 'sustainability' between 1994 and 1997, whilst just a few teachers made sustainability concepts a central issue in their teaching.

Due to the enormous concept of the environment, the literature indicated that EE involves a wide range of conceptions in formal education (Stables & Bishop, 2001). These conceptions were varied from teaching about the conservation of natural resources (see Lieberman, 1987; Francis et al., 1993) and the appreciation of nature's beauty (aesthetics) (see Badacsonyi, 1987; Simmons, 1991), through the ecological approach of studying aspects of living and non-living species and relationships (see Lisowski & Disinger, 1991; Orr, 1992) and understanding the interconnections and the effects of human actions and including a spiritual dimension in EE (deep ecology) (see Devall & Sessions, 1985; Lachapelle, 1991), to the recognition of all species and clarifying the responsibilities of humans (environmental ethics) (see Nash, 1989, p. 36; Jim, 1992; Sandlos, 1998) and how human beliefs and behaviors, including political and economic influences, affect the environment (socio-cultural approach) (see Greenall Gough & Robottom, 1993).

Whether these conceptions are rhetoric or realism, several studies showed that EE has a low priority in the schools and in teacher education programs (Grace & Sharp, 2000). Particularly, EE instruction time is limited, and its impacts are hardly visible to the naked eye (Stevenson, 1987; Vulliamy, 1988; Rickinson & Robinson, 1999). Until this situation changes, EE will be failing in its endeavor to prepare students for a world in which environmental literacy will be of critical importance. However, in most countries, there is still a gap between many of the expectations of EE and what teachers are able to do. Most teachers who feel committed to EE develop their instructional

materials based on personal experiences and ideas. They use materials available in the schools library, trade books, videos and media coverage of current issues (Littledyke, 1997).

Generally, most of the ineffectiveness of EE in formal settings has emerged from the absence of solid philosophical foundations of EE; the nature of the educational climate in the schools; the economic level of the country; and other factors relevant to certain country or certain environmental problems (Gayford, 1998). These factors, which have complicated the EE efforts, leave crucial EE issues under debate. At any rate, environmental researchers need to consider more carefully the teaching practices regarding EE, in order to dissipate the discrepancy between the theory and practice in EE.

Finally, the contemporary practices of EE in formal education settings vary considerably in quality and quantity, from country to country and from school to school. However, the general feature that has been emphasized in the literature is that teachers, in the best cases, teach few satisfactory EE lessons. Therefore, it could be concluded that much remains to be done if environmental educators hope to see EE become a priority in formal education settings (NAAEE, 2000).

3.3.4 Research Methodologies in Formal EE

As in any other educational field, the research in EE adopted a wide range of research methodologies. Recently, there is an emphasis on the qualitative methods of inquiry in conducting and reporting EE research (Sebasto, 2000). Gough and Reid (2000) provided guidelines and implications for EE qualitative research, since they considered EE research as profession, science, art and craft.

Nevertheless, Action Research remains the most popular methodology which enables a participant to determine answers to his own problems as he attempts to perform organizational tasks. This type of research is aimed at the solution of an immediate local problem. Action research usually starts with data collection as a means of “arousing dissatisfaction” (Nanda, 1997, pp. 2-3). A study of data produced by survey instruments arouses interest and attention. The educational literature on formal EE expressed, mainly, three types of action research methodologies that were adopted to evaluate and develop EE.

The first one is the expert-based research and development, which has a traditional view of educational change. This is comprised of expert-based research and development based on the idea that outside experts can best diagnose schools and develop prescriptions that could lead to the necessary changes (OECD, 1994).

The second is the community-based research and development, where it surveys the community leaders’ perspectives in order to create the right conditions for EE programs in schools. Therefore, it is supposed that they could provide the study with new information and experiences, and assist in disseminating the findings to other school settings through developing EE programs (Wals & Alblas, 1997).

The third research type is the school-based research and development. This type takes into consideration the school-community (teachers, administrators, supervisors and, indeed, the curriculum developers) in the development, implementation and evaluation of educational change or an educational innovation (Wals, et al., 1990; Wals & Alblas, 1997). Fien and Rawling (1996) indicated that school-based research and development studies in EE should be participatory and practice based. Working actively with formal educators to resolve tensions and contradictions between personal

beliefs and professional practices can provide the personal reflection necessary for meaningful changes in professional practices in EE.

There are other less common methodologies in this field, such as content analysis and direct interactions with the target groups through surveys and interviews, in addition to the empirical studies which were adopted, for example, by Boersching and De Young (1993) to analyze certain models of environmental behaviors, and El-Zubier (1992) to evaluate the acquired environmental knowledge by rural and urban students in Sudan.

Finally, school-based research and development appears to be the most appropriate action research for the present study, since this approach mixes the theory and practices of EE, where formal educators help determine what theories and experiences are the most meaningful and relevant.

3.3.5 The Literature Related to the Study Variables

Research related to EE in formal settings has increased. A number of authors have documented that teachers generally think that teaching EE is important, especially after they participate in an EE workshop (Gifford et al., 1983; Glass, 1982; Ham et al., 1988, Kunz, 1989; Van Koevering & Sell, 1983). Given that little attention is actually focused on EE in the classroom, attitude alone is not a reliable predictor of teachers' confidence in teaching EE. Ham and Sewing (1988) found that this discrepancy was in part due to "barriers" that intervened between teachers' positive dispositions toward EE and their subsequent teaching behavior. A major question that arose here is why some teachers are able to overcome the barriers to teaching EE, whereas others are not.

Since some teachers are able to follow through on their positive attitudes toward teaching EE, despite the existence of barriers, this may correlate with

their deeper confidence in infusing EE into their teaching settings. Understanding the factors that influence teachers' confidence in teaching EE is central to formulating strategies for preparing young teachers to teach EE and may prove especially valuable in preservice training, as well as in inservice educational programs focused on EE. This knowledge could lead to the development of a generation of teachers more committed to teaching about the environment in their classroom. Teachers' confidence in teaching EE could originate in a variety of ways. First of all, I would like to begin a search for existing theory and past research that might pertain to teachers' behavior.

Field theory:

Field theory (Lewin, 1942) formed the foundation for the model-building process. The underlying hypothesis of field theory is that the person's construct and the person's environment operate together in an integral way within the immediate "field of time." Simply, at any given time, a behavior (B) is a function of the person (P) and the environment (E).

From the perspective of field theory, teaching EE is a behavior (B) that is a function of both the teacher and the school environment. The behavior includes such changes in everyday life as taking a field trip with the class, using the school assembly for environmental issues, conducting direct contact with nature activities, or recycling in the classroom. P-factors include the teachers' personality, beliefs, lifestyles, attitude toward and interaction with students, and other internal factors. E-factors include physical factors, such as the ages and number of students, size of the classroom, mood of the students, school curriculum and textbooks, and the availability of school facilities.

Field theory's emphasis is on the immediate time surrounding the behavior. Past life events carry minor weight, thus, field theory leaves a major issue unresolved: What is the role of historic contribution in current and future behavior? Is there a certain background to behavior that must be taken into account along with the P-factor? On the other hand, there is a lack of clear operational definitions for measuring P- and E-factors.

The Theory of Planned Behavior (TPB):

The Theory of Planned Behavior (TPB) (Ajzen, 1985) is based on the assumption that humans are rational beings that make systematic use of information available to them (Ajzen & Fishbein, 1980). An important concept in the TPB is the idea of "salient beliefs" that represent the immediate determinants of a subjective norm or attitude. Six constructs are central to the TPB: behavior, behavioral intention, attitude toward the behavior, subjective norm related to the behavior, behavioral beliefs, and normative beliefs related to the behavior.

From the perspective of the TPB, teachers who teach EE have made a rational decision to do so. The intent of the TPB is to predict and explain voluntary, but not mandatory, behaviors and events. The TPB will not work effectively in predicting or explaining commitment to EE in a school where doing so is required.

Life-Span Developmental Theory:

Life-Span Developmental Theory seeks to predict and explain changes in behavioral responses as a consequence of life events as they occur over a long period of time (Brim & Ryff, 1980, p. 370). This theory seems pertinent to understanding how teachers develop a commitment to teach EE, since it provides theoretical support for a wide range of life events that may influence behavior development among teachers.

Life events (the universe of critical incidents and early recollections) have been identified by many life-span developmental theorists as important antecedents of behavior development and career choice. For instance, Palmer (1993) investigated the development of personal concern about the environment. Two hundred and thirty two environmental educators were asked to provide an autobiographical statement of life experiences and formative influences, which have contributed to their present concern about the environment and interest in EE. The influential experiences mentioned by environmental educators were:

1. Outdoors experiences
2. Formal Education/courses
3. Parents and close relatives
4. Organizations-including childhood, youth, and adult organizations
5. TV/media
6. Friends and other individuals
7. Travel abroad
8. Disasters/negative issues
9. Reading Books
10. Becoming a parent
11. Keeping pets and animals
12. Religion
13. Other experiences that have minor importance.

Life-span developmental theory identified significant life experiences that have had an impact on individuals involved in the environmental field. However, it provides the theoretical impetus for the inclusion of life experiences as they relate to career choices, such as teaching EE.

The previous review and discussion of the of the existing theory and past research, that might pertain to teachers' behavior, but the preceding theoretical diagnoses did not lead to formulate a comprehensive model of confidence in teaching EE because past research did not take into consideration the demographic variables such as teachers' age, gender,

educational experience, academic qualifications, occupation, and the nature of teaching subject.

According to the finding of this study, males of formal educators tend to infuse EE into their educational settings more than females do. Formal educators with higher *academic qualifications* and *educational experiences* tend to infuse EE into their educational settings more than those with lower *academic qualifications* and *educational experiences*. Formal educators who received training in EE tend to infuse EE into their educational settings more than those who did not. Regarding *occupation*, formal educators tend to infuse EE into their educational settings in the following order: educational activities officials, curriculum developers, supervisors, and finally, teachers.

In the present study, the selected independent variables that relate to the formal educators are: gender; educational experience; qualification; occupation; teaching subject; and training received in EE. According to the best knowledge of the researcher, here below is a presentation of the relevant experimental studies:

Gender Differences: Initially, it is worth noting that issue of gender for adults, such as educators, has received surprisingly little attention in EE studies. Since gender is a significant factor affecting attitudes towards most educational subjects, the same may be applied to environmental attitudes which were developed outside, as well as inside the classroom (Palmer, 1993).

A claim frequently encountered in the alternative conceptions literature is that individuals' notions of natural phenomena are robust with respect to gender variable. In a study of undergraduates, Gifford and others (1983) found that men had more environmental knowledge about pollution and ecological issues than women did, while women expressed greater

negative affect toward anti-environmental events. In addition, both Roth and Perez (1989) in the Dominican Republic, and Blum (1984) in Israel, found males to have more environmental knowledge and more positive environmental attitudes than females.

Reid and Sa'di (1997) assessed schoolchildren's attitudes towards the environment in Jordan and Britain, using a specifically designed scale in Arabic and English, according to nationality and gender. The findings show that no such differences were found among the Jordanian children, males and females having almost identical scores. Interestingly, British female pupils scored significantly higher than the males.

In Jordan, a national survey of environmental knowledge of 8th and 10th grade students showed that males had more environmental knowledge than females (Ahlawat et al., 1994). Similarly, Hausbeck and others (1992) found that 11th grade girls are slightly more environmentally concerned and aware, whereas boys are slightly more knowledgeable about the environment.

Research in several societies, and with older pupils and students, has shown irregular gender differences in environmental knowledge and attitudes. However, the literature showed that males generally display greater knowledge, and females report stronger feelings and verbal commitment (Zimmermann, 1996).

Finally, the issues that are raised by gender and education in Jordan, as in other developing countries, is one of the most complex issues for educational debate. Therefore, gender differences need to be explored and explained in order to be taken into considerations in curriculum development.

Educational experience: This variable represents the ‘educator’s practical memory’ which affects the ability to recall personal experience, and, through which educational skills are acquired (Yates, 1984, p. 144).

In the empiricism view, the experience was seen as the imprinting of data on a largely passive mind, which then stored it for future use. This idea can explain why most contemporary educationists consider that the practical experiences carry habitual antagonism to development and training (Winch & Gingell, 1999, p. 142).

Disputes about the role of the educational experience in practical applications tend, then, to be disputes about the efficacy of teacher training programs as a method of developing teaching practices in schools. Fien and Corcoran (1996) found that educational experiences could make the teachers conscious of the transformative nature of EE and empower them to be more active in their chosen profession. Therefore, they recommended that teacher training programs should be based on direct and active teacher educational experience in order to identify, develop and reinforce new skills. In the same regard, Emmons (1997) showed that educational experience participates in the development and revision of a theoretical model of environmental action.

In Britain, Littledyke (1997) indicated that teachers with long educational experience, had positive attitudes to EE, a good understanding of environmental issues, and considered it important and interesting. They were actively involved in both environmental teaching and in environmental action in their lives.

Finally, while many educators disparage the importance of experience in developing the present practices in schools, most research in EE supported

the significance of educational experience in developing teaching skills regarding EE.

Qualification: There are considerable variations among countries in the way in which teachers or supervisors are appointed to their positions. Unexpectedly, the academic qualifications were not mentioned in EE literature according to the best knowledge of the researcher.

Nevertheless, this variable represents the general common criteria for recruiting educators. For example, the criteria for recruiting supervisors in MoE in Jordan include a requirement for, at least, a bachelor degree and diploma of education. Studying this variable may give insights into considerations to review such criteria.

Teaching Subject: In formal education settings, EE had traditionally been linked to science curriculum because the common approaches of EE (*about, through, and for* the environment) have relevance to science education, while EE is considered in all other teaching subjects as a modern option.

Before Rio 1992, most teachers believed that EE should be taught within science education (Simmons, 1989). For example, Ham and Sewing (1988) found that the majority of teachers in the states of Idaho and Washington, named science as the teaching subject in which EE should be taught. The traditional approach to science education is designed to train students to be scientists, but does not train them to be citizens capable to confront many issues in their lives, including environmental ones. Science education practices do not have enough evidences in fulfilling the goals of EE (Abdallah, 1990, pp. 283-286; Ashley, 2000). On the other hand, the effectiveness of most science education practices still in debate, such as the

use of texts, camps and laboratories, which have more emphasis on the acquisition of knowledge and scientific skills than attitudes, values and behaviors. Thus, researchers' efforts attempted to move the teachers' view to go beyond ecology and science education (Robertson and Krugly-Smolska, 1997).

After Rio 1992, the major turning point in EE was the emphasis that EE should traverse all disciplines. There are many reasons why social issues, including EE, should be an important part of every teaching subject not only science ones (Dennis & Knapp, 1997). It is worth noting here that this tendency is confirmed with Dewey's conception of 'development'. Dewey sees that 'development' is concerned with the whole person in the social context and the relationship of that person to his environment (Srinivasan, 1983, p. 38).

EE is an essential requirement for the future survival of humanity and, therefore, should be treated as a central component in all schools' teaching subjects. In addition, the concept of environment is so comprehensive to the extent that there is scarcely a teaching subject in schools that does not have a bearing on the environment. EE is, therefore, not a subject of its own; instead, it forms part of many different areas of learning (Rooyen, 1998).

A national survey in Jordan studied the association between environmental knowledge and awareness of 8th and 10th graders and achievement in Science, Arabic language and Mathematics. The results showed more association between environment and science, and environment and Arabic than between environment and Math. Finally, the survey recommended that both lack of awareness, in general, and differential knowledge of different groups of students over different content areas, call for closer

attention of the agencies concerned with spreading EE in Jordan (NCERD, 1994).

Nevertheless, EE is not being infused equally within school teaching subjects. Simmons (1996) indicated that EE is still treated, mostly, as an enrichment of the science education programs. However the research efforts give support to infuse EE into science education or into all school disciplines. The chronic problem which shows up frequently is the discrepancy between research recommendations and the schools' realities. Thus, it is the school system that decides which is the best position for EE. It can choose the appropriate approach for the infusion of EE into the educational process.

Training Received in EE: Do EE training programs play an effective role in EE? The preparation of teachers has been recognized in many parts of the world as a major priority for research and action in promoting EE (UNESCO-UNEP, 1990; Tilbury, 1992). Braus (1995) showed that teachers who had received training in EE were more effective environmental educators than those who did not. In addition, Wilke and others (1987) reported that few teacher-training programs adequately prepare teachers to effectively achieve the goals of EE in their classrooms (p. 1).

On the other hand, Scott and Oulton (1998) indicated that the commitments to promote EE in schools, at the national and international level, are not always translated into policy relating to teacher education. At the same time, much attention has been given to both the preservice and inservice areas in EE literature. As an example, Fien and Rawling (1996) showed that the status of EE in teacher education in Australia remains at an unsatisfactory level. Ham and Sewing (1988) reported that teachers feel

quite unqualified to teach EE and that they believe they lack practical support in terms of resources, time, and suitable class sizes.

In addition, Williams (1992) listed a number of factors that put a stop to effective incorporation of an EE dimension in teacher education programs. These factors include constraints of time, staffing, and resources; a lack of experience and expertise among staff in respect of the aims; and substance and methodology of EE.

Generally, EE has a low priority in teacher education programs (Wilson & Smith, 1996). In addition, there are actual and potential gaps in EE and their implications for preservice teacher training programs (Grace and Sharp, 2000). Until this situation changes, formal education will be failing in its responsibility to prepare students for a safe future. As a conclusion, most teachers have not been equipped in their teacher training to deal with EE. Obviously, this area of teacher training for EE will need to be given much more attention from researchers (Wals & Alblas, 1997).

As a recapitulation of the previous presentation of EE literature regarding formal settings, the researcher can summarize his envision of these notions, that EE theory in current literature maybe viewed as moving EE into the approach of long term, societal and economically activated action projects, while teaching practices in schools emphasize, environmental knowledge, environmental issues, and, if any, the promotion of the students' affective domain. Thus, EE in formal settings is needed to further studies in order to narrow the gap between the important ideas that have been put forward by modern environmentalists and the traditional views of EE taken by formal educators. Therefore, the level of formal educators' awareness of current thinking is to be assessed. Moreover, upon the results, the curriculum developers and teacher trainers can construct their programs and move up the level of formal educators' competencies to the desired level.

3.4 Nonformal EE

Although much of EE movement is in the formal settings, most of what occurs to educate people about the environment and their relationships to the environment happens in nonformal settings (Heimlich, 1993). Since school is not the only place where learning takes place, the understanding of nonformal EE is essential for any environmental educator who desires to work outside of the classroom. Therefore, this section continues to depict the theoretical background of the study, in order to deepen our understanding of the status of nonformal EE and its effectiveness in developing environmental literacy.

3.4.1 The Concept of Nonformal EE

Developing a single definition of nonformal education is difficult because nonformal activities are numerous and diverse. However, according to Etling (1998), nonformal education is:

any intentional and systematic educational enterprise, usually outside the school system, where the enterprise is adapted for particular students or situations in order to maximize learning and to minimize the maintenance constraints.

While, Philip Coombs (1974) defined nonformal education as:

any organized educational activity outside the established formal system, whether operating separately or as an important feature of some broader activity, which is intended to serve some identifiable learning clientele and learning objectives.

(Coombs, 1974 cited in Etling, 1998)

In general, nonformal education is viewed from the position of the learner and his relationship to the objectives and means of programs. Generally, in

nonformal setting, the learners control the objectives but not the means. Also, the learner controls the reasons for participating, controls the options for completion, maintains the choice to complete or quit, and ultimately determines what to receive from completing the required program. The choice is part of the participation aspect and there is no specified level of performance for the outcome (Heimlich, 1993). It is called nonformal because it is not compulsory, often not lead to a formal certification, and it may or may not be government-supported (Walter, 1997).

From these definitions, nonformal EE activities could be classified into two main types: the first comprises the activities that are organized to improve public environmental awareness and the second one comprises the activities that take place outside the school system.

3.4.2 The Nature of Nonformal EE

The nature of nonformal EE programs may vary from one setting to another. A review of related literature revealed that nonformal EE programs rely either on local resources with low costs that don't give good quality, or on international resources, as it is often occurred in developing countries.

In addition, in nonformal EE programs, both conventional and unconventional sources are used, and the available resources are deployed efficiently. Expensive technology is not necessary and often undesirable. Because learners often bear part of the costs, higher motivation and greater program accountability usually result (Peter, 1989, pp. 12-15). It is supposed that nonformal education could have a direct usefulness, in reference to educational content and methodology directly related to learners' lifestyles.

Reed and Loughran (1984) determined the characteristics of nonformal education as: learner centered; community-oriented content; non-hierarchical

relationship of facilitator and learner; use of local resources; and present time focus.

On the other hand, nonformal EE often has low-level structure, which is necessary when local situations vary greatly between and within themselves. Since a high level of structure means a high level of control, learner-centered approaches, informal human relationships and immediate usefulness, will be difficult under tightly controlled situations (Srinivasan, 1979, p. 41; Etling, 1998).

3.4.3 The Importance of Nonformal EE

EE relies heavily upon nonformal education as a major component of the environmental message being transferred to the public. The new pushes toward education for environmental sustainability demanded the participation of peoples in nonformal activities, where existing formal institutions were incapable of undertaking a task of such magnitude. Thus, the demands of environmental sustainability have given us new appreciation of nonformal ways of providing education for all people around the world (Heimlich, 1993).

On the other hand, nonformal EE plays an important role in building environmental literacy for the whole population because it reaches various population groups and offers varied opportunities for action upon the environment (UNESCO, 1980). In addition, nonformal EE can assist in achievement of personal goals, such as self-confidence and new health behavior. On a community level, it yields increased involvement in community life and services. Nonformal EE programs are effective since they require learners to participate actively rather than to sit passively. Nonformal EE programs can encourage learners to interact with each other and try new behaviors, and help them take responsibility for their performance (Hsu & Roth, 1996).

Formal educators cannot assume that several years of formal education will ensure that students gain and retain all the knowledge and skills needed for environmental literacy (Stables & Bishop, 2001). Therefore, nonformal education could provide some sort of intervening treatment for the maintenance and reinforcement of the knowledge and skills people learned in school (Emmons, 1997). Finally, the use of nonformal setting provides an opportunity to focus on all learning areas together, removed from the constraints of a formal curriculum and school climate.

3.4.4 Approaches of EE in Nonformal Education

The review of nonformal EE literature indicated that the workers in nonformal EE have adopted several nontraditional approaches in order to improve environmental knowledge and awareness among different target groups. Some of these approaches are:

Learner-Centered Approach: The emphasis in this approach is on learning rather than on teaching. The learner participates in determining educational objectives and has considerable control over content and method. Attitudes of self-awareness and power to control environment are fostered. Local initiative, self-help and innovation are encouraged in order to equip learners to analyze critically and take action to resolve their own practical problems (Peter, 1989, pp. 12-16).

Cafeteria Approach: This approach is featured in place of the sequential, prescribed curriculum associated with schools. It consists of a curriculum, which includes several options and flexible activities, and strong entertainment features. Examples include local newspapers and radio, market day exhibits, posters, mobile libraries, drama, role-play, games, puppets, and epic narrative (Etling, 1998).

Workshops in Natural Settings Approach: Many studies have verified the effectiveness of teaching through the environment. Therefore, educators construct learning activities that often require moving into natural settings surrounding the learners, to have direct contact with natural environment, and to explore environmental issues (Heimlich, 1993).

Colvin (1993) found that training workshops in natural settings have a strong effectiveness on the trainers' environmental awareness and behaviors. Thus, the use of natural settings, such as agricultural lands, forests, rivers, marshes, parks, and urban nature and protected areas, could improve the public environmental awareness and behaviors. Most of EE workshops in such natural settings are organized for formal and nonformal educators to increase knowledge, skills and behaviors in EE content and methodology, and understanding of current education reform strategies and issues. Natural setting activities may include training workshops on: pedagogy, learning standards, student assessment and connecting EE programs to schools (NEEAP, 1998).

Public Folklore Approach: Public folklore and traditions are essential means for enhancing human relationships and building consensus over common issues such as environmental issues. Sarathy (1987) sees that it is possible for the "environmental message" to be part of the public folklore and traditions, since national folklore and traditions are economic, active and psychologically effective means.

Story Telling Approach: Stories as a traditional means of communication have been used by people of all ages. Stories can explain natural phenomena, and mold culturally appropriate behaviors (Sandlos, 1998) as well as they enrich life by stimulating imagination, clarifying emotions and suggesting solutions to problems. Stories are successful in doing so,

because they simplify complex situations, which cope with enormous amounts of information (Bardwell, 1991).

Within the field of EE, there is a strong and growing awareness of the value of stories. Many researchers were arguing for an increased role of stories as vehicles of knowledge transfer (Schreier, 1988; De Young & Monroe, 1996). Monroe & Kaplan (1988) argue that the use of stories and talking about what others are doing to solve environmental problems may be as or even more effective than the traditional approach of learning by doing. Monroe (1991) has shown a significant association between interesting stories and attitudes toward taking conservation actions (Monroe, 1991 cited in De Young & Monroe, 1996). Therefore, environmental educators should investigate the pedagogical use of story telling to teach environmental concepts and ideas.

Moreover, Yates and Aronson (1983) found that using stories of 'super-conservers' was a particularly effective means of promoting energy conservation. In addition, Littledyke (1997) takes a postmodern perspective and proposes that the narrative strategies of postmodern fiction should be incorporated into the critical readings of story telling in EE. Similarly, Bell and Russell (1998) suggested that story telling approach would guide our relationship with and participation in nature.

Environmental Action Approach: Some EE researchers are attempting to move beyond studying issues and promoting routine activities. They want to add a focus on education through long-term action projects such as recycling (Robertson & Krugly-Smolska, 1997).

In addition, Greenall Gough and Robottom (1993) have described a model to investigate the environmental issues called "Environmental Action Project." They take the study of water quality in a coastal school as an

example to explain the components of their proposed model. Their model was a comprehensive environmental action program, which includes research, record keeping, correspondence and so on.

Environmental action approach emphasizes environmental action instead of environmental behavior as a goal. Moreover, it focuses on the integration of multiple student learning areas and their combined effect on positive environmental action (Emmons, 1997).

Movies Approach: several studies have examined the influence of Movie-based Approach on environmental knowledge, awareness, concern and attitudes. Iozzi (1989) believed that the media are powerful sources for influencing environmental attitudes and values. He stated that television and films provide a promising medium for EE, given that students learn better when they acquire information through several senses. Eagles and Muffitt (1990) found that films about wildlife lead to significantly more positive attitudes toward animals among Canadian children who watched these films than non-viewer. Similarly, Hausbeck and others (1992) showed that junior and senior high school students in the United States rated television as a more prevalent source of environmental information than other resources.

There are other approaches of nonformal EE, which are less common or haven't sufficient evidence nowadays to indicate their effectiveness in improving environmental literacy (Stables & Bishop, 2001), such as *Risk Instruction* (see Riechard, 1993), *Role Play Approach* (see Blum, 1987; Errington, 1991), and *Environmental Issues Approach* (see Knamiller, 1987; Young & Maggs, 1987).

3.4.5 Teaching Nonformal EE

In nonformal EE, it is often assumed that little instruction for learning is necessary. Teaching methods in nonformal settings mainly emphasize flexibility, thorough preparation, ability to anticipate learners' changing needs, willingness to adapt to learners, and a healthy cynicism toward institutions (Peter, 1989, pp. 12-16).

In addition, much of nonformal EE activities occur “outdoors,” such as youth groups, service clubs, tours, nature sites, camping and scouting centers. The methods used are often confused with the philosophical base of instruction. Moreover, in constructing nonformal educational experiences, Heimlich (1993) emphasized the importance of the imposition of the human into the learning settings, whether they are in a classroom, assembly room or mountains.

It is worth noting here that a misconception that often appears is the labeling “Nonformal” to any teaching method that is considered nontraditional or extracurricular activities. When a school class moves to the outdoors for a session, it is still operating in a formal education setting because the goals and the means of instruction are controlled by the institution. While a learner who chooses to attend a seminar on habitat in a nature preserve, is controlling the learning objectives by choosing to attend while holding previously established expectations for determining the success of the program (Heimlich, 1993).

Nonformal EE programs usually use different materials and facilities such as parks, nature centers or reserves, zoos, museums, scouting camps, farmer training centers, etc (see Peter, 1989, pp. 12-16; Negra & Manning, 1997). For instance, parks are considered unique locations for environmental literacy, since they are places where people may develop their concern for nature through contact with natural environments. Parks also, as places for

spending free time and seeking out new experiences, provide opportunities for learning about natural systems, which may increase awareness of how nature is threatened by human actions (Negra & Manning, 1997).

3.4.6 Working Organizations in Nonformal EE

One of the influential threefold divisions of EE is education *for* the environment (Palmer & Neal, 1994, pp. 18-22). Education *for* the environment is the social purpose of EE (Marsden, 1997), and hence, the role of community organizations is in supporting this division of EE. Although EE prepares students for the profit of society, the extent to which the community organizations are able to prepare people for conservation of the environment is a matter of great concern. The main role that community organizations can play, in achieving the educational goals, is by providing a healthy climate which takes into account the desires, beliefs, and abilities of learners. Clubs, service groups, charity societies and various organizations are perhaps more significant providers of nonformal EE on a continual basis (Holtz, 1996; McDuff, 2000).

On the other hand, Schafer (1981) suggests that the real friends of EE are not the formal education agencies, but rather the environment-related management and protection agencies. Organizations that respond to constituent needs and provide services or programs are often operating as nonformal educators.

Similarly, Kahler (1998, pp. 4-8) considered that environmental NGOs are the true initiatives of nonformal EE and that their efforts clearly demonstrate the advantages of linking nonformal education methods and approaches to a wide range of people. In addition, he stated that environmental NGOs are flexible, not only in terms of their educational approaches, but also in terms of their ability to intervene in a timely fashion in response to development problems.

Nonformal EE agencies are usually provided by a number of voluntary organizations and groups of amateurs. Those, certainly, have good will, but frequently lack the necessary specialist knowledge. In the last decades, one can notice that numerous people without deep knowledge of the environmental issues have adopted the new mode of speaking, writing and even publishing about the environment and environmental protection. In addition, many nongovernmental groups have been established under the flag of environmental protection. However, they lack the basic information and knowledge. They perform their activities as if they are preaching. In other words, insufficient human resources committed to the EE programs, especially in developing countries, opened the doors for amateurs (Srinivasan, 1983, pp. 69-74; Batanouny, 1998).

3.4.7 Target Groups of Nonformal EE

Nonformal EE programs are instituted for the wide sphere of the public. The target groups of nonformal EE consist of all community sectors, but mainly, adults. In most cases, target groups consist of the powerless classes such as housekeepers, farmers, dwellers in rural areas and slums, in addition to the children and youth (Khoshoo, 1987).

Since nonformal EE programs should reach all community sectors, nonformal EE leaders should take into consideration the wide range of differences such as age and educational level. Target groups may include some illiterates, especially in developing countries, and demographic variables such as race, income level and residence area (Mehta, 1987).

Therefore, the large range of audiences represents one of the main constraints that face environmental organizations. In this case, these organizations should not work randomly in any field, (Batanouny, 1998), they need to know the segments of local community in order to work out general concepts. These variations among the target groups reflect the need to survey

the local communities in order to assist nonformal EE leaders in designing suitable programs.

3.4.8 Research Methodologies in Nonformal EE

The literature related to nonformal EE seems noticeably different from that on formal EE. Researchers in nonformal EE focus often on what is needed to understand the content of learning *about*, *in* and *for* the environment from this source and its effect on and interaction with that learning in the classroom.

Nonformal education studies, in general, are done at the micro-level, within communities. Most are qualitative and descriptive and can be classified as survey research (Sebasto, 2000). Not many researchers have used experimental methods to document behavior changes or the acquisition of environmental literacy. In addition, there are other less common approaches, such as evaluation research (Monroe & Kaplan, 1988).

3.4.9 Related Literature to the Current Study

The following is a review of nonformal EE literature that relates to the current study:

Firstly, Kirk and Wilke (1997) studied the status of nonformal EE programs to provide baseline data for EE in the 50 United States. The findings showed that 11 states' leaders reported having a state EE master plan to guide future planning; 13 additional were actively developing master plans to guide their efforts to create comprehensive EE programs; 15 reported having EE curriculum guides; and 23 had EE interagency committees, which had helped to ensure coordination and eliminate overlap among the state agency EE providers.

Most respondents reported that EE programs and training were being provided by numerous nonformal outdoor and EE centers. Twenty environmental state leaders reported they had EE centers or regional offices, or both, that were assisting educators and administrators in implementing EE into the schools. The centers were providing services such as resource libraries, inservice programs and assistance for infusing EE into district and school curricula. In addition, these centers were serving as central links for networking among teachers interested in EE. Finally, respondents identified several revenue sources for EE efforts such as environmental license plates, lottery funds and pollution fines.

Secondly, Sebasto (1998) assessed the EE programs and activities of educators in a nonformal educational organization-the University of Illinois Cooperative Extension Service (UICES). The findings showed that the percentage of educators who were currently delivering or developing new programs about the environment and/or infusing education about the environment into their programs was 41.5%. Additionally, 80% of educators, who indicated that they were infusing EE concepts into their educational settings, reported doing so in less than 25% of their educational settings. Educators cited better access to resources and more inservice training as key situations that would affect the extent to which they infuse EE concepts into their educational settings. In addition, they cited lack of knowledge/background as the primary reason for not infusing EE concepts into their educational settings. On the other hand, only 1 of 5 UICES educators indicated that they were not interested in programming about the environment. Despite these facts, nearly 9 of 10 UICES educators, whose programming has environmental content, believed that their educational settings contribute to the development of environmental literacy.

Thirdly, Hsu and Roth (1996) have assessed environmental knowledge and attitudes held by community leaders in the Hualien area of Taiwan. They developed a 55-item instrument, administered by mail. They found significant differences in knowledge level by age, education level, occupation and ethnicity. The multiple regression, which they used as the main statistical analysis, indicated that the education level was the best predictor of environmental knowledge and attitudes. They found, generally, the level of environmental knowledge and attitudes were moderately high, and the attitudes appeared to be positive. They recommended that environmental educators should improve and intensify the content of environmental matters in the mass media and emphasize an informal atmosphere and a nonacademic approach to EE for community leaders, such as field trips, outdoor activities, slide shows and movies. In addition, they suggested that both formal and nonformal organizations should be effectively tapped to improve people's environmental knowledge and attitudes.

Taking advantage of the previous studies, the researcher designed his study and built an instrument to survey the status of nonformal EE programs in Jordan.

3.5 Formal Versus Nonformal EE

Formal and nonformal modes of education are integral components of a lifelong learning process. An individual's set of environmental beliefs and behaviors reflects the integration of these learning experiences (Negra & Manning, 1997). Most definitions, described previously, revolve mainly around the issue of who holds the control of objectives and means of learning - either the institution or the learner (Heimlich, 1993). In fact, the term formal education refers to the structured educational system supported and operated

often by the state government. In contrast, nonformal education refers to education that takes place outside of the formally organized schools.

There is a continuing debate in some educational circles about the relative merits of formal and nonformal education. There is an argument in literature which shows that EE in nonformal settings has the same effect as formal schooling, producing environmentally aware citizens. Generally, formal EE produces citizens environmentally aware, while, nonformal EE produces citizens environmentally behaving. This analysis reveals that they are complementing each other. A general notion is that these two educational settings are mediated by “autonomy” or “empowerment” settings rather than by shared activities or coordinated programs (Walter, 1997).

Coordinating formal and nonformal education activities may, hopefully, help to address and answer questions that have begged to be answered for a long time. In developing countries, some of these questions are: what is the best EE curriculum and how should it be taught? Why do people think poorly of formal educational institutes and of the environment? Moreover, what are the possible forms of coordination among formal and nonformal environmental educators? However, certain links and coordination between formal and nonformal education would participate in achieving the ultimate goals of EE. It seems probable that a more balanced approach or model for formal versus nonformal EE will need to be developed by educational theorists.

On the other hand, the framework of the present study harmonizes with the significant component of Agenda 21, especially from the point of view of developing countries, with its strong emphasis on the role of education in empowering people for sustainable development (UNCED, 1992). Thus, the framework could be described as follows:

1. EE, both formal and nonformal, leads to empowerment of the individuals and the communities.
2. This empowerment results in new environmental behaviors.
3. These behaviors, in turn, affect social transformation such as thrift, cooperation and socio-economic behaviors.

In the light of the previous review of literature, the researcher recapitulated the theoretical positioning that runs through the present study as follows:

1. EE has the potential to lead educational reform that ultimately can help reshape relationships between people and their environment. Therefore, EE can be viewed as a participatory process that leads to educational reform. This means that EE is not a mere instrument that can modify behavior in a predetermined direction.
2. The environmental knowledge acquisition is not sufficient to affect significant value, belief, behavioral and cognitive shifts in individuals. Therefore, EE should lead to the critical thinking about environmental issues that affects the quality of human life and the lives of other species.
3. Exploring environmental educators' perspectives, competencies and deficiencies is a vital procedure in recognizing the conditions or procedures that result in spreading EE in schools.
4. Supporting EE programs should be developed by formal and nonformal EE sectors, governmental and non-governmental, to involve young people and children in environmental activities.
5. There is no literature, in the best knowledge of the researcher, on nonformal EE in Jordan. Most of the work done in Jordan relates to the assessment of the components of students' environmental literacy and content analysis of curriculum, at the same time, all these studies are in formal EE. Studies in other parts of the world,

such as those described in sections 3.3.5 and 3.4.4, do not refer to the conditions in Jordan. This points to the importance of the present study which surveys the status of formal and nonformal EE in Jordan, with the aim of improving and coordinating EE programs.

Today's seeds are tomorrow's flowers. Renewing EE programs and coordinating EE activities means not only reforming schools, but also, investing in all settings where education takes place.

Chapter Four

METHODOLOGY OF THE STUDY

This study is a survey research that aims at describing and determining significant issues and concerns by soliciting input from individuals and organizations regarding EE. In light of the previous chapters, it is obvious that the study will be composed of two parts: formal and nonformal EE. Therefore, this Chapter presents the methodologies utilized in surveying the status of formal and nonformal EE in Jordan.

4.1 Research Methodology in Formal Education Sector

This part of the study is to survey the status of formal EE in Jordanian schools as perceived by selected formal educators. In detail, it attempts to estimate the contribution of six independent variables to explain the relationships (if any) with the dependent variables. Here below are definitions of these variables.

4.1.1 Operational Definitions of Variables:

4.1.1.1 Dependent Variables

The Operational Definitions of the dependent variables are as follows:

1. The Infusion of EE into Educational Settings:

Infusion of education about the environment refers to the integration of environmental concepts and skills into existing educational settings (courses, programs, or activities) in a manner as to focus on those concepts and skills without jeopardizing the integrity of the original

course. The main aim is to “ environmentalize” the course, while still meeting the objectives set for the existing educational course, programs and activities. This variable was the criterion, which was used in the present study to classify formal educators into two groups: first group, which infused EE into their educational settings, and the second group which did not. It was measured by a nominal scale consisting of Yes/No questions.

2. The factors that would influence formal educators in Jordan to infuse EE into their educational settings:

This variable represents the reasons for not infusing EE into educational settings and the situation that would influence the formal educators in Jordan to infuse EE into their educational settings. The variable was measured by 15 items of 6-points Likert-type.

3. The volume of EE activities and coordination of them with other agencies, accomplished by the formal educators in Jordan:

This variable measures the extent to which the educational institution (department or school) pays attention to EE programs, and it aims to collect general information regarding the EE activities and practices in the educational institution. It also attempts to measure the volume and types of coordination between the educational institution and other agencies in Jordan. Nine Yes/No items were used to measure this variable with an open-end for additional comments and explanations.

4. The teaching style of formal educators to teaching EE:

This variable represents the teaching style of formal educators in Jordan regarding teaching EE. It consists of two selected criteria: the first is whether educators’ present approach to teaching EE places emphasis on environmental values or environmental knowledge. The second is whether educators’ present approach to teaching EE is child-centered or

subject-centered. The variable was measured by using an ordinal scale; educators were asked to choose the position that best describes their approach to teaching, with regard to EE, by ticking the statement that represents their position.

5. Aspects of EE:

It represents the extent to which formal educators in Jordan are giving emphasis to five selected aspects of EE in the context of the subject area for which they are responsible. These aspects are: personal responsibility toward the conservation of the environment; environmental knowledge and understanding; environmental ethics; awareness of local issues; and awareness of issues in other countries. Thus, the variable was measured by a nominal scale using 6 Likert-type items. Each educator has indicated the degree of his emphasis on each aspect of EE, which proceeds from ‘not important’ to ‘essential’, and was assigned the values from 1 to 6, respectively.

4.1.1.2 Independent Variables:

The following independent variables will have the associated meanings whenever encountered in the text:

1. Gender:

This variable represents the gender of formal educators in all subject areas in Jordan. Each respondent pointed to his/her gender on a nominal scale, which has two levels: male and female, and was assigned the values 1, and 2, respectively.

2. Educational Experience:

This variable represents the number of years that the formal educator has been working in the field of education. Each formal educator pointed to his/her educational experience, on an ordinal scale, by selecting one of the following intervals: 1 to 5 years; 6 to 10 years; 11 to 15 years; 16 to 20

years; and over 20 years, and these intervals were assigned the values 1, 2, 3, 4, and 5, respectively.

3. Academic Qualifications:

This variable represents the highest certificate that formal educators have attained. Each educator pointed to his academic qualifications on an ordinal scale, which proceeds from Bachelor (B.A. or B.Sc.), Bachelor and Diploma, Master degree (M.A. or M.Sc.), to PhD degree, and was assigned the values 1, 2, 3, and 4, respectively.

4. Occupation:

This variable presents the position of the formal educator in the educational system in Jordan. This variable was measured by a nominal scale which has four levels: teachers; supervisors; curriculum developers; and educational activities officials, and was assigned the values 1, 2, 3, and 4, respectively. As mentioned previously, the educational activities officials are educators working for the *Department of Educational Activities* at the MoE. They have responsibilities for the following types of activities in all MoE institutions:

- Summer clubs, traffic guide teams, and charity moneybox.
- School Clubs for the Conservation of Nature.
- School Clubs for the Protection of Animals.
- Music, theatre, scouts and guides.
- Participation in sports tournaments, voluntary work, and Al-Hussein air camps.
- School garden contest, programs of schools of the armed forces, and school trips.
- Production and provision of educational TV, radio, and computer programs.

5. Teaching Subject:

This variable was used to represent the teaching subject for which the formal educator is responsible. If the formal educator is responsible for more than one teaching subject, he was asked to choose the subject for

which he is most often responsible or has most experience in. The *teaching subject* variable was measured by a nominal scale with eight levels: religion; Arabic language; English language; mathematics; sciences (including physics, chemistry, ecology and biology); social sciences; sports; and art, and was assigned the values from 1 to 8, respectively.

6. *Training Received in EE:*

It is the enrollment of the formal educators in training programs, which include EE concepts and approaches, whether it was preservice or inservice. Each educator pointed as to whether he received training in EE or not. Thus, this variable was measured by a nominal scale with two levels: positive response (Yes) and negative response (No) and was assigned the values 1, and 2, respectively.

4.1.2 *Questions Guiding the Investigation*

The purpose of this part of the study is to investigate the following guiding questions, which serve as criteria for the evaluation of the status of formal EE in Jordan:

1. Are there associations between the infusion of EE into educational settings by formal educators in Jordan and the independent variables (*gender, educational experience, academic qualifications, occupation, teaching subject and training received in EE*)?
2. What are the most serious factors that would influence formal educators to infuse EE into their educational settings in Jordan?
3. What is the volume of EE activities and the coordination of them with other agencies accomplished by formal institutions in Jordan?
4. What are the teaching styles of EE that formal educators prefer in Jordan?

5. What are the most serious aspects of EE that formal educators in Jordan are putting emphasis in?

(Questions 4 and 5 are limited to educators who infuse EE into their educational settings).

4.1.3 Population and Sample

The population (formal educators) of this part of the study consisted of the following two subgroups: Teachers of different disciplines and Educational officials (supervisors, curriculum department members, and the officials at the department of educational activities in MoE).

The dynamic nature of the MoE positions during the years of the study makes the identification of the size of the population at any given point difficult. For example, during the course of this study, some educators retired and new educators were hired.

The first population subgroup is comprised of educational officers considered by the researcher as the most expert and knowledgeable educators in EE affairs in the MoE in Jordan. MoE chooses them from among the best-qualified teachers, and the curriculum developers and educational activities officials are chosen among these supervisors. Furthermore, supervisors are required to make at least two classroom visits per teacher per year. Usually they are involved in inservice education programs for teachers. For these reasons, the population members were considered to be aware of what is going on in the schools regarding EE, and aware of the practices and persistent needs of teachers in the field of EE. In addition to that, a part of the questionnaire was designed to ascertain teachers' practices and situations directly.

Based on these facts, it seems that the selection of a sample from this population is reasonable to collect the data that can be used to study the status of EE in Jordanian schools.

Regarding the teachers' sample selection, it is important to mention here that the respondent teachers were secondary teachers, who were selected deliberately by MoE to participate in the correction process of high school secondary exam sheets.

Selecting the sample is very important in order to represent the population (Awad & Abu-Zaineh, 1982, p. 121). The sample was selected through random procedures from each teaching subject and from most regions of Jordan. Response rates for the questionnaire were generally high, as shown in Table 4.1. Nonresponsive organizations did not exceed 9.8% for each group of the respondents and it did not exceed 8.6% in total.

Table 4.1: Number of Respondents that Received the Questionnaire, Number of Returns and Response Rate.

Respondents	Number Asked to Respond	Number of Returns	Response Rate (%)
Teachers	215	194	90.2
Supervisors	145	133	91.7
Curriculum Developers	18	18	100.0
Educational Activities Officials	7	7	100.0
Total	385	352	91.4

Table 4.1 shows the assumption that respondents were not unduly confused or alienated by the format or content of the items. Five returned responses were negated, because of lack of information needed or carelessness in responding to the questionnaire:

- Two respondents did not obey the instructions of the questionnaire, and they responded to all items, whether they are needed or not (section 2 of the questionnaire is limited to educators who do not infuse EE into their educational settings, section 5 of the questionnaire is limited to educators who do infuse EE into their educational settings).
- Two respondents gave the same answer to all items of section 2 of the questionnaire.
- One respondent did not give the general information.

The final size of the sample was 347. According to Odeh and Malkawi (1991, pp. 159-162), the sample size should be at least five times the number of items in the questionnaire. Therefore, the sample size in this study meets this requirement, since the number of items in the questionnaire is 34.

4.1.4 Formal Educators' Questionnaire

4.1.4.1 Construction of the Questionnaire

This questionnaire was designed to obtain specific information about formal educators' practices and perceptions regarding EE in Jordan.

The basic format of this questionnaire was based on the guidelines for EE programs, which were developed by the faculty and staff of the Wisconsin Center for Environmental Education (WCEE) in the United States. In the light of these guidelines, Sebasto (1998) developed a questionnaire, composed of 112 items, to obtain specific information about the EE situation in Illinois schools, and to assess the formal educators' preparation to infuse EE concepts into their educational settings, their attitudes toward EE, and the extent to

which they were infusing EE concepts into their educational settings. Sebasto reported that he took into consideration the characteristics of several types of attitude scales.

Since this study does not focus on environmental attitudes, it is worthy to mention that a section in Sebasto's questionnaire, under the title "*Environmental Attitudes Assessment*," has been completely ignored. In addition, many other items have been ignored, such as those items that relate to the United States regions, but do not relate to Jordan.

In addition to the items that were selected from Sebasto's questionnaire, other items incorporated into the questionnaire were either generated by the researcher or selected from questionnaires developed for similar purposes by Michael Littledyke (1997) and Robert Holtz (1996).

Michael Littledyke (1997) developed a questionnaire to assess the relationships between experience, attitudes and practice in science and EE, which were conducted on teachers and administrators in Gloucestershire, Britain. Robert Holtz (1996) surveyed the status of EE in the United States, in an attempt to collect data to reveal a generalized picture of EE requirements, guidelines, resource materials, staff and teacher education requirements.

As a general look at the questionnaire, its construction is mainly analogous to Sebasto's questionnaire, while the content derived, as described previously, is from different resources.

For the purpose of this study, the selected items were reconstructed by modifying the content of some items to keep up with the current thinking in EE, and by making changes in wording to make them more relevant to formal educators in Jordan. However, the overall wording of many items remained intact.

The first draft of the questionnaire was reviewed with the researcher's external supervisor, the head of Curriculum and Instruction Department at Sultan Qaboos University in Oman. The new version of the questionnaire has been reviewed according to the reliability procedures results and the comments of the validation panel members, as shown in the next sections. After that, the last version was examined by the researcher's Doctoral Supervisor. The number of the items in the final version of the questionnaire was 34 (see Appendix III).

4.1.4.2 Validity of the Questionnaire

After preparing the questionnaire, a validation panel examined it. The panel consisted of seven Jordanian specialists in educational affairs and knowledgeable in EE ideas and concepts: one academic member of Educational Sciences and Art Faculty at Yarmouk University in Jordan; four academic members of Educational Sciences Faculty at Sultan Qaboos University in Oman; and two academic members at Al-Rustag College for Educational Sciences in Oman.

The questionnaire has been distributed to each panel member. They were asked to review the questionnaire in order to ensure the content and construct validity. Their inputs and suggestions were used to improve the questionnaire. Specifically, they were requested to write in detail their comments and concentrating on the following points:

1. The appropriate domain for each item.
2. The suitability of each item, especially stems and alternatives for each question.
3. Consideration of language problems.
4. The ease and clarity of each item.

4.1.4.3 Reliability of the Questionnaire

The questionnaire was trailed using a pilot group consisting of 30 respondents (10 supervisors and 20 teachers), to check for clarity of format and reliability of interpretation and response, and adjustments were made correspondingly. Reliability, as an indication of how accurately it determines whatever it reports to measure, was calculated using the SPSS package (Statistical Package for Social Sciences, Version 9.0).

Cronbach alpha coefficient, as a measure for the internal consistency, was calculated using the pilot group. For section 2 of the questionnaire, which included 18 items designed for those who did not infuse EE into their educational settings, Cronbach alpha coefficient was 0.77. The analysis showed that three items failed the corrected item total correlation coefficient with item total correlation value less than 0.20. These three items (number 9, 18, and 21) were deleted, as shown in appendix VII. After deletion of these items, Cronbach alpha coefficient became 0.81.

Regarding section 5 of the questionnaire, which included 16 items designed for those who infuse EE into their educational settings, Cronbach alpha coefficient was 0.83. The analysis showed that only one item failed the corrected item total correlation coefficient with item total correlation value less than 0.20. This item (number 6) was omitted from the data analysis. After deletion of this item, Cronbach alpha coefficient became 0.87, as shown in appendix VIII. Totally, the reliability procedures led to the deletion of four items. Section 1, 3 and 4 were designed to collect general information regarding the respondents and their institutions, thus, this type of items did not require measuring for reliability.

Oppenheim (1966 cited in Odeh & Malkawi, 1991, pp. 195) indicated that reliability of 0.85 is often achieved for a Likert scale (Henerson et al., 1978 cited in Awad & Abu-Zaineh, 1982, p. 173) remarked that while reliability

coefficients of above 0.7 are certainly desirable, lower coefficients are sometimes tolerated, although this affects the confidence with which one can make decisions based on measurement results.

However, the reliability coefficients of instruments for curriculum or practical evaluation need not be as high as that of tests used to make fine discrimination among individuals. On the other hand, the internal consistency increases with the length of the questionnaire, but considerations of economy and efficiency demand that very high reliabilities be sacrificed in order to restrict each questionnaire to a manageable size (Odeh & Malkawi, 1991, pp. 196). Therefore, the reliability coefficients, which calculated for the questionnaire, appear to be acceptable.

Finally, the construction of the questionnaire is adequate to describe the reality of formal EE in Jordan. Nevertheless, the procedures used to design the questionnaire and to provide evidence of reliability and validity, while defensible, are not without limitations. In addition, the exploratory nature of this study drives us to accept the possible liabilities of the questionnaires.

4.1.4.4 Description of the Questionnaire

The questionnaire was designed to gather information regarding formal educators' practices as they relate to EE. Since the target group consisted of two subgroups (educational officers and teachers), the questionnaire was formulated in two different versions.

The main contents of the two versions were the same except for certain descriptions. For example, in the 'teachers' questionnaire' version, the teachers were asked to respond on how long they had been in teaching, while in 'educational officers questionnaire' version, the educational officers were asked to respond on how long they had been working in their departments.

The questionnaire consisted of five sections. Each section was composed of a number of items. The items of section 1, 2 and 5 were of 6-point Likert-type scale. The items which involved positive direction were scored 6,5,4,3,2 and 1, for the responses of “Strongly Agree”, “Agree”, “Tends to Agree”, “Tends to Disagree”, “Disagree”, “Strongly Disagree”, respectively. The items that involved negative direction were scored in the reverse manner. Respondents were asked to indicate their levels of agreement or disagreement with the listed items regarding their abilities and/or reasons for delivering (or not delivering) EE concepts and ideas in their educational settings.

On the other hand, the items of section 3 and 4 are Yes/No questions. Positive responses (Yes) coded 1 and negative responses (No) coded zero. The five sections of the questionnaire are:

Section 1: General Information

This section was to obtain personal information about the formal educator's, such as their gender and educational experiences. The information, which represents the independent variables of the study, will hopefully serve in reading the collected data.

The main question in this section was “*Do you currently infuse education about the environment into your class curriculum?*” This question divided the questionnaire into two parts regarding whether the educator responded positively or negatively. For those who responded positively, they were asked to leave section two (The infusion of EE into Educational settings) and skip to section 3 and 4.

Section 2: The infusion of EE into Educational Settings:

The aim of this section is to determine the reasons for not infusing EE concepts into formal educators' educational settings. This section consisted of 15 items divided into two groups: (1) Constraint factors: consisted of 10 items representing reasons for not infusing environmental concepts into their

educational settings; and (2) Encouragement factors: consisted of 5 items representing situations that would influence them to infuse EE concepts into their educational settings. Respondents asked to select the response that best describes their agreement or disagreement with the statements, regarding whether the situation would influence them to infuse environmental concepts into their educational settings, or not.

Section 3: EE Activities:

The purpose of this section is to collect general information regarding the EE activities and practices in the department (or the school) where the educator works. This section consists of four items, in the form of yes/no questions, with blank spaces after each item. The blank space in this questionnaire and the next one allows for the display of individual differences of the respondents, through the comments on each item, and the additional items that the respondents may add; at the same time it has its own subjective scale.

Section 4: Coordination with Other Agencies:

This section consists of four Yes/No items with open end for additional comment designed to collect information that may help in the coordinating of EE programs between different agencies to improve the implementation of EE in Jordanian schools. The other agencies were the environmental conservation organizations; organizations other than the environmental conservation organization; and other schools or higher education institutions.

Finally, the respondents were asked to write down their opinions about the constraints of coordination and to suggest ways of coordination between their institutions and any other agencies.

Section 5: Teaching and Learning in EE

The goal of this section was to discover if there is any gap between EE theory and practice and to determine the width of the gap, if one exists,

hoping that the awareness of how far we are from our desires and expectations will help us in defining our goals for forthcoming programs.

This section consisted of three items. The first two items are to determine the position that best describes the educators' present approach to teaching EE, including assessment of present teaching style. For the first item, low score represents the emphasis on environmental knowledge, whilst high score represents the emphasis on environmental values. For the second item, low score represents subject-centered approach, whilst high score represents child-centered approach.

The last item is to determine what emphasis the respondents give to the aspects of EE in the context of the subject area for which he is responsible. Five environmental aspects were selected from a wide range of EE aspects. These environmental aspects include: personal responsibility; knowledge and understanding; ethics; awareness of local environmental issues; and awareness of environmental issues in other countries.

4.2 Research Methodology in Nonformal Education Sector

This part of the study is concerned with what has not been widely reported in Jordan. It is the assessment of EE programs of nonformal organizations, both governmental and nongovernmental.

4.2.1 Population and Sample

The population of this part of the study was the environmental awareness program leaders at the organizations that are represented on the council of environment protection in Jordan, which was created according to the Article 6 of the Environment Protection Law (EPL), No. 12/1995, as shown in

Appendix I. Those leaders are heads or directors of EE programs within their organizations. Therefore, the sampling unit is an organization. After consultation with officers at the GCEP about the target group of the study, the final list of the population members includes 15 Organizations, 6 Governmental and 8 nongovernmental, as follows:

Governmental Organizations:

1. General Corporation for the Environment Protection (GCEP).
2. Ministry of Agriculture (MoA).
3. Royal Scientific Society (RSS).
4. Ministry of Health (MoH).
5. The Ministry of Municipal, Rural Affairs and Environment (MMRAE).
6. The Ministry of Water and Irrigation (MWI).

Nongovernmental Organizations:

1. Jordan Environment Society (JES).
2. Royal Society for the Conservation of Nature (RSCN).
3. Friends of Environment Society (FoE).
4. National Environment and Wildlife Society (NEWS).
5. Arab Women's Organization of Jordan.
6. The National Society for the Protection of Animals (NSPA).
7. The Jordanian Society for Cultural and Tourism Awareness.
8. Fertile Crescent Society (FCS).
9. The Jordanian Society for the Control of Desertification and Badia Development.

Table 4.2 shows the number of the organizations that received the questionnaires, the number of returns and the response rate.

Table 4.2: Number of Organizations that Received the Questionnaire, and Number of Returns and Response Rate.

Type of Organizations	Number asked to Respond	Number of Returns	Response Rate (%)
Governmental	6	5	83.3
Nongovernmental	9	6	66.7
Total	15	11	73.3

It can be seen from Table 4.2 that the study deals with 73.3 % of the population. Since the respondent should be a leader of environmental awareness programs within an organization, those nonresponsive organizations apparently did not have specialists in this subject, so they considered themselves out of the study target group. For example, the responses received from MWI and MMRAE were negated because they sent back the questionnaires blank, since they did not have staff members in charge of EE. Thus, the researcher might claim that the study dealt with all the population members.

4.2.2 Nonformal EE Questionnaire

4.2.2.1 Construction of the Questionnaire

This questionnaire was designed to obtain specific information about nonformal EE programs and to identify the possible ways of coordination between environmental organizations and the formal education system.

Many of the efforts to incorporate EE into formal education have been piecemeal. However, most efforts focused on individual EE components, such as teacher training, state agency support, and EE in the school curricula. In 1994, Ruskey and Wilke developed a model for helping agencies to achieve

environmentally literate citizens. This model identifies 16 components of a comprehensive EE program.

In 1995, the National Environmental Education Advancement Project (NEEAP) staff in the United States developed a questionnaire based on the Ruskey and Wilke (1994) model components and conducted a national survey the status of EE in the United States. Later on, another questionnaire was developed by Kirk and Wilke (1997), based on Ruskey and Wilke (1994) model components to provide baseline data regarding the status of comprehensive state-level EE programs in the United States (NEEAP, 1998).

The content of the questionnaire was derived from Kirk and Wilke (1997) questionnaire, while its construction is mainly analogous to the formal educators' questionnaire. For the purpose of this study, the selected items were reconstructed to make them more relevant to environmental awareness program leaders in Jordan.

The first draft of the questionnaire was reviewed by the researcher's external supervisor, and then the new version was reviewed by the validation panel members who examined the formal educators' questionnaire. In addition to this panel, and due to the privacy of this questionnaire, it has been reviewed by the director of Environmental Awareness Programs at RSCN in Jordan. As for the reliability of the questionnaire, it cannot be calculated, since most items are open-ended questions. Finally, the questionnaire was examined by the researcher's Doctoral Supervisor. The number of the items in the final version of the questionnaire was 20. A copy of it appears in Appendix IV.

4.2.2.2 Description of the Questionnaire

This questionnaire represented a semi-structured interview consisting of three sections:

Section 1: General Information

The purpose of this section was to obtain some personal information about the person who completed this questionnaire and the organization to which that respondent belongs. The information obtained: gender; years of experience in the organization; educational level; field of specialization; training received in EE; the sort of the organization members; and the availability of networking opportunities and communication with the organization members about environmental concerns.

Section 2: EE Activities

This section was concerned with the programs that the organization sponsors or conducts under its supervision. The section was composed of six items and aimed to collect information about the programs of the organization in order to determine to what extent the organization gives attention to improving the situation of EE in formal education sectors.

Section 3: Coordination with Other Agencies

This section was designed to gather information, which may help in coordinating EE programs between different educational agencies in order to improve the implementation of EE in Jordanian schools. The section was composed of six Yes/No items and the respondent was often requested to extend his/her answer.

The questionnaires were accompanied by cover letters, to explain the purpose of the study and the respondents were kindly requested to respond to all questions to the best of his/her knowledge, by ticking the appropriate boxes for his/her responses to each question, and to write further comments as instructed. At the end of the questionnaires, a blank sheet was left for the

convenience of the respondent to add further comments on any item. The respondents were asked to use the back of the paper or add extra paper if the assigned space was not sufficient.

The final forms of the questionnaires were translated into English language. A copy of the Arabic version of the formal educators' questionnaire and the environmental organizations' questionnaire appear in Appendix V and VI, respectively.

4.3 Administration of the Questionnaires

The following steps describe how the research was carried out:

1. The researcher received, upon request from his supervisor, a letter of recommendation written on the Hamburg University letterhead. This letter served as impetus to encourage the respondents to support the study by answering the questions in the questionnaires. A copy of that letter is included in Appendix IX.
2. A copy of the formal educators' questionnaire has been sent to the MoE attached to a letter explaining the premise of the study and asking permission to distribute the questionnaire in MoE institutions. After MoE had approved the questionnaire, MoE issued a letter of authorization, which was circulated to all formal institutions in Jordan. A copy of this authorization document appears in Appendix X. This remark is necessary for the benefit of those who intend to do research in the same field. This process made directors of the MoE aware of the study. This awareness helped later in gaining their support in administering the questionnaire.
3. The formal educators were given enough time (almost two weeks) to respond to the questionnaire; most of them returned the questionnaires

within the time limit. However, it must be pointed out that the successful administration of the questionnaire was possible because there is a good opportunity to facilitate data collection during the summer period, since most teachers and supervisors from different areas of Jordan are engaged in the correction process of higher secondary exam sheets. Therefore, it was easy to distribute the questionnaires and easy to gather them.

4. The respondents do not often pay attention to the questionnaires that reach them, especially in third world countries, which are not research-oriented. Thus, how to ensure that the respondents are serious in answering the questions of the questionnaire? The director of each exam sheets correction committee was involved personally in administering the questionnaire. This force of authority made the respondents feel seriously about responding to the questionnaires.
5. Regarding the respondents from the environmental conservation organizations, the researcher traveled to their locations to conduct the semi-structured interview where possible. Otherwise, the questionnaires were mailed to the organizations.

The researcher inferred through the administration procedures of the questionnaire and the review of collected responses, that the respondents were very cooperative; many of them expressed their delight and enthusiasm with their participation of the study. This can be seen clearly from their written remarks on the questionnaire. Some respondents indicated that they would like to receive a copy of the study results.

4.4 Statistical Analysis

After reviewing and coding the collected responses, the coded data was analyzed by utilizing the following statistical techniques where suitable:

Frequencies: to present the distribution of each variable value and the descriptive statistics providing measures of central tendency. The frequencies and percentages for each independent variable, and the mean, standard deviation, and percentages for each item, were calculated to the first two decimals.

Chi-Square Analysis: to determine whether the associations between the dependent and independent variables could or could not ascribed to the operation of chance, or to determine whether the differences are stem from the fact that we studied a sample and not the entire population.

The analysis of the data was carried out using the Statistical Package for the Social Sciences (SPSS, version 9.0) in the computer facilities of the Sultan Qaboos University in Oman. The alpha level was set at 0.05. Histograms were used to display the associations between variables. As for the qualitative analysis, the comments of the respondents were categorized for each item. The additional items that the respondent added were summarized and ranked whenever it was possible.

Chapter Five

FINDINGS OF THE STUDY

Since the study attempts to investigate the status of formal and nonformal EE in Jordan, this Chapter describes and presents the findings that for the first time ever, at the national level in Jordan, are collected.

The quantitative and qualitative results and the statistical analysis are presented in two parts:

1. Findings related to formal EE; and
2. Findings related to nonformal EE.

5.1 Findings Related to Formal EE

The purpose of this part of the study was to assess formal educators' preparation and practices toward EE ideas and concepts and the extent to which they were infusing EE concepts into their educational settings. Several areas were examined, each of which measured a specific aspect of formal EE requirements, and possible ways of coordination between formal and nonformal EE in Jordan, in addition to educator's background and teaching styles. The following is the quantitative analysis of the findings, followed by the qualitative analysis of the responses on open-ended questions and the additional comments of the respondents.

5.1.1 Quantitative Analysis

The distribution of the respondents (formal educators) is presented as follows:

1. **Gender:** Since the actual sample to which the questionnaire was administered was 347 respondents, there were 170 males (49.0%) and 177 females (51.0%) in the data sample.
2. **Educational Experience:** The distribution of the respondents according to the *educational experience* is shown in Table 5.1.

Table 5.1: Distribution of Respondents According to the *Educational Experience* (n = 347).

Educational Experience (in years)	Frequency	Percentage
1-5	51	14.7
6-10	43	12.4
11-15	97	27.9
16-20	45	13.0
Over 20	111	32.0
Total	347	100.0

3. **Academic Qualifications:** The distribution of the respondents according to their *academic qualifications* is shown in Table 5.2.

Table 5.2: Distribution of Respondents According to their *Academic Qualifications* (n = 347).

Academic Qualifications	Frequency	Percentage
Bachelor	133	38.3
Bachelor + Diploma	97	27.9
Master's Degree	104	30.0
PhD	13	3.8
Total	347	100.0

4. **Occupation:** According to the positions of the respondents in the educational system (*occupation*), there were 190 (54.8%) teachers, 132 (38.0%) supervisors, 18 (5.2%) curriculum developers and 7 (2.0%) educational activities officials*. It is worthwhile to mention here that the criteria for recruiting supervisors in the MoE in Jordan include a requirement of at least 8 years of experience in teaching in the secondary schools, first university degree and a diploma of education. This requirement was phased out in 1995, and has been replaced with the Master's Degree.
5. **Teaching Subject:** The distribution of respondents classified according to the *teaching subjects* for whom the formal educators are responsible, is shown in Table 5.3. In the case of the respondent being responsible for more than one subject, he/she was asked to

* Educational activities officials are educators working in the Department of Educational Activities at the MoE. They have responsibilities for all types of educational activities in all MoE institutions.

choose the subject that he/she teaches most often or has most experience in.

Table 5.3: Distribution of Respondents According to their *Teaching Subject* (n = 347).

Teaching Subject	Frequency	Percentage
Religion	34	9.8
Arabic	49	14.1
English	52	15.0
Mathematics	44	12.7
Science	54	15.6
Social Studies	54	15.6
Sports	35	10.0
Art	25	7.2
Total	347	100.0

6. ***Training Received in EE:*** Fifty two (15.0%) educators indicated they had received education in EE, and 295 (85.0%) indicated they had not.

5.1.1.1 Findings Related to Question No. 1

(Are there associations between the infusion of EE into educational settings by formal educators in Jordan and the independent variables (gender, educational experience, academic qualifications, occupation, teaching subject and training received in EE)?.

Of 347 respondents, 129 (37.2%) educators indicated they do currently infuse education about the environment into their educational settings and 218 (62.8%) indicated they do not. In order to answer this question, the frequencies of educators who infuse EE into their educational settings and the their percentages within the independent variables are presented in Table 5.4.

Table 5.4: Distribution of Responses to Item 7 Regarding the Independent Variables.

Independent Variables		n ^a	The Infusion of EE into Educational Settings			
			Yes		No	
			Frequency	% ^b	Frequency	% ^b
Gender	Male	170	82	48.2	88	51.8
	Female	177	47	26.6	130	73.4
	Total	347	129	37.2	218	62.8
Educational Experience	1-5 years	51	4	7.8	47	92.2
	6-10 years	43	10	23.3	33	76.7
	11-15 years	97	39	40.2	58	59.8
	16-20 years	45	22	48.9	23	51.1
	Over 20 years	111	54	48.6	57	51.4
	Total	347	129	37.2	218	62.8
Academic Qualifications	Bachelor	133	42	31.6	91	68.4
	Bachelor+Diploma	97	31	32.0	66	68.0
	Master's Degree	104	49	47.1	55	52.9
	PhD	13	7	53.8	6	46.2
	Total	347	129	37.2	218	62.8
Occupation	Teacher	190	56	29.5	134	70.5
	Supervisor	132	54	40.9	78	59.1
	Curriculum Developer	18	12	66.7	6	33.3
	Educational Activities Officials	7	7	100.0	0	0
	Total	347	129	37.2	218	62.8
Teaching Subject	Religion	34	18	52.9	16	47.1
	Arabic	49	21	42.9	28	57.1
	English	52	19	36.5	33	63.5
	Math	44	15	34.1	29	65.9
	Science	54	27	50.0	27	50.0
	Social Studies	54	12	22.2	42	77.8
	Sports	35	2	5.7	33	94.3
	Art	25	15	60.0	10	40.0
	Total	347	129	37.2	218	62.8
Training Received in EE	Yes	52	34	65.4	18	34.6
	No	295	95	32.2	200	67.8
	Total	347	129	37.2	218	62.8

a Number of Cases.

b Percentage within each Independent Variable.

Since the group sizes are unequal, the percentages of educators who infuse EE into their educational settings within the independent variables are more useful than the frequencies to describe the associations between variables, as shown in Figures 5.1 to 5.6.

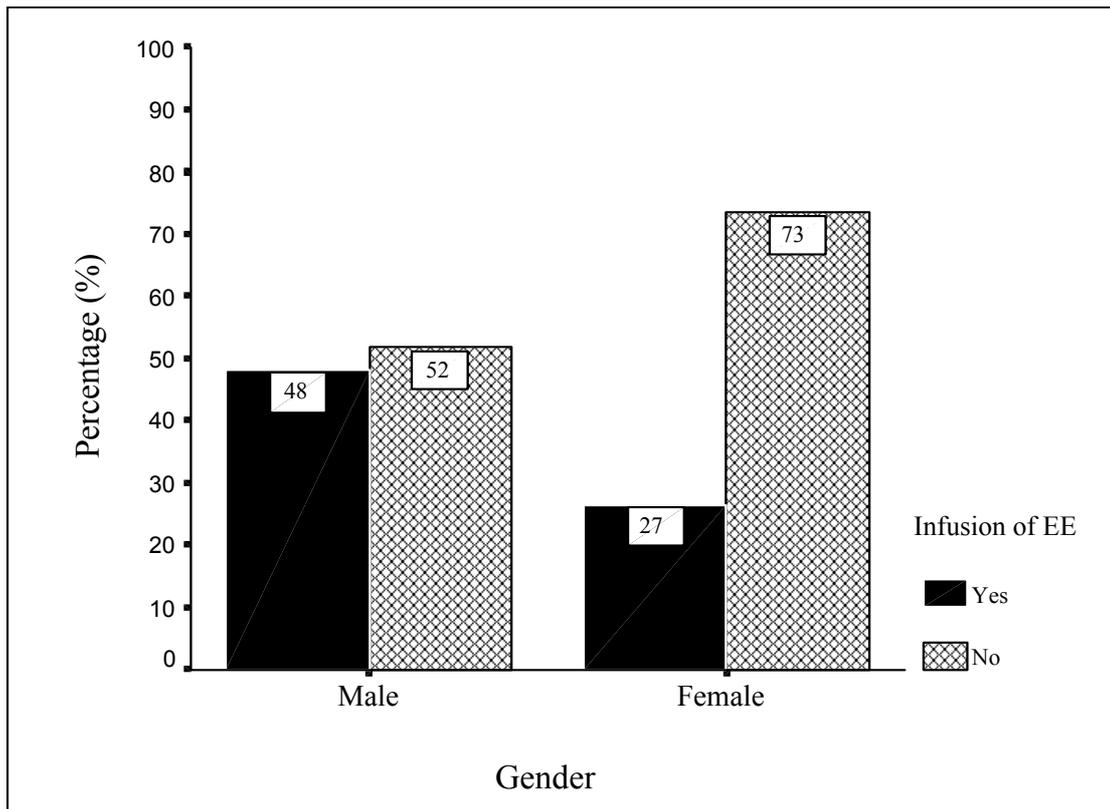


Figure 5.1: Infusing EE into Educational Settings with Gender.

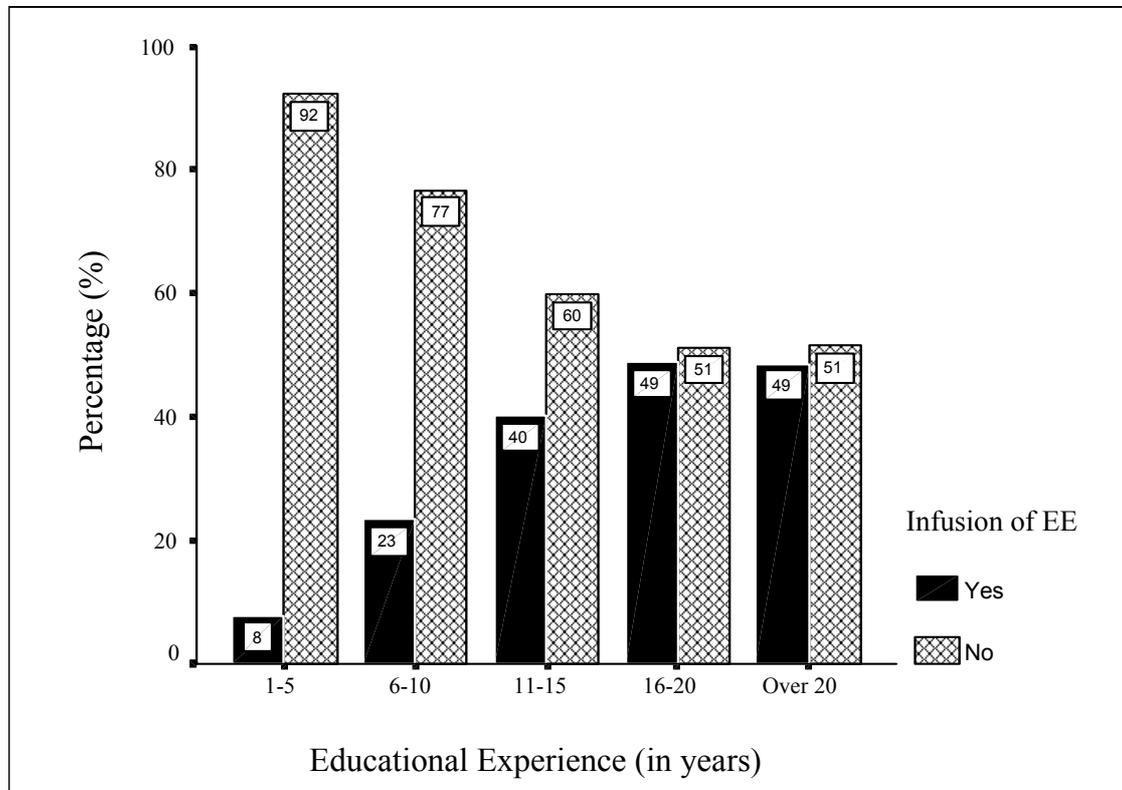


Figure 5.2: Infusing EE into Educational Settings with Educational Experience.

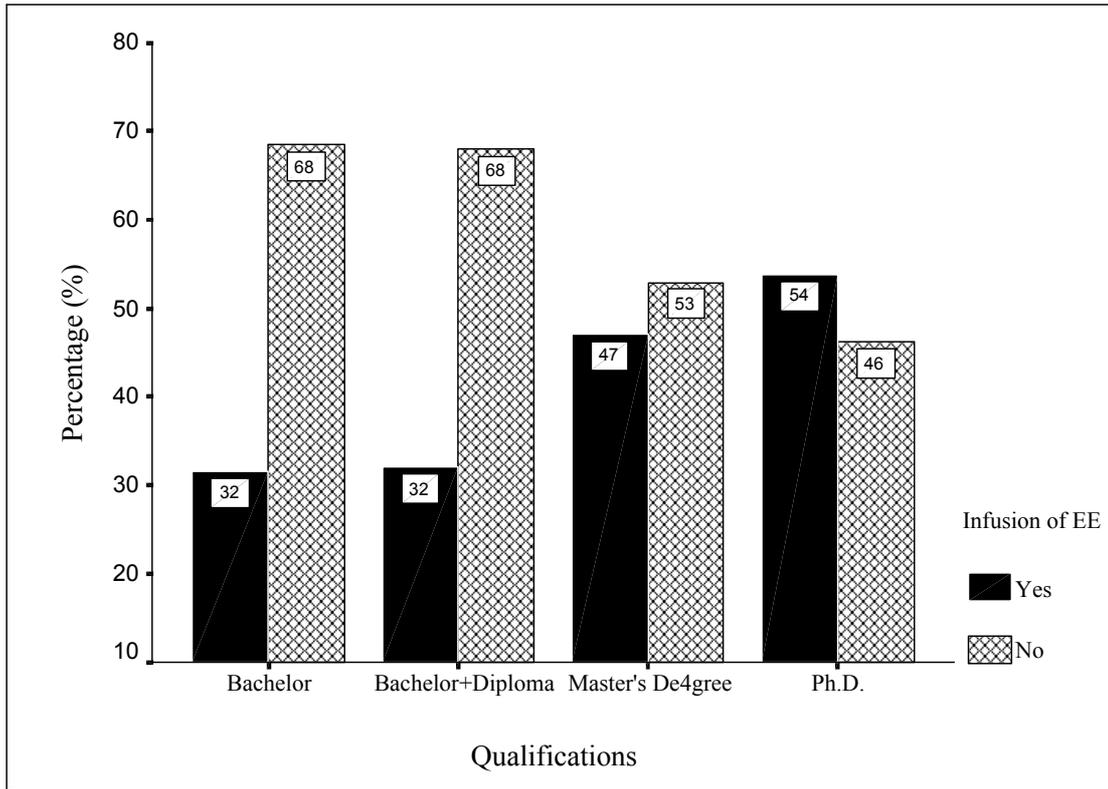


Figure 5.3: Infusing EE into Educational Settings with Qualifications.

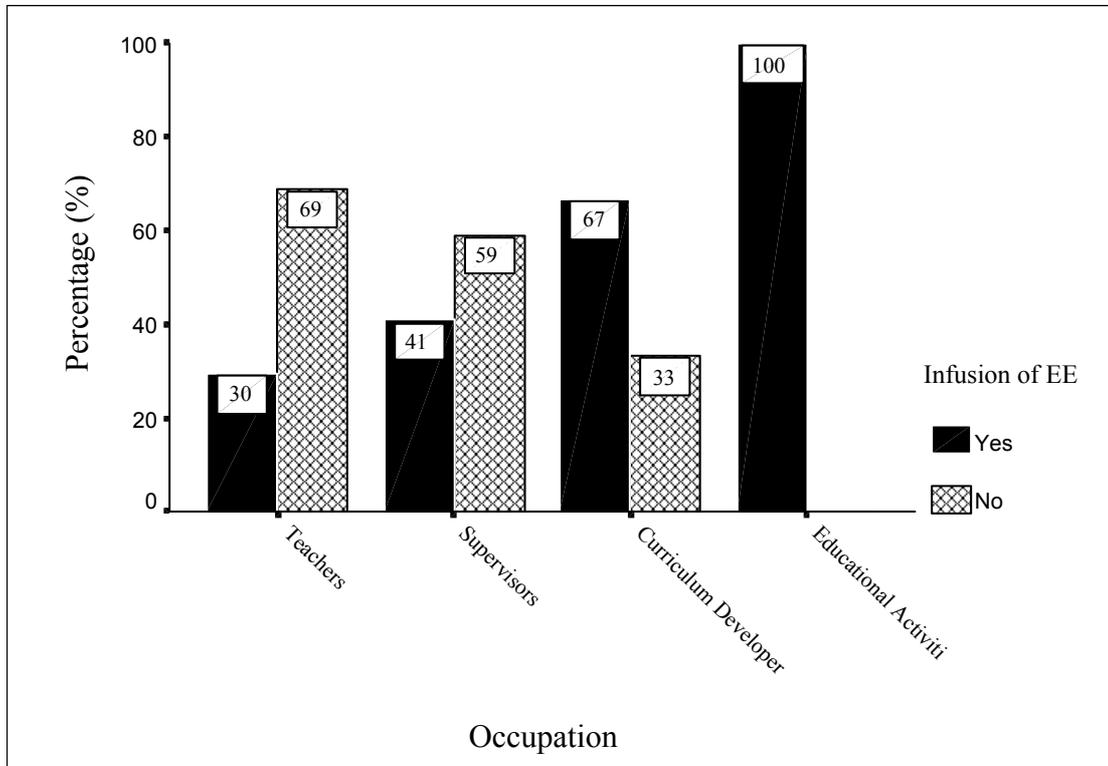


Figure 5.4: Infusing EE into Educational Settings with Occupation.

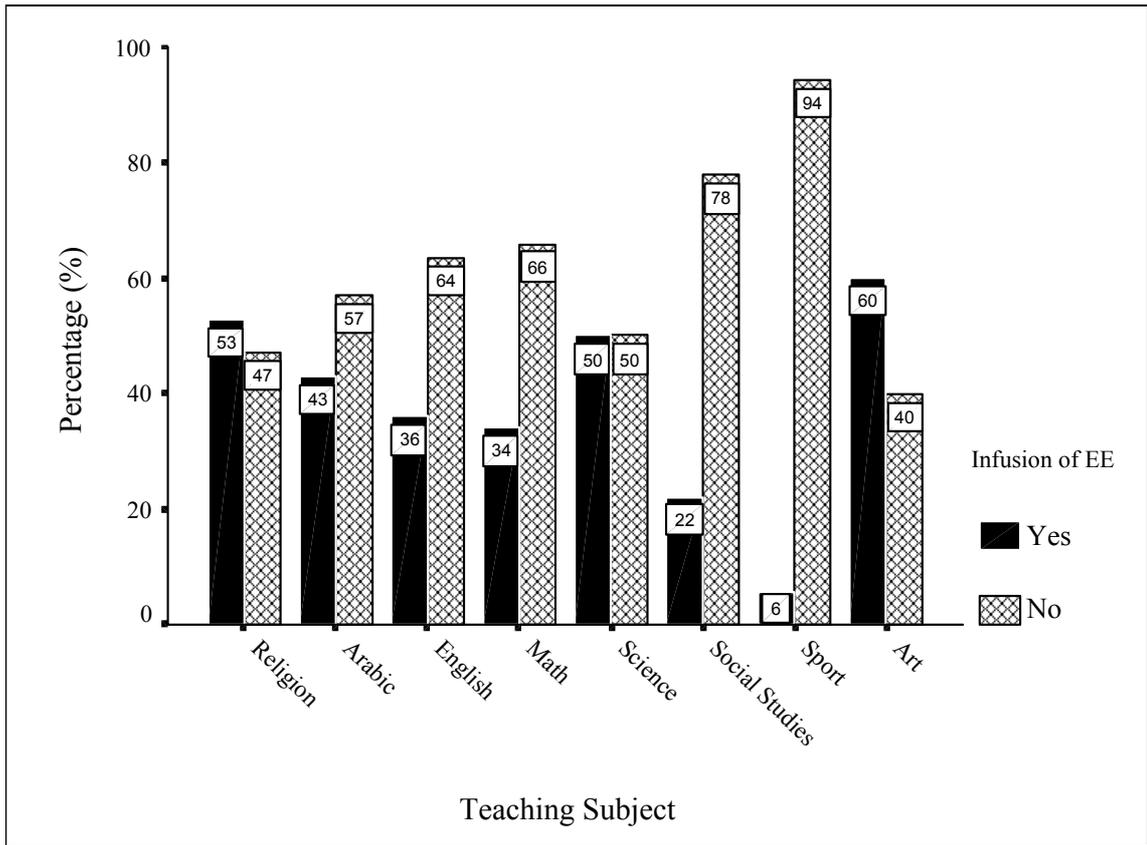


Figure 5.5: Infusing EE into Educational Settings with Teaching Subject.

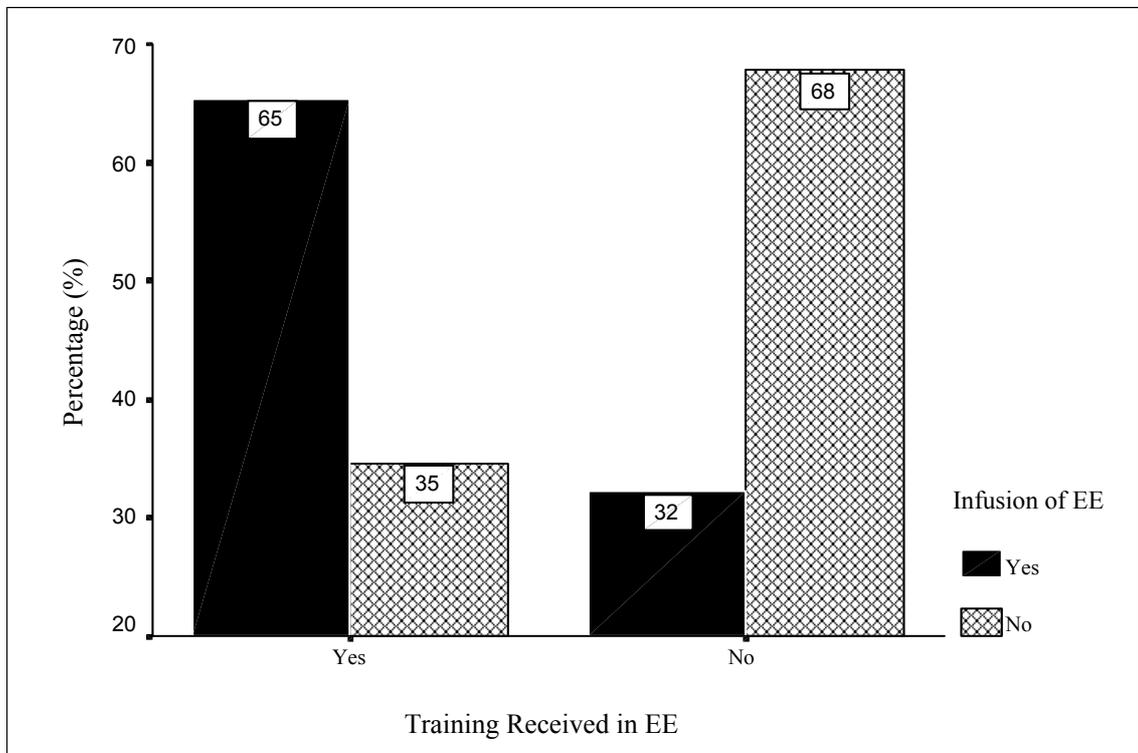


Figure 5.6: Infusing EE into Educational Settings with Training Received in EE.

A chi-square test of independence is used to determine how certain we can be about the apparent associations between responses to item 7 and the independent variables do not result from chance. The results indicated that there are significant associations between the infusion of EE into educational settings and the six independent variables, as shown in Table 5.5. In order to measure the degree of associations between the variables, the Contingency Coefficients* were calculated.

Table 5.5: Chi-Square Test and Contingency Coefficients (n = 347).

Independent Variables	Chi-Square Value	df^a	Significant Level	Contingency Coefficient^b
Gender	17.454	1	.000*	.219
Educational Experience	31.636	4	.000*	.289
Academic Qualifications	8.860	3	.031*	.158
Occupation	24.146	3	.000*	.255
Teaching Subject	33.866	7	.000*	.298
Training Received in EE	20.840	1	.000*	.238

a Degree of Freedom.

b The Maximum Value of the Contingency Coefficient Equals 0.707.

* Significant at $\alpha = 0.05$.

* Contingency Coefficient: A measure of association based on chi-square. The value ranges between zero and 1, with zero indicating no association between the row and column variables and values close to 1 indicating a high degree of association between the variables. The maximum value possible depends on the number of rows and columns in a table.

The previous data analysis indicated the following associations:

- Males of formal educators in Jordan tend to infuse EE into their educational settings more than females do.
- Formal educators with longer *educational experiences* tend to infuse EE into their educational settings more than those with lower *educational experiences*.
- Formal educators with higher *academic qualifications* tend to infuse EE into their educational settings more than those with lower *academic qualifications*.
- Regarding *occupation*, formal educators tend to infuse EE into their educational settings in the following order: educational activities officials, curriculum developers, supervisors, and finally, teachers.
- Regarding *teaching subjects*, formal educators tend to infuse EE into their educational settings in the following order: Art, Science, Religion, Arabic, English, Math, Social Studies, and finally, Sports.
- Formal educators who *received training in EE* tend to infuse EE into their educational settings more than those who did not.

Moreover, the Contingency Coefficients indicated that the best independent variables that associate with the infusion of EE into educational settings are the *teaching subject*, then the *educational experiences*, respectively.

Generally, the previous results showed that the highly educated, male activities worker* or curriculum developer in the field of art, religion, or science, especially who holds a doctoral degree, has received training in EE and has more than 16 years of experience is more likely candidate to infuse EE into his programming himself.

5.1.1.2 Findings Related to Question No. 2

(What are the most serious factors that would influence formal educators to infuse EE into their educational settings in Jordan?).

The 218 (62.8%) educators of the sample who indicated that they were not currently infusing EE concepts into their programs were asked to indicate their levels of agreement or disagreement with a list of factors that may influence them to infuse EE into their educational settings.

In order to answer this question, the responses are summarized in two parts: one combines the agreement responses (strongly agree, agree and tend to agree) and the other combines the disagreement responses (strongly disagree, disagree and tend to disagree). The frequencies and percentages of the responses for the 15 items of section 2 of the questionnaire were calculated and the items were ranked from the most serious factor to the least one with respect to the frequencies. Moreover, the items were divided into two groups: constraint factors as shown in Table 5.6, and encouragement factors as shown in see Table 5.7.

* An educator who works for the Department of Educational Activities at the MoE in Jordan.

Table 5.6: Descriptive Statistics of Responses on the Items Related to the Constraint Factors that would Influence Formal Educators to Infuse EE into Educational Settings.

Item No.	n ^a	Mean	Standard Deviation	Sum of Agreement Responses		Sum of Disagreement Responses	
				Frequency	%	Frequency	%
10	216	4.63	1.20	175	81.0	41	19.0
9	215	4.00	1.44	146	67.9	69	32.1
8	217	3.19	1.63	110	50.7	107	49.3
11	217	3.26	1.46	76	35.0	141	65.0
13	217	2.94	1.68	72	33.2	145	66.8
17	217	2.67	1.43	58	26.7	159	73.3
12	217	2.16	1.47	42	19.4	175	80.6
14	218	1.96	1.19	26	11.9	192	88.1
15	217	1.70	1.17	13	6.0	204	94.0
16	218	1.84	.95	13	6.0	205	94.0

a Number of valid cases.

As shown in Table 5.6, the serious constraint factors that would influence formal educators to infuse EE into their educational settings in Jordan are as follows:

1. They do not have enough funding (81.0%);
2. They do not have the knowledge to effectively monitor EE activities (67.9%); and
3. Low priority has been ascribed to EE (50.7%).

Table 5.7: Descriptive Statistics of Responses on the Items Related to the Encouragement Factors that would Influence Formal Educators to Infuse EE into Educational Settings.

Item No.	n ^a	Mean	Standard Deviation	Sum of Agreement Responses		Sum of Disagreement Responses	
				Frequency	%	Frequency	%
22	217	5.23	.72	209	96.3	8	3.7
19	216	5.16	.62	206	95.4	10	4.6
21	216	5.11	.73	200	92.6	16	7.4
20	214	5.00	.90	182	85.1	32	14.9
18	215	4.16	1.44	123	57.2	92	42.8

a Number of valid cases.

Table 5.7 showed that all encouragement factors influence formal educators to infuse EE concepts into their educational settings, in the following order:

1. The need for more support from the administrators (96.3%);
2. The need for more inservice education courses on EE (95.4%);
3. The need for more preparation time (92.6%);
4. The need for more funding (85.1%); and
5. The need for better access to resources (57.2%).

Those 218 educators were instructed to stop at this point and go no further with the questionnaires. The 129 educators who indicated they were either currently infusing EE concepts into their existent programs or developing new programs about the environment were instructed to continue answering the remaining questions.

5.1.1.3 Findings Related to Question No. 3

(What is the volume of EE activities and the coordination of them with other agencies accomplished by formal institutions in Jordan?).

This question aims at describing the status of EE programs in the formal education sector and what the position of EE is in formal institutions (schools and educational departments).

The data collected to answer this question were included in two sections of the questionnaire. The first section gathers information regarding the EE activities and practices in the institute where the formal educator works. In general, the items were designed to examine the reality of EE in formal education associations in Jordan. The second section was designed to gather information that may help in proposing and suggesting ways of coordinating EE programs between different agencies, to improve the implementation of EE in Jordanian schools.

Using Yes/No questions with open end if the answer is yes, educators were asked to indicate whether the listed items regarding the situation of EE in their departments (or schools) are in place or not. An extra space was left after each item for more details and explanations that need a qualitative analysis of the responses. Frequencies and percentages of the items related to EE activities and coordination of them with other agencies are shown in Table 5.8.

Table 5.8: Frequencies and Percentages of Response to the Items Related to EE Activities and Coordination of them with Other Agencies.

No	Item	n ^a	Yes		No	
			Frequency	%	Frequency	%
23	Does your department (or school) hold any programs or activities with regard to EE?	344	103	29.9	241	70.1
24	Do you have an EE plan and/or manual to help teachers develop EE programs?	345	45	13.0	300	87.0
25	Is there a listing within your department (or school) of nonformal programs, such as outdoor schools, nature centers, zoos, museums, parks, etc.?	345	58	16.8	287	83.2
26	Are there strategies for involving teachers in efforts to expand or strengthen EE in your area?	344	42	12.2	302	87.8
27	Does your department (or school) have shared EE program(s) with the environmental conservation organizations?	343	55	16.0	288	84.0
28	Does your department (or school) have shared EE program(s) with community organizations or agencies other than the environmental conservation organization?	344	47	13.7	297	86.3
29	Does your department (or school) have any coordination with other schools or higher education institutions to deliver the required activities to EE programs?	343	49	14.3	294	85.7
30	Do you think that the presence of a national journal, which primarily provides EE teaching tips for teachers, would strongly support the coordination of EE activities between different agencies in Jordan?	344	335	97.4	9	2.6

a Number of valid cases.

The items in Table 5.8 classified into two groups as follows:

Group One: EE Activities (items 23 to 26):

- One hundred and three (29.9%) of formal educators indicated that their departments (or schools) hold programs or activities regarding EE;
- 58 (16.8%) indicated that there are outdoor programs within their departments (or schools), such as nature centers, zoos, museums, parks, and so on;
- 45 (13.0%) indicated that they have an EE plan and/or manual to help teachers develop EE programs; and
- 42 (12.2%) indicated that there are strategies for involving teachers in efforts to expand or strengthen EE in their region.

Group Two: Coordination with other Agencies (items 27 to 30):

- Fifty five (16.0%) of formal educators indicated that their departments (or schools) have shared EE program(s) with the environmental conservation organizations;
- 49 (14.3%) indicated that their departments (or schools) have certain types of coordination with other schools or higher education institutions to deliver the required activities to EE programs; and
- 47 (13.7%) indicated that their departments (or schools) have shared EE program(s) with community organizations or agencies other than the environmental conservation organization.

In response to the question of whether or not there is a need for a national EE journal geared to the needs of EE activities between different agencies in Jordan, 335 (97.4%) respondents said yes and only 9 (2.6 %) said no.

5.1.1.4 Findings Related to Question No. 4

(What are the teaching styles of EE that formal educators prefer in Jordan?).*

Educators were asked to choose the position that best describes their present approach to teaching and learning with regard to EE by ticking the statement that represents their position. Of the 129 educators who indicated that they infuse EE into their educational settings, 75 (58.1%) educators see that the best teaching methods emphasize environmental values, not environmental knowledge (item 32). On the other hand, 100 (77.5%) of the respondents consider that a child-centered approach is more appropriate for teaching and learning in EE, than a subject-centered approach (item 33). The mean, the standard deviation and frequencies related to these items are shown in Table 5.9.

Table 5.9: Frequencies and Percentages of the Responses on the Items 32 and 33 (n = 129).

Educational Approach		Item 33		Total	
		Child- Centered Approach	Subject-Centered Approach	Frequency	%
Item 32	Value-Centered Approach	67	8	75	58.1
	Knowledge-Centered Approach	33	21	54	41.9
Total	Frequency	100	29	129	100
	%	77.5	22.5	100	

* This question is limited to educators who infuse EE into their educational settings.

It is clear from Table 5.9 that formal educators in Jordan who preferred a child-centered approach also tend to prefer the value-centered approach.

5.1.1.5 Findings Related to Question No. 5

(What are the most serious aspects of EE that formal educators in Jordan are putting emphasis in?)*.

The 129 (37.2%) educators of the sample who indicated that they were currently infusing EE concepts into their programs were asked to indicate the level of importance for each aspect of EE. The responses summarized in two parts: one combines the negative responses (not important, marginal important, and tend to not important) and the other combines the positive responses (tend to important, quite important, and essential). The frequencies and percentages of the responses for the items of EE aspects were calculated, and ranked from the most serious factor to the least one as shown in Table 5.10.

Table 5.10: Descriptive Statistics of Responses on the Items Related to EE Aspects (129).

EE Aspects	Mean	SD ^a	Negative Responses		Positive Responses	
			Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)
a) Personal responsibility toward the conservation of the environment	5.46	1.38	18	14.0	111	86.0
b) Awareness of local issues	5.32	1.51	23	17.8	106	82.2
c) Environmental ethics	4.94	1.82	34	26.4	95	73.6
d) Environmental knowledge and understanding	4.67	1.93	44	34.1	85	65.9
e) Awareness of issues in other countries	4.47	1.84	55	42.6	74	57.4

^a Standard Deviation.

* This question is limited to educators who infuse EE into their educational settings.

According to the percentage of respondents who indicated that the aspect of EE is essential, Table 5.10 showed that the serious EE aspects as perceived by formal educators in Jordan are in the following order:

1. Personal responsibility for the conservation of the environment (86.0%).
2. Awareness of local environmental issues (82.2%).
3. Environmental ethics (73.6%).
4. Environmental knowledge and understanding (65.9%).
5. Awareness of environmental issues in other countries (57.4%).

5.1.2 Qualitative Analysis

The study attempts to make comprehensive descriptions of EE programs in Jordan, to allow formal educators to overcome EE constraints and develop educational situations. In each item of sections three and four of the questionnaire there is a blank space to add details, in case the educator responds positively to any item. In addition, it is important to mention here that the qualitative analysis covered only 129 responses, because these two sections were answered by those formal educators ($n = 129$) who infuse EE into their educational settings. The following is the qualitative analysis of the responses on the Yes/No, open-ended questions, in the case of answering positively.

5.1.2.1 EE Programs and Activities

Responses to Question 1

(Does your department (or school) hold any programs or activities with regard to EE? If the answer is yes, please provide the titles of these programs or activities) (Item 23).

Educators' responses expressed a variety of programs. Most of these programs can be summarized as shown in Table 5.11.

Table 5.11: Number of Responses and Rank Order Regarding the Main EE Programs in Formal Education Sector in Jordan (n = 344).

Programs and Activities	No. of Responses	Rank Order
Picking litter from school area under the catchphrase “Keep our environment tidy”	11	1
School assemblies	11	1
Writing reports on environmental topics by students	10	3
The environmental activities mentioned in the curricula	9	4
The activities of SCCN implemented by RSCN	7	5
Lectures on environmental topics on school’s activity day	6	6
The use of refuse materials in making art works and school exhibitions	6	6
Guest speaker to the audience from the school area	5	8
The participation in the Annual Environmental Competition which is implemented by FoE Society	5	8
Awareness programs on the national celebrations, such as the day of faithfulness for our own country	4	10
Issuing brochures to improve awareness in school area	4	10
Water Awareness program implemented by JES	4	10
Activities related to SEMEP project	3	13
The participation in Nour Al- Hussein Foundation projects	2	14
Training of teachers responsible of SCCN	2	14

The highest ranked EE activity items were collecting litter and talks during school assemblies. The lowest ranked items were activities requiring manipulation. It is obvious from Table 5.11 that there is an absence in the role of environmental conservation organizations in formal education sectors, except the RSCN, JES and FoE.

Responses to Question 2

(Do you have an EE plan and/or manual to help students (teachers) develop EE programs?) (Item 24).

Responses to this question are summarized as shown in Table 5.12. It is clear that the wide spread of RSCN publications ranked at the first level.

Table 5.12: Number of Responses and Rank Order Regarding the type of EE plans and manual used in Formal Education Sector in Jordan (n = 345).

EE Plan and/or Manual	No. of Responses	Rank Order
Al-Reem Magazine and other printed matter which issued by RSCN	13	1
The use of the reference books of the educators' academic studies	8	2
References from school library	8	2
Al-Bea'h Magazine issued by JES	7	4
Teacher training guidelines issued by UNESCO	2	5
The guidebook for animals conservation clubs	1	6

Responses to Question 3

(Is there a listing within your department (or school) of outdoor programs, such as nature centers, zoos, museums, parks, etc.?) (Item 25).

Responses classified as shown in Table 5.13. The participation in environmental campaigns in the local area has gotten the highest order. Indeed, most of these campaigns are concentrated on collecting litter.

Table 5.13: Number of Responses and Rank Order Regarding the Main EE Outdoor programs (n = 345).

Outdoor Programs and Activities	No. of Responses	Rank Order
The participation in environmental campaigns in the local area	8	1
The participation in the activities of JES branches	6	2
School trips to the reserve areas	5	3
Visiting factories and recording the level of pollutants emitted by the factory	5	3
Scout camps which have environmental concerns	4	5
Taking care of cultural and touristy areas	3	6
Taking care of landscapes in the school area	3	6
Studying wildlife animals, such as mammals and birds	2	8

Responses to Question 4

(Are there strategies for involving students (or teachers) in efforts to expand or strengthen EE in your area?) (Item 26).

In response to this question, the strategy of curriculum developers is the continual revision and expanding of the matrix of environmental concepts and ideas; the strategies of educational activities officials are expanding schools and School Clubs, both numbers and activities of clubs - the Protection of Animals (SCPA) and SCCN - and training teachers who are responsible for these clubs; and the strategy of supervisors is directing teachers in implementing the environmental activities that are mentioned in the curriculum.

5.1.2.2 Coordination of EE Activities with Other Agencies

Responses to Question 1

(Does your department (or school) have shared EE program(s) with the environmental conservation organizations? If the answer is YES, please specify the name(s) of the organization(s) and the shared programs (or activities)) (Item 27).

Among the large number and wide spread environmental conservation organizations in Jordan, in response to this question, respondents indicated that they have shared programs in most cases with RSCN or JES, as shown in Table 5.14, but rarely do they mention the nature of these programs.

Table 5.14: Number of Responses and Rank Order Regarding the Shared EE Program(s) with the Environmental Conservation Organizations (n = 343).

Environmental Conservation Organization	No. Of Responses	Rank Order
RSCN	16	1
JES	9	2
FoE	4	3
GCEP	2	4

Responses to Question 2

(Does your department (or school) share EE program(s) with community organizations or agencies other than the environmental conservation organization?) (Item 28).

Responses classified as shown in Table 5.15.

Table 5.15: Number of Responses and Rank Order Regarding Shared EE Program(s) with Community Organizations or Agencies Other than the Environmental Conservation Organization (n = 344).

Community Organization	No. of Responses	Rank Order
Municipalities	9	1
Ministry of Health (MoH)	7	2
Nour Al-Hussein Foundation	6	3
Royal Scientific Society (RSS)	5	4
Sports Club	5	4
Natural Resources Authority	4	6
Charity Societies	3	7
Religious Associations	3	7

Responses to Question 3

(Does your department (or school) have any coordination with other schools or higher education institutions to deliver the required activities for EE programs?) (Item 29).

Most responses did not give accurate details, since they just mentioned names of universities. Table 5.16 shows the valid responses.

Table 5.16: Number of Responses and Rank Order Regarding Coordination with Other Schools or Higher Education Institutions (n = 343).

Coordinated Programs or Activities	No. of Responses	Rank Order
Guest speakers from the universities	8	1
Borrowing Scientific instruments and apparatus from universities to perform environmental measures	6	2
Between teachers within the school	6	2
Between schools	4	4

Responses to Question 4

(Please, use the following area to write down your suggestions about the possible ways of coordination between your department and any other organization or agency in Jordan?)(Item 31).

In the blank space at the end of this question, the respondent wrote down his suggestions about the possible ways of coordination between his department and any other organization or agency in Jordan. The qualitative analysis of the responses indicated that the suggestions of the educators could be summarized into seven categories as shown in Table 5.17.

Table 5.17: Number of Responses and Rank Order Regarding Suggestions about the Ways of Coordination between the Department (or School) and any Other Organization in Jordan (n = 343).

Ways of Coordination	No. of Responses	Rank Order
Developing an environmental center in each district to coordinate environmental activities and programs	11	1
The universities, which are distributed through the country, may play the main role in coordinating EE efforts	9	2
Make available an EE network using the internet	5	3
EE efforts can be coordinated through concentrating these efforts on an pressing environmental issue in the area	3	4

5.1.3 Results of Additional Comments

The additional comments sheets of the questionnaires were kept in a separate file. Unfortunately, most respondents left these sheets blank. Even so, the valid comments were analyzed to understand the concerns, issues and suggestions that were expressed. The following is a brief summary of these public comments:

- Some formal educators recognized the role that NGOs can play in promoting EE in Jordanian schools. This forms a sound basis for developing effective EE. At the same time, formal educators criticized the duplication of efforts among environmental conservation organizations regarding nonformal EE, because there have been more than one organization holding EE programs at the same school, especially in central urban cities, while in other schools, such as in rural areas, no EE efforts can be recognized. One educator explained that the lack of coordination is due to replacement of the NGO staff that had originally started the program or project.
- There is a feeling among some formal educators in Jordan that the new generation is less competent, less enthusiastic than previous generations, and they are not equipped with life skills, such as thrift (turn out the lights), personal responsibility (keep your country tidy), and civics (write to your congressman).
- Some formal education suggests that the lack of practical work in schools limits students' abilities to participate in outdoor environmental activities, in addition to inadequate teaching materials and methodologies to facilitate the integration of EE into the formal and nonformal education programs. On the other hand, the state of school laboratories is inadequate for practical work that should be done within science disciplines.

- Several comments, especially from educational activities officials and curriculum developers, showed that most schools have many good EE materials on the shelves, while, unfortunately, teachers do not use them in developing students' skills.
- Some formal educators indicated that the slow pace at which EE has progressed in Jordanian schools is a reflection of: the lack of trained officials; inadequate teaching materials and methodologies to facilitate the integration of EE into the school programs; and a lack of appropriate curricula.
- Curriculum developers and educational activities officials acknowledged that there was a lack of concern within the supervisors and the schools administrators to incorporate EE effectively within the different levels of formal education programs.
- Some formal educators indicated that science educators are responsible for EE. This is because they look to EE as a branch of science or ecology, which aims at helping students understand environmental concepts and the theoretical backgrounds of natural phenomena. They did not mention the environmental attitudes, behaviors and the social benefits that students may gain from EE programs.
- Some formal educators concentrate on the understanding of environmental concepts mentioned in the school curriculum not on allowing the students to become environmentally responsible citizens. In addition, they commented that EE activities mentioned in the school curriculum are in danger of being treated, if they are treated, in a rather hurried and superficial way.
- Supervisors and educational activities officials suggested that teachers in schools need a filtering process to know what is

important and what is not, and how they should help their students to take advantage of all the information that is available, and they want training in using the technology that brings more information and data into their classrooms.

- The common feature that was repeated frequently in the additional comments is that formal educators showed positive attitudes towards EE, while they showed negative attitudes towards the formalities to teaching EE in Jordanian schools, and many activities are used just because they have been used in previous years. They want the students to get to do something rather than read about environmental issues. Other formal educators support the need for EE activities and programs that focus on teaching learners not to litter and encourage non-wasteful behaviors toward water and electricity.
- The researcher found that the respondents' beliefs and thoughts towards EE fall into two groups:
 - Group One: includes educators who are characterized by positive attitudes toward tradition and authority, and absolute adherence to rules and roles. They tend to think in concrete terms that are subject to little change. Educators, who are located in this group, are generally dogmatic and hold rigid beliefs regarding the environment and EE, and regarding the world around them. They want and need to rely on other people. Only an inconsiderable number of formal educators tend to have negative attitudes toward tradition and authority.
 - Group Two: includes abstract thinking, open-minded educators; they tend to be creative, flexible and utilitarian in their problem-solving styles. They respond with moderation to rules and regulations, not seeming to need much structure

or dependency for themselves but recognizing that they are frequently necessary for others. This group seemed enthusiastic, since they gave a great body of comments toward improving and coordinating EE activities.

- Formal educators face serious barriers before EE can do a better job of achieving a goal. Most of the barriers identified through research can be categorized as follows:
 - Structural barriers obstruct the ability of motivated educators to engage in EE activities. These include a wide range of funding, time, policy and liability issues.
 - Barriers related to the irresolvable disagreements among educators within the institutions (or schools) about which agency is in control of EE programs. This barrier may result in dysfunctional programs.
 - A cognitive and attitudinal barrier held by educators which includes insufficient knowledge, motivation, or interest and the existence of the two belief systems that interfere with concepts of learning accurately.

The major findings of this part of the study showed that about one third of formal educators in Jordan currently infuse education about the environment into their educational settings. On the other hand, males of formal educators tend to infuse EE into their educational settings more than females do. Formal educators with higher *academic qualifications* and longer *educational experiences* tend to infuse EE into their educational settings more than those with shorter *academic qualifications* and shorter *educational experiences*. On the other hand, formal educators who received training in EE tend to infuse EE into their educational settings more than those who did not.

Regarding *occupation*, formal educators tend to infuse EE into their educational settings in the following order: educational activities officials, curriculum developers, supervisors, and finally, teachers. In relation to *teaching subjects*, formal educators tend to infuse EE into their educational settings in the following order: Fine Arts, Science, Religion, Arabic, English, Math, Social Studies, and finally, Sports.

The most serious factors which prevented more teaching of environmental topics included: the need for sufficient funding; the need for the knowledge of how to effectively monitor EE activities; more support from administration; more inservice education courses on EE teaching methods; and the need for better access to EE resources.

58.1% of formal educators who indicated that they infuse EE into their educational settings, see that the best teaching methods are those with emphasis on environmental values, not on environmental knowledge; and 77.5% consider that a child-centered approach is more appropriate for EE teaching and learning than subject-centered approach. Formal educators indicated that the most serious aspects of EE that they are giving emphasis to, are in the following order: personal responsibility for the conservation of the environment; awareness of local environmental issues; environmental ethics; environmental knowledge and understanding; and awareness of environmental issues in other countries.

The analysis of the volume of EE activities and coordination with other agencies, accomplished by formal educators in Jordan, showed that less than 30% indicated their institutions (departments or schools) hold EE programs or activities, and less than 20% has shared EE programs with other agencies, such as community organizations, or environmental conservation organizations or higher education institutions.

Additionally, the comments gave an insight into what Jordanian formal educators' perceptions are about EE. It showed their difficulties, aspirations, likes and dislikes. A general message came in through the additional comments from the valid questionnaires that formal educators were interested and enthusiastic about EE.

5.2 Findings Related to Nonformal EE

The goal of collecting data from Environmental conservation organizations is to find out which EE initiatives are in place in environmental conservation organizations in Jordan, and which initiatives are being developed. Data collecting, in most cases, was conducted by the researcher, through semi-structured interviews.

The following is the quantitative analysis of the findings, after that, the qualitative analysis, which consists of representation of EE programs for each responding organization.

5.2.1 Quantitative Analysis

Here below is a summary of the findings according to the format of the questionnaire.

5.2.1.1: Findings Related to the General Information

The purpose of this section is to obtain some general information about the person who is completing this questionnaire and the organization to which he/she belongs. It is supposed that this person is the director of the EE (environmental awareness) programs in his organization.

1. Since the actual sample of environmental conservation organizations which received the questionnaires was 11 organizations⁴, there were 5 (45.5 %) of them belonging to governmental organizations and 6 (54.5%) belonging to NGOs.
2. As for the respondents, there were 8 (72.7%) males and 3 (27.3%) females. In some cases, more than one response was received from one organization, in this situation, the researcher selected the response of the officer who has the higher official degree.
3. Six (54.6%) of the respondents have been working in their organizations for (1-5) years, 4 (36.4%) for (6-10) years and 1(9.1%) for (11-15). The details are shown in Table 5.18.

Table 5.18: Distribution of the Respondents According to the Years of Experience in the Organization (n = 11).

Years of Experience in the Organization	Frequency	Government Organizations		NGOs	
		Frequency	%	Frequency	%
1-5	6	1	16.7	5	83.3
6-10	4	3	75.0	1	25.0
11-15	1	1	100.0	0	0.0
Total	11	5	45.5	6	54.5

4. With regard to the *academic qualifications*, 8 (72.7%) hold Bachelor's Degrees and 3 (27.3%) hold Master's Degrees. Most of their major subjects are in science fields, so there are 7 (63.6%) specialized in science matters, 2 (18.2%) in environmental management, 2 (18.2%) in literature and languages and none in education.

⁴ The population consists of 15 units (organizations), which means that the study dealt with 73.3 % of the population.

5. Respondents were asked whether they received training in EE or in managing the organization of environmentally oriented programs, or not. Four (36.4%) respondents have responded positively to this question. One (25.0%) of them is governmental and 3 (75.0%) are NGOs. A review of some titles of the courses indicates that only 2 of 4 can be considered EE courses, and the other two courses are environmental studies.
6. The members of governmental organizations are government agents, but the target groups of the programs are most sections of population in Jordan. On the other hand, the members of NGOs vary from schoolteachers and students to private business agents. Some NGOs have other specific categories, such as hunters, and non-environmental organizations, such as sport clubs, charity societies and factories.
7. All environmental NGOs provide their members with networking opportunities, professional development and communication about environmental concerns. They have either already constructed web pages or have them under construction, while none of the governmental organizations have web pages.

5.2.1.2: Findings Related to Nonformal EE Activities

This section is concerned with the programs that environmental conservation organizations sponsor or conduct under their supervision.

Responses to Question 1

(Does your organization hold any environmental programs or activities with regard to EE? If the answer is yes, please indicate what are these programs or activities?) (Item 8).

All respondents indicated that their organizations have EE programs. The main features of these programs are as follows:

-Most EE programs are undertaken by environmental NGOs.

-EE programs can be classified into four categories:

1. Awareness programs directed to the general public;
2. Awareness programs directed to school students;
3. Publications and evaluation studies; and
4. Training programs.

The Jordan Environment Society (JES), Royal Society for the Conservation of Nature (RSCN) and Friends of the Environment Society (FoE) are the three key players at the national level. JES has a range of environmental awareness programs, involving seminars, workshops, training, field activities and written materials. RSCN focuses on public awareness of protected areas and wildlife, and school programs addressing diverse environmental issues. FoE has tangible EE programs that concentrate mainly on school students.

Some potentially innovative EE activities that are applied in schools were identified from the inputs of other environmental organizations, such as the School Clubs for the Protection of Animals (SCPA) that has been established by NSPA.

Responses to Question 2

(Does your organization have a plan of action for EE? (EE plan whose purpose is to chart a course of action and to provide an implementation schedule for meeting the goals of EE.) (Item 9).

It supposed that these plans are to set forth the goals and objectives for EE within the region in which the organization located. Seven of 11 (63.6%) respondents indicated they have an EE plan of action to chart a course of action, and to provide an implementation schedule for meeting the goals of EE.

A review of the materials provided for those plans indicated little depth and they are concentrated on certain sectors of the community. Only two plans of action for EE represent an actual schedule for meeting the goals of EE; three focus on one EE topic or two (water awareness, recycling, or both); one is adopting the plan of project GLOBE; and one is a school EE materials.

Responses to Questions 3 & 4

(Does your organization assist teachers for incorporating EE into school curriculum?) (Does your organization have an EE curriculum guide or other publications which provide direction to the development of EE programs at the school level?) (Item 10 and 11).

Only three (27.3%) respondents stated that their organizations assist schoolteachers for incorporating EE into school curriculum. In addition, the same organizations have EE curriculum guides and publications which provide direction to the development of EE programs at the school level. These three organizations are: JES, RSCN and FoE.

Responses to Question 5

(Does your organization apply any EE study or assessment procedures that include standardized testing, authentic-performance assessment measures, or other evaluation methods, to assess environmental literacy among school students?) (Item 12).

Only one positive response has been recorded. One of the main educational programs implemented by JES is Awareness Project in Water (APW). This program includes several applied studies, such as Water Awareness Study. The project conducted a study to help design its public awareness campaigns. The study included measuring water awareness of schools students in several areas of the country.

Two respondents answered positively to the question, but, when the researcher reviewed the provided copies of their studies, he found that their target groups were not the school students. Nevertheless, the researcher's personal knowledge of the situation in Jordan, indicates that there were

several studies conducted to promote this approach by the higher education sector.

Responses to Question 6

(Please write your suggestions or recommendations to improve the implementation of EE in Jordanian schools) (Item 13).

The suggestions or recommendations to improve the implementation of EE in Jordanian schools, which were introduced by the respondents, are summarized as follows:

- In spite of the EE elements that had been established in most areas in Jordan by environmental conservation organizations, few formal educators have participated in them. Thus, building trust and respect between environmental awareness program leaders and formal educators is an essential factor to successfully distribute EE in schools.
- Some respondents emphasized that school laboratories would play a valuable role as centers of EE programs in schools. Thus, EE can participate in investing in the available equipment effectively, and developing the practical skills of the students.
- The professional development of formal educators as agents of change who have central roles to play in helping to create the broad social context necessary for environmentally sustainable development.
- Developing and supporting schools with environmental kits.

5.2.1.3: Findings Related to the Coordination of EE Activities with Other Agencies

This section is designed to gather information that may help in coordinating EE programs between environmental organizations and other agencies in Jordan to improve the implementation of EE in schools.

Responses to Question 1

(Are there shared EE programs or activities between your organization and other environmental conservation organizations?) (Item 14).

Nine (81.8%) environmental awareness programs leaders responded positively. All nongovernmental organizations responded that they have shared programs with GCEP.

Responses to Question 2

(Does your organization share EE program(s) with community organizations or agencies other than the environmental conservation organization or agencies?) (Item 15).

All surveyed organizations have shared EE program(s) with community organizations other than the environmental conservation organization, for example, charity societies, sport clubs and municipalities.

Responses to Question 3

(Is there a systematic coordination with the Ministry of Education?) (Item 16).

To improve the implementation of EE in Jordanian schools, there are 10 (90.9%) who have shared programs with MoE, but only 4 (36.4%) organizations have systematic coordination with the MoE. These organizations are: GCEP, JES, RSCN and FoE.

Responses to Question 4

(Does your organization have EE contact persons in the schools?) (Item 17).

In response to whether their organizations have EE contact persons in the schools, only 4 (36.7%) answered that they did. It should be noted that in the organizations that did not, the respondents indicated that they have plans to have EE contact person in schools.

GCP, JES and RSCN indicated that their EE contact persons were teachers and administrators. FoE indicated that its EE contact persons were students in secondary schools and teachers in elementary schools.

Responses to Question 5

(Do you have any coordination with higher education institutions to deliver the EE programs or activities?) (Item 18.).

Eight (72.7 %) responded that they have coordinated activities with higher education institutions, especially with the University of Jordan and Yarmouk University. The activities revolve around inviting guest speakers, and volunteers from students to participate in campaigns and special occasions.

Responses to Question 6

(Did your organization make a contribution in the National Strategy for EE, Communication and Awareness (EECA)?) (Item 19).

Respondents were asked whether their organizations make contribution in EECA. Three (27.3%) stated positively, they had participated in developing the National Strategy for EECA; the others stated that they hadn't participated, and some of them didn't hear about it. The organizations that participated in developing EECA are GCEP (principal participant), JES and RSCN.

Responses to Question 7

(Please, use the following area to write down your suggestions about the possible ways of coordination between your organization and any other organization or agency in Jordan?) (Item 20).

Some suggestions about the possible ways of coordination between environmental organizations and other agencies are shown in Table 5.19.

Table 5.19: Number of Responses and Rank Order Regarding Suggestions About the Possible Ways of Coordination of EE Activities (n = 11).

Ways of Coordination	No. of Responses	Rank Order
Coordinating the environmental activities and programs needs an authorized office	5	1
Dispersed EE efforts result from the lack of the financial resources	5	1
The universities can play a major role in coordinating EE efforts	3	3
Mayors of municipalities can lead the cooperation between different organizations to achieve the objectives of EE in the area	3	3

5.2.2 Qualitative Analysis

A review of the results of the semi-structured interviews with the environmental organizations leaders and the attached documents indicated that these organizations hold tangible efforts regarding EE. The following is a summary of EE programs of each responsive environmental conservation organization.

5.2.2.1 Governmental Organizations:

1. The General Corporation For Environment Protection (GCEP)

Three officers filled out the questionnaires that were sent to the GCEP. After analyzing and comparing their answers, the researcher found that GCEP has made impressive contributions in developing environmental awareness in Jordan. The main projects and programs, which are conducted by GCEP, are as follows:

King Hussein Environmental Management Training Program (KHEMTP)

This project is executed by the GCEP in coordination with the World University Service of Canada (WUSC). The project is funded by the

Canadian International Development Agency (CIDA), which usually gives financial support for human resources development projects.

KHEMTP's purpose is to develop Jordan's human resources, to provide Jordan with environmental management expertise, and to develop its economic and social levels, while protecting both its natural and built environment. Specifically, the program will address the need for human resource development in environmental impact assessment, environmental law and public awareness, by collaborating with Jordanian institutions to develop and deliver training modules to individuals with environmental management responsibilities from government, industry and local communities. It is supposed that the project will result in an increased capacity of Jordan's training institutions to deliver effective environmental management training throughout the Jordanian society.

The agencies that are benefiting from this program are: the Jordan Environment Society (JES), the Royal Scientific Society (RSS), and the Jordan University for Science and Technology (JUST).

In 1998, the KHEMTP issued a compilation of Jordanian legislation with environment protection requirements, called "Jordanian Environmental Legislation", which includes environmental legislation in regard to water (surface and ground water); wastewater and sewage laws; marine environment; air; fire; noise; soil and agricultural land; flora and fauna (biological diversity); desertification; pesticides and fertilizers; human settlements and habitat; land use; public health; monuments and archaeological sites; energy and mineral wealth; and chemicals laws. Each section includes the laws; regulations (by-laws); instruments; standards; and specifications.

Environmental Public Awareness Training Programs

These programs aim at developing the human resources in the field of Public Awareness for the NGOs and community groups. The most important objective is that the participant will be able to define public environmental awareness programs and explain how they fit with other environmental management and sustainable development tools. A review of the training modules provided for these programs indicated that they were well designed.

Environmental Information and Awareness Project

The GCEP aims, by implementing this project, to disseminate and heighten environmental information to the community at large and to activate the media; to introduce the basic means to tackle environment elements; to introduce environmental terminology in the school curricula; and encourage students' involvement in nonformal EE activities. In addition, GCEP has implemented the following activities during the previous few years: celebration on the International Environmental Day, seminars; production of TV programs; and organization of an environmental contest.

2. Ministry of Agriculture (MoA)

A semi-structured interview was held with the head of the Agriculture Extension and Information Department (AEID) at MoA. The main project completed by MoA, with regard to EE, is the development of an "EE and Training Module," with financial support of FAO. The module aims at integrating environmental terminologies in agricultural extension services, with the goal of deepening environmental awareness and the correction of agriculture practices, in order to achieve sustainable agricultural development, as in the case of using integrated pest management to reduce the use of pesticides. Other examples promote safe usage methods when spraying pesticides.

At the end of the interview, the head of the AEID at MoA added a general comment: “the government provides weak extension services, meanwhile the private sector companies in the irrigation areas provide concentrated extension services. Moreover, other serious problems relate to environmental safety, as a result of the chemicals misuse, which has emerged with no appropriate extension services to meet the situation that has developed.”

3. Royal Scientific Society (RSS)

Two environmental researchers, in the Environmental Research Center (ERC) at the RSS, filled out the questionnaires, and they attached some documents, which included information about environmental measures and pollution in Jordan. ERC undertakes and manages applied research and studies in selected environmental areas; it provides scientific and technical advisory services to the public and private sectors in Jordan. A great deal of ERC work is carried out through contractual research and services. It is obvious that ERC does not have environmental awareness programs or activities that may assist in developing EE in Jordanian schools.

4. Ministry of Health (MoH)

The results of the interview with the head of Health Education Division at MoH showed that MoH is attempting to initiate Environmentally Healthy Schools in different districts in Jordan. This project, which is funded by WHO, is implemented in three different schools in Jordan, in cooperation with the MoE as the focal point. The project is unique in terms of being a trial in the East Mediterranean countries.

The project aims at pointing out the extraordinary impact the school site has, not only on the students and teachers, but also on the families and community health. It focuses upon the school as a unit for bringing and integrating students, teachers, families and the community together to

improve health and the environmental framework. The project considers the high percentage of students that comprise the population, and the impact they make.

5. The Ministry of Municipal Rural Affairs, and the Environment (MMRAE)

MMRAE prepares plans and policies to ensure the protection of the environment at present and in the future. It conducts research and studies on prevention of pollution. On the other hand, MMRAE currently studies and analyzes development, agricultural, industrial and construction projects, in cooperation with concerned parties, to ensure that such projects satisfy environmental conditions and protect the environment; and it participates in drafting laws, by-laws, instructions and orders with regards to the environment. Since there is no specialist in MMRAE to deal with environmental awareness programs and activities, it is safe to conclude that environmental awareness programs have no priority in the MMRAE⁵.

5.2.2.2 Nongovernmental Organizations:

1. Jordan Environment Society (JES)

The results of an interview with the executive director of JES were as follows:

- There are monthly lectures held at JES headquarters in Amman. JES participates in many seminars, workshops, meetings and special events organized by various local and international agencies.

⁵ An interview with the Head of the Environment Department in MMRAE.

- JES has organized eight different specialized committees. The most active committee regarding EE is the “Education & Information Committee.” This Committee engages in several activities, such as organizing several environmental seminars. Through the Education and Information Committee, JES creates study circles, constituted of a number of JES’s members who are interested in study and research.
- The main educational programs that are implemented by JES are as follows:

The National Environmental Information and Education Program (NEIEP)

An agreement to implement this program was concluded with the Friedrich Naumann foundation in 1991. NEIEP conducts training and educational activities targeting JES’s staff and volunteers and other local and Arab environmental groups, media people, politicians, teachers and women’s organizations and other sectors of the society. The program produces information materials on environmental issues and uses its mobile environmental exhibition to spread awareness all over the country. NEIEP aims at creating a special environmental library (Environmental Information Bank) in future phases of cooperation. NEIEP is considered one of JES’s tools to implement its policies and to achieve its goals.

Awareness Project in Water (APW)

This project aims at strengthening the institutional capabilities of JES and its branches in the field of planning, supervising and implementing public awareness activities. APW’s main strategic goal is to increase the number of people with better knowledge of water issues and water conservation methods. To achieve its goals, the APW conducts several field activities, in cooperation with JES branches and other official and non-official

organizations. The activities include information seminars, training workshops, lectures and special events that are held on special occasions, such as International Water Day and Arab Environment Day, in addition to environmental exhibits and activities⁶.

EE and Communication Project

The Project aims at introducing Jordanian journalists and public officers to the global and national environmental issues. The target is to provide in-depth knowledge and to motivate journalists to report more seriously and intensively on environmental topics. The project was implemented in cooperation between JES, Jordan Television, and UNESCO.

Medical Waste Management Project

The project's goal is to raise awareness in the medical community about biosafety and medical waste management, and to train local medical officials in biosafety and proper medical waste management. It will also work on developing guidelines for biosafety and proper medical waste management in hospitals and laboratories in the Amman area. This objective will be achieved through developing awareness about biosafety among the medical staff of hospitals and laboratories in Amman. This project is funded by the German GTZ⁷ and implemented by JES.

Finally, the seminars, conferences meetings, forums, school campaigns, study circles, field visits and implementation of environmental projects of JES had a substantial impact on the groups of citizens who participated in these activities. The study circles approach, adopted by JES, helped to develop a special kind of 'friends who are loyal to JES' and voluntary work. The publications issued by JES constituted support for other

⁶ These information was represented in the attached document with a questionnaire filled by Mr. Mahmood Al-Omary, the executive director of JES.

⁷ GTZ (Gesellschaft für Technische Zusammenarbeit) is a service company owned by the German Federal Government. It was formed in 1975. The primary goal of GTZ's work is to improve the living and working conditions of people in the partner countries and sustain the natural basis for life.

activities, since they are the main materials provided to participants and they contain simple and effective environmental messages. And, the follow up and continuation of providing public environmental awareness programs, the issuance of publications and the enhancement of branches' and specialized committees' activities, are very important factors in promoting JES's credibility and widening the base of voluntary work and strengthening the environmental movement in Jordan.

2. The Royal Society for the Conservation of Nature (RSCN)

The results of an interview with the head of the Public Awareness Division of RSCN were as follows:

- RSCN has many achievements, since it is the environmental organization with the longest history in Jordan. Here are just a few examples:
 - The establishment of seven natural reserves, as described in Chapter 2.
 - The successful captive breeding of the magnificent and endangered Arabian Oryx, gazelle and Ibex, and their reintroduction to the wild.
 - The control of illegal hunting throughout all regions of the Kingdom.
 - The monitoring and controlling of pollution in the Gulf of Aqaba.
 - The development of large-scale conservation programs designed to integrate environmental protection with the socioeconomic development of local people.
- The future for the RSCN looks bright. As the importance of environmental protection is recognized the world over, the RSCN

is poised to have a much greater and influential role in Jordan. Among the projects in the pipeline are:

- Five major new reserve areas.
 - Restoration of the internationally important wetland at Azraq.
 - Development of a regional training unit to promote and provide vocational training in the field of environmental management.
 - Participation in international programs to protect habitats for birds and encourage the development of voluntary organisations in other Middle Eastern countries.
 - Further development of the membership program to encourage many more Jordanians to join the Society and contribute to the protection of their own environment.
 - The creation of a database on the status and distribution of the plants and animals throughout Jordan to identify species at risk.
 - Extending the public environmental awareness program to all sections of Jordan society and influencing the national school curriculum so that it reflects modern environmental concerns and teaching methods.
- RSCN has published “Al-Reem Magazine” since 1979. This is a quarterly magazine and is considered one of RSCN's outlets for disseminating public awareness and raising the level of understanding of the Jordanian people as to the ecological and social value of conserving wildlife. Al-Reem Magazine is Jordan’s first wildlife and environment magazine, a high quality environment magazine addressing institutions and encouraging individuals to take action. It is an interactive magazine that serves

as a platform to debate and discuss issues, by highlighting problems or issues, and lobbying for better legislation. Al-Reem Magazine invites researchers to write about topics related to RSCN concerns covering local and international issues.

- Water Conservation Education Project: Since RSCN has SCCN clubs in many schools, it determined that disseminating information to the public on how they can help conserve water could occur through a curriculum for the students in the club. Water Conservation Education Project is collaboration between the United States Agency for International Development (USAID) and RSCN. The general objective of the project is to raise awareness about the need for water conservation in Jordan amongst secondary schools that have SCCN clubs.

The Project has received support from the MoE in selection of schools and selection of teachers. The Water Authority provided expert technical assistance about water issues in Jordan. Implementation was through the Public Awareness Division of RSCN and its five staff members who worked on essential activities. A coordinator within the Division, funded by USAID, was responsible for planning, logistics and assuring continuity. The director of the Division had overall responsibility and received support from the RSCN Board of Directors, the RSCN Acting Director and the members of the Education Committee of the Board.

The project has been implemented through the SCCN clubs in the secondary schools only that have been in existence for two or more years, because by the age of 16 to 18 students are beginning to learn as adults, not as children. The water activities will eventually reach, not only these students, but also their parents, teachers and their

families, creating a grassroots understanding of water issues and laying the foundation for changing social norms. Thus, RSCN's unique relationship with the schools made it a natural vehicle for this project.

The setting up of SCCN to help children to understand environmental issues and become involved in practical conservation projects. Since SCCN clubs are thought to utilize EE as a vehicle for accomplishing school improvement goals as part of the current education reform movement in Jordan, the researcher collected the following detailed data regarding the role of RSCN in SCCN.

The Role of RSCN in SCCN

All SCCN are linked and supported through a national network. RSCN is the hub of the network. Each administrative region in Jordan has a regional coordinator, usually from the Educational Directorate, whose job is to facilitate communication between the clubs in the region, provide personal support to club leaders, promote the club network regionally, and provide feedback to RSCN.

RSCN supports the work of regional coordinators, provides materials and information for club supervisors, develops the supervisors' skills in EE, and promotes the clubs at a national level. The RSCN also works closely with the MoE to develop the environmental components of the national curriculum. RSCN provides training workshops for club supervisors every year.

The Public Awareness Section in RSCN provides new ideas and techniques for club activities and enhances the supervisors' knowledge of environmental issues and teaching approaches.

In addition to training and general support, RSCN provides each club supervisor with an environmental "tool box." This is a unique file of information, fact sheets, and ideas for activities that is regularly updated. With this file, club supervisors can easily develop their club programs and pursue many ideas for linking club activities to the environmental curriculum in the school.

On the other hand, any school that would like to start a club should first apply to RSCN through MoE. The regional coordinator in their area will then inform RSCN and a member of the Public Awareness staff, will visit the school to explain how to get the club started and provide a starter kit of information and materials.

RSCN also produces an attractive newsletter, which keeps the clubs up-to-date on club activities and RSCN's educational work, as well as providing information on national projects and environmental issues. It provides an effective vehicle for clubs to publicize their own activities and learn about the activities of others.

3. Friends of Environment Society (FoE)

The results of an interview with the executive director of FoE Society showed that FoE Society has many educational programs directed toward Jordanian schools:

Jordan GLOBE⁸ Program

GLOBE program is the most important educational activity coordinated by FoE. Jordan joined GLOBE in 1997, under an agreement with the MMRAE and the US Embassy in Jordan. The FoE Society serves as the Country Coordinator. Jordan currently has 19 schools, all over the country, enrolled in GLOBE activities. Teachers attend annual GLOBE

⁸ GLOBE (Global Learning and Observations to Benefit the Environment) is a hands-on, school-based, international program for science and EE.

workshops organized by the FoE Society. Some schools lack adequate funding for chemicals and equipment, and phone/internet access is a problem, but FoE is trying now to overcome these problems.

In 1997, a workshop was coordinated by FoE, which sustains the GLOBE program. The workshop attendees included a computer expert from the University of Jordan, a science specialist from the MoE, the GLOBE National Coordinator⁹, and volunteers from FoE. The three-day introductory workshop included an overview of GLOBE and the scientific protocols for atmosphere, hydrology, biometry, and land cover. Moreover, The workshop included short lectures, teachers trooped outdoors to measure a variety of parameters including tree height, rainfall, canopy density, and water quality.

In April of 1999 FOE, in collaboration with local scientists, FOE held another workshop for GLOBE teachers in the areas of Land Cover, Soil, and Remote Sensing. 16 of the 18 GLOBE schools from all over Jordan attended the workshop. The goal of this workshop was to give GLOBE teachers additional skills they needed to guide their students in taking more land cover and soil measurements and to compare this data with the schools' satellite images that were handed out to all participating schools.

FoE is currently not actively recruiting new schools because of financial problems. New schools that come on board right now must have their own computers and Internet service. Which means that problems with the GLOBE Program in Jordan are largely financial. Governmental schools do not have the funds to purchase equipment and pay for the long distance phone bills to dial into the Internet server. FoE has been working with the MoE to get these costs covered, but it has been difficult.

⁹ The President of Friends of Environment Society (FoE).

The Annual Environmental Competition

One of the main tasks of the FoE Society is to educate secondary schools' students and to increase their environmental awareness by conducting an annual nation-wide school competition. The projects which are submitted are expected to be prepared utilizing scientific methods and taking into account actual situations. It is expected that participants will suggest permanent solutions to environmental problems which affect their lives and the health of their communities. During the school year, workshops are organized in order to discuss student projects and to offer assistance in conducting their research and studies.

The Dialogue Program

FoE aims to expand the environmental information among students throughout Jordan by initiating dialogue with other students regionally and internationally, and through organizing trips and visits to these countries, the purpose of which is to increase the youths' awareness regarding the latest environmental issues.

Finally, throughout the school year, FoE conducts lectures, workshops, organizes environmental field camps and field visits to nature reserves and other natural and cultural sites.

4. National Environment and Wildlife Society (NEWS)

NEWS aims at improving the level of environmental awareness among all strata of the Jordanian community and creating new positive behavioral patterns towards the environment. Many members of NEWS are environmental management trainers in the field of training of trainers. NEWS publishes a monthly newsletter "Dahnoun" that documents its activities and future plans. At the NEWS premises, a bimonthly program on awareness and information exchange is held.

NEWS has opened channels of cooperation with several national and international environment groups. It is a member of the Arab Network for Environment and Development. Host to the Mediterranean Ecological Media Network Secretariat, NEWS has launched awareness and training campaigns for journalists. In June 1999, NEWS sponsored, for 20 months, a “Journalist Awareness Program” (JAP) in cooperation with the General Corporation for Environment Protection GCEP and the German GTZ. Moreover, NEWS has established links with Haya Cultural Center, Greater Amman Municipality and many other national and international organizations in Amman, to promote awareness for hotel staff and the nearby community. The concept of establishing a botanical garden is an idea conceived on the basis of serving the public through introducing it to different types of plants.

5. Arab Women's Organization of Jordan (AWO*)

AWO is holding the following two projects:

Madaba Productive Forest

The AWO has implemented a project on Desertification Control (Madaba Productive Forest). The project aims at establishing a community of managed and owned productive forests; taking measures to reduce soil erosion; helping in water conservation efforts by rain harvesting; involving local women and their families in environmental protection; and raising environmental awareness through a series of systematic activities.

Moreover, water precipitation in the project site area is very low, so water had to be brought to the site. The project acted as a catalyst for the Association, and another project was initiated for environmental

* These information was represented in the questionnaire filled by Mrs. Emily Naffa', the director of AWO.

awareness on the site. The project involved planting 159000m² with productive trees and medicinal plants; rehabilitating an old water-collecting cistern; constructing terraces; constructing an 'Environment House' to serve environmental campaigns to introduce ecotourism concepts and train environmental volunteers; and using the site to celebrate international environmental occasions.

Bird Life Conservation Project

The Project aims to conserve genetic diversity of Jordan's avifauna by collection and documentation of data for Jordan's avifauna and carrying out a public awareness campaign towards bird life in Jordan.

6. The National Society for the Protection of Animals (NSPA)*

This Society aims at the promotion of human treatment and the prevention of cruelty to animals, and to do all that is legally necessary to further these aims. It also aims to assist the owners of domestic and working animals, utilized for agricultural and transport purposes in the countryside and inaccessible areas, by providing the required veterinary help, all-free of charge. NSPA has established, through cooperating with MoE in Jordan, 51 School Clubs for the Protection of Animals (SCPA).

5.2.3: Results of Additional Comments

These comments revolved around the following general points:

- The major challenges facing users of environmental information are the absence of a coordinating body to manage access and dissemination of environmental information among all stakeholders,

* These information was represented in the attached document with a questionnaire filled by, the director of NSPA, Dr. Ragheb Kamal.

in addition to the weakness and absence of some laws and regulations governing the environment information in Jordan.

- Most of the respondents criticized the role of GCEP in raising public environmental awareness in Jordan. They indicated that the GCEP is not ready to enhance and support the activities of other governmental and nongovernmental agencies through the endorsement of the EPL No. 12 /1995.
- Many international organizations have participated frequently in the dissemination of environmental awareness in Jordan, by supporting the national organizations, government and nongovernmental, with experiences and funding, such as the UNESCO organizations, World Health Organization (WHO), the German Friedrich-Naumann Stiftung, the United States Agency for Development, the European Union for Regional Environmental Cooperation, and the Canadian Environmental Development Agency (CEDA).
- Environmental awareness program leaders can contribute by working with formal educators to set priorities to ensure that their support for EE programs is allocated to those that are effective, produce measurable results, and survive long enough to have a real impact. At the same time, organizations can participate in mentoring programs and internships.

Finally, the study showed that less than 20% of environmental awareness program leaders have received education (training) on EE or on how to deliver environmentally oriented programs. In addition, the respondents indicated that their organizations hold a considerable body of EE programs, and, that most EE programs are undertaken by environmental NGOs. The Jordan Environment Society (JES), Royal Society for the Conservation of Nature (RSCN) and Friends of the environment (FoE) Society are the three key players at the national level.

Chapter Six

DISCUSSION OF THE FINDINGS

This Chapter discusses the findings of the study in the following sequence:

1. Discussion of the findings related to formal EE.
2. Discussion of the findings related to nonformal EE.

6.1 Discussion of the Findings Related to Formal EE

This part of the study was to survey the status of formal EE programs in Jordanian schools as perceived by selected formal educators; assess formal educators' preparation and practices toward EE ideas and concepts, and the relationships between infusing EE into educational settings by formal educators in Jordan, and the independent variables (*gender, educational experience, academic qualifications, occupation, teaching subject, and training received in EE*).

Primarily, the findings in Chapter 5 showed that 37.2% of formal educators were currently delivering programs or infusing education about the environment into their educational settings. This result suggests that EE has not achieved the level of acceptance that might be expected from such an established formal education sector, while the commitment to infuse EE into school curriculum and programs is one of the central tenets of EE (Stapp, 1969; UNESCO, 1977; Wals & Alblas, 1997).

In addition, this result is congruent with the results of Simmons (1996), who indicated that teachers in Chicago area are not infusing EE, neither sufficiently nor uniformly, into their instruction and educational activities. Similarly, Sebasto's study (1998) at the University of Illinois in the United States showed that the percentage of educators who were currently delivering or developing new programs about the environment was 41.5%. At the same time, this result is in accord with several studies that indicated the weakness of formal programs in achieving the stated goals and objectives of EE, such as Vulliamy (1988); Barnes and Ferry (1992); Ahlawat and others (1994); and Walter (1996). These results reveal that the lack of implementation is a general reality for EE, and not a specific problem in the Jordanian educational system.

Theoretically, EE is interdisciplinary in nature; thus, it doesn't have a clearly identified disciplinary home, which may contribute to a very piecemeal and ineffective educational strategy adopted by formal educators when they try to infuse EE into their subjects. The following discussion adopts the same sequence of the guiding questions of the study:

6.1.1 Discussion of the Results Related to Question No. 1

(Are there associations between the infusion of EE into educational settings by formal educators in Jordan and the independent variables (gender, educational experience, academic qualifications, occupation, teaching subject and training received in EE)?).

Gender variable showed significant association with the infusion of EE into educational settings, to the benefit of males. This result is congruent with several studies (Gifford et al., 1983; Blum, 1984; Roth & Perez, 1989) that showed men had more environmental knowledge and more positive environmental attitudes than females. Since gender is a significant factor affecting attitudes towards most educational subjects (Palmer, 1993), the same may be applied to EE.

Research in several societies has shown irregular gender differences in environmental knowledge and attitudes. The literature showed that males generally display greater knowledge, and females slightly more environmentally concerned and aware (Hausbeck et al., 1992; Zimmermann, 1996). Since formal educators are all adults, it is expected that they will not show gender differences because the gender differences arise early in life, but these differences may well diminish, as people get older (Gabel, 1994, p. 215).

In Jordan, Ahlawat and others (1994) found that males had more environmental knowledge than females. Finally, Key distinctions regarding the issues that are raised by gender and education have hardly begun to be understood in Jordan. In the long run, gender issues are becoming increasingly important.

Formal educators with longer *educational experiences* tend to infuse EE into their educational settings more than those with shorter *educational experiences*. This result is congruent with most research in EE that supported the significance of educational experience in developing teaching skills regarding EE. Littleadyke (1997) indicated that teachers with long educational experience, had positive attitudes to EE and they were actively involved in both environmental teaching and in environmental action in their lives. Similarly, Fien and Corcoran (1996) found that the *educational experience* could make the teachers conscious of the transformative nature of EE and empower them to be active in their chosen profession. Moreover, Emmons (1997) showed that educational experience participates in the development and revision of a theoretical model of environmental action.

On the other hand, since infusing EE into educational settings is considered a development in educational settings, this result contradicts to a degree with Winch & Gingell (1999) who indicated that the practical

experiences carry habitual repulsion to development and training. Since the contingency coefficient equals 0.289, *educational experience* is one of the best independent variables that associate with the infusion of EE into educational settings. *Educational experience* is a variable that could predict the educators' infusion of EE into their educational settings. Thus, *educational experience* leads to professional development in EE. In addition, *educational experience* can awaken educators to the social change objectives of their field and empower them to be active in their chosen profession. Therefore, educational activities officials or curriculum developers should try to act like classroom teachers when they are designing activities or programs for the schools.

People respect their *academic qualifications*. This statement describes why educators with higher *academic qualifications* tend to infuse EE into their educational settings more than those with lower *academic qualifications*. On the other hand, the *academic qualifications* represent the general common criteria for recruiting educators. This result should encourage the decision makers in MoE to review such criteria.

Regarding *occupation*, formal educators tend to infuse EE into their educational settings in the following order: educational activities officials; curriculum developers; supervisors; and finally, teachers.

The economic and social situation of curriculum developers and educational activities officials qualify them to be more interested in teaching and learning in EE. For example, excellent income level, area of residence - often in Amman, visitation to national areas and reserves, study of environmental books and magazines, may well support the curriculum developers and educational activities officials to infuse EE into their educational settings.

The low value of the contingency coefficient (0.255) may be due to the variation in the educational environment and the nature of the job of teachers; supervisors; curriculum developers; and educational activities officials.

Educational environment, which includes the routines of the everyday formal job, curriculum and classroom climate, the most factors that interacts directly with formal educators' infusion of EE into their educational settings. The influence of educational environment on educators' practices can be explained through studying formal educators' understanding of the philosophy and objectives of schools; the level of coordination between teachers; and the differences between the perceptions of teachers and administrators.

Regarding *teaching subjects*, formal educators tend to infuse EE into their educational settings in the following order: Fine Arts; Science; Religion; Arabic; English; Math; Social Studies; and finally, Sport.

Since Fine Arts is an obvious subject for raising environmental awareness, educators who teach Fine Arts tend to infuse EE into their programming more than others.

Friends of Environment Society (FoE) has an active role in supporting Fine Arts teachers through organizing an annual drawing contest for students under the age of 15, entitled "Environment Through the Eyes of Children." The objective of the contest is to encourage children to think about environmental issues by drawing scenes portraying the environment they live in. These drawings are then reproduced as cards, postal stamps or calendars on recycled Jordanian paper.

Regarding science education, which located in the second level, this result provides new evidence that teachers believed that EE should be taught within science education. Ham and Sewing (1988) and Simmons (1989), for

example, found that teachers named science as the curriculum area in which EE should be taught.

After Rio 1992, the major turning point in EE was the emphasis that EE should traverse all disciplines. Generally, EE is not being infused equally within the school curriculum. The chronic problem, which shows up frequently, is the discrepancy between research recommendations and the schools' realities. Thus, it is the school system that decides which is the best position for EE. It can choose the appropriate approach for the infusion of EE into the educational process. In addition, this result highlights the role that NGOs can play towards the implementation of EE in school systems.

Formal educators who *received training in EE* tend to infuse EE into their educational settings more than who did not. This result gives strong evidence for the importance of EE training programs. EE training programs have been recognized in many parts of the world as a major priority for the promotion of EE in formal education (see, for example, Wilke et al., 1987; Stone, 1989; UNESCO-UNEP, 1990; Fien & Tilbury, 1995; Rickinson & Robinson, 1999).

On the other hand, findings reveal that the lack of understanding of EE, among formal educators, is due to the preservice (or inservice) education programs that have not prepared them to be environmental educators. Lack of adequate preservice and inservice training is one of the most important barriers for EE. Accordingly, Braus (1995) suggested that if we want to see EE in our schools, we need to train teachers in what EE is all about; how to facilitate open-ended discussions; how to teach EE action skills and problem solving; how to deal with information and technology; how to teach in an interdisciplinary way and integrate EE across the curriculum. Generally, efforts to develop preservice and inservice training opportunities for teachers should continue.

6.1.2 Discussion of the Results Related to Question No. 2

(What are the most serious factors that would influence formal educators for infusing EE into their educational settings in Jordan?).

The most serious factors that prevented more teaching of environmental topics can be summarized into the following three categories:

1. Facilitators (need more support from their administrations, they do not have enough funding, and they need more preparation time);
2. The lack of knowledge about EE (they do not have the knowledge to effectively monitor EE activities, they need more EE training programs, and they need better access to EE resources);
3. The importance of EE (the low priority which has been ascribed to EE). As mentioned in Chapter 5, the most important factors were summarized in three categories: (i) Facilitators; (ii) The lack of knowledge about EE; and (iii) The importance of EE (there are other concepts that are more important than EE).

These factors, in general, are congruent with the findings of Littledyke (1997), who found that the factors which deter EE include poor resources in many schools; lack of curriculum time; lack of scientific understanding of environmental issues by many teachers; and limited concern for, or interest in EE with some teachers.

In addition, these results agree somehow with Williams' (1992) list of factors that obstruct the effective incorporation of an EE dimension in teacher education programs. These factors include constraints of time, staffing, and resources and a lack of experience and expertise among staff with respect to the aims, substance and methodology of EE.

There is a lack of necessary educational facilities in many schools in Jordan, such as EE kits, tools, equipment, and internet access, that are needed for the smooth running and carrying out of the EE activities in Jordanian schools. Generally, educational facilities are not at an adequate level in most developing countries. This result agrees with Valliamy (1988) who denoted the absence of prepared EE facilities in developing countries. Therefore, most educators find themselves surrounded by traditional administration practices and a lot of practical constraints, such as the feeling that any extra or outdoors activities will cost additional funding, and that more time is needed for preparation and conducting such activities. These factors have come to interpret why most formal educators in Jordan do not infuse EE into their educational settings. Simply, formal educators did not receive the needed administrative recognition, nor the necessary funding, nor the needed training in EE.

The administrator plays a key role in the ultimate success of change efforts. In most cases, he is charged with responsibility for the ongoing success of the school's educational programs. His prestige and authority can play a great part in determining a final EE outcome. The administrator can allocate school-wide resources in terms of people, money, or time (Nanda, 1997, p. 4).

Moreover, the support from administration is closely related to a term known as "*locus of control*" (Gabel, 1994, p. 214), that describes the extent to which other individuals believe that reinforcement is contingent on their own behavior. In other words, some people believe their deeds influence what eventually happens to them. This means that formal educators in Jordan do not think that "luck" is largely behind the reward or punishment they receive.

On the other hand, the traditional administrative practices in Jordan were inherited from the British colonial era. The objectives of the colonialism were

to educate the employees to carry out the tasks assigned to them in the colonial administration. The bureaucratic model is characterized by fixed and official jurisdictional areas, and administration by full-time trained officials. Authorities administer on the basis of written documents, established regulations, and comprehensive general policies.

Although formal educators believe that it is important to take time to integrate environmental concepts and issues into their educational settings, they need time for preparation and for applying the activities and programs. On the other hand, teachers in Jordan get low incomes and most teachers have an additional overtime job. This condition discourages them from participating in any developmental activities.

The lack of knowledge about EE teaching methods is related to the philosophical and epistemological constraints. This result completely agrees with Stone (1989) who found that not only teachers, but also teacher educators are neither familiar with the goals and teaching methods of EE nor prepared to effectively incorporate EE into their courses. Similarly, Wilson & Smith (1996) reported that the scarcity of information about EE in professional literature indicated that teachers and teacher educators couldn't use the literature as a source for information and ideas on how to incorporate EE into the school curriculum.

Since formal educators indicated that there are other concepts more important than EE, does this mean that they have insufficient understanding of beliefs, attitudes, and values regarding the environmental issues, in addition to the EE teaching methods? There is a host of educational and cultural factors that may influence how formal educators believe and behave towards EE.

Firstly, EE is not a priority because the governmental leaders and educational reform workers have not emphasized EE in their programs, in spite of the fact that it was emphasized the educational standards and guidelines that were developed for the curriculum area. In addition, many governmental and nongovernmental environmental organizations have consistently cut back on formal education. Moreover, there are exceptions; funds for sponsorship and public EE activities have far exceeded resources allocated to formal education.

Secondly, curricula are already overfilled. An overflowing curriculum creates another problem for EE. Some people say that EE is not a priority because in many schools it is hard to tell what the priorities are. All of us who work with educators know that they are faced with overloaded curriculums and are just trying to stay afloat.

Thirdly, the location of Jordan, in an area with continuous religious and political tensions, contrasts to a degree with EE concepts and ideas that harmonize with the main components of globalization, or should be. Globalization, as it is claimed, seeks to produce collaboration among nations with regard to confronting dangers menacing all of them, such as ecological disasters. Whilst terrorist operations and acts of violence in the Middle East are frequent between nations, from time to time, and since their ethnic and religious antagonisms are likely to express themselves in guerrilla warfare and terrorism, regardless of the peaceful negotiations which are under way, between Arabs, especially Palestinians, and Israelis, this unstable, charged climate might place the issue of the environment on secondary priority for most people in the area.

Lack of funding spreads throughout most Jordanian schools. Field trips, action projects, demonstration projects and other activities are costly. Batanouny (1998) indicated that it is not justifiable to introduce EE to less

developed countries, advising them to preserve their resources, while they see the rich countries exploiting these resources. Under immediate compulsions, the poor countries would not bother about environmental conservation. As a result, environmental educators should draw on the cultural factors and national interests to make new concepts relevant to EE, in order to achieve a better understanding of environmental issues. On the other hand, what money is granted for education goes often into the construction of school buildings and very little goes into curriculum development and educational programs.

Educators' responses showed that the least serious factors that influence educators to not infuse EE into their educational settings are the interest in the issue of environment and EE. This indicates that formal educators in Jordan have good personal commitment to EE, while the previous results showed that formal educators have insufficient knowledge regarding EE teaching methods. The overall conclusion is that most formal educators have interests in the issue of the environment, but at the same time, most of them do not infuse EE into their teaching activities.

On the whole, EE is not well developed in most schools, though some teachers and schools have well developed practices, according to their own rating. Inadequate support from administration; insufficient emphasis on teacher training programs in environmental issues; a lack of appropriate preparation time; inadequate funding; inadequate access to educational resources to facilitate the implementation of EE in school curriculum; and the lack of knowledge to effectively monitor EE activities, caused the slow pace at which EE has progressed in Jordanian schools.

6.1.3 Discussion of the Results Related to Question No. 3

(What is the volume of EE activities and coordination of them with other agencies, accomplished by formal institutions in Jordan?).

The data showed that 29.7% of formal educators indicated that their institutions hold EE programs or activities. Comparing this result with what we found, at the individual level, where 37.2% of formal educators were currently infusing education about the environment into their programs, generally, these findings indicate that the status of EE programs in Jordanian formal institutions is at a dissatisfactory level.

The findings reveal that there are not many EE programs within the formal education institutions in Jordan. At the same time, formal educators were very close to being undecided concerning whether they were competent to design and deliver programs about the environment and environmental issues.

Some potentially innovative EE development programs were identified. These programs include examples of good practice, which were revealed by the survey. A priority is, therefore, to build on that good practice.

The highest ranked EE activity was the collection of litter, while, the lowest ranked items were activities requiring manipulation. These data may help with designing more EE programs and identifying misconceptions that may hinder learning and teaching EE. The detailed description of EE programs was shown in Chapter 5, and may provide opportunities for formal educators to foresee potential problems in programs.

There is limited understanding of biodiversity and little evidence of interest in wildlife. It should be a priority of EE to foster a positive interest in

them and develop methods for lessening the tendency of individuals to view them as repulsive creatures. Bixler and Floyd (1999) indicated that developing an adequate understanding of ecological concepts is difficult without some awareness and knowledge of invertebrates, microbes, and soil science. In addition, school students need information on how wildlife is being affected by human activities. Environmental conservation organizations, which are always keen to expand their youth members, can help them to do something about these issues.

Teacher training programs are not adequately preparing teachers to achieve the goals of EE in their classrooms. Yet again, the data showed only a small percent of formal educators (12.2%) indicated that they have strategies for involving teachers in efforts (or strategies for involving students in EE activities) to expand or strengthen EE in their regions. In addition, another small percent of formal educators (13.0%) indicated that they have an EE plan and/or manual to help teachers (or students) develop EE programs. Therefore, the development of formal educators is particularly important because of the failure of many inservice education programs, to date, to adopt a critical agenda for the promotion of the general teaching skills.

The researcher believes that many of the problems of the educational system in Jordan cannot be solved unless the competencies of teachers are enhanced. To do so, effective inservice teacher education programs should be organized and implemented. To improve the quality of inservice education, we have to start with the teacher trainers or instructors.

In spite of the fact that education about the environment has a visible priority in most school curricula in Jordan, very little has been grounded in school systems and translated into visible programs or outdoor activities, such as visiting nature centers, zoos, museums, parks, and so on. In addition, the results should stimulate educational activities officials into looking at the type

of environmental activities that they develop for EE, taking into consideration factual realities of schools.

On the other hand, most formal educators (97.4%) do support the presence of a national journal, which could primarily provide EE teaching tips for teachers. Some of them indicated that such a journal would strongly support the coordination of EE activities between different agencies in Jordan. At the same time, it is supposed that this type of journal could bring environmental issues into a sharper focus and provide a forum for an exchange from a variety of perspectives. In the United States, there is no consensus to have a national EE journal for schoolteachers. For example, Holtz (1996) found that only 51% of teachers answered positively to the question of whether or not there is a need for a national EE journal geared to the needs of teachers. At the same time, EE journals are distributed to United States schools periodically; however, these journals are not used effectively in the school curriculum.

Formal educators suggested several ways of coordination of EE programs and activities, such as developing an environmental coordination center; the role that the universities can play; and an EE network using the Internet, however, only few EE shared programs between different agencies were observed. The higher education institutions seem to limit continuing the process of education in general, and in teaching environmental courses in particular cases, in some universities. This implies a clear ignorance of their responsibilities towards the community regarding EE. This state of EE reveals that the teachers of tomorrow are poorly prepared regarding EE, thus, the universities may need to modify their teacher preparation programs and open their doors to cooperate with the community organizations in developing EE programs.

Simply, one can conclude that the formal education sector is isolated from other agencies that would support EE programs. In other words, nonformal EE sectors do not play an important role in formal education settings as perceived by formal educators.

6.1.4 Discussion of the Results Related to Question No. 4

(What are the teaching styles of EE that formal educators prefer in Jordan?).

It is necessary to employ a range of teaching strategies that address students' knowledge, attitudes/values, and behavioral orientations as part of an integrated, long-term program. Strategies that may be used in realizing EE objectives are not necessarily new, but their application will be related to environmental issues. Therefore, a range of teaching styles is common in EE, such as child-centered approach, subject-centered approach, knowledge emphasis approach values emphasis approach, and skills emphasis approach.

The result showed that formal educators in Jordan consider the emphasis on environmental values over environmental knowledge, and child-centered approach over subject-centered, are the best teaching approaches. This result reflects the need in Jordanian schools for a proper EE model that is suitable to the educators' thoughts and that fits the school system climates.

There is a traditional imbalance between the importance placed on environmental knowledge, and attitudes/values in EE (Ballantyne & Packer, 1996). Most educators are now quite confident about the cognitive components of their curriculum that they have to teach, but they are dissatisfied about the affective component. The integration of environmental values, attitudes, and ethics into classroom teaching is a problem under discussion (Wals & Alblas, 1997).

The result of this question does agree with the findings of several previous studies, such as Bequette (1993) and Schindler (1999). Bequette found that teaching positive environmental values is more important in bringing about change in environmental behavior than the teaching of environmental knowledge (Bequette, 1993). In addition, Schindler found that environmental educators currently emphasize how to recognize environmental values and ethics, shape positive attitudes, and establish environmentally responsible behaviors, instead of emphasizing knowledge about the environment, which the students need to learn.

Knowledge emphasis approach to EE that focuses on students' conceptions does not disregard affective issues but rather recognizes their interdependence with the cognitive and behavioral dimensions (Ballantyne & Packer, 1996).

The constructivist approach has most commonly been implemented in the context of cognitive rather than affective development. Thus, its application to the environmental knowledge dimension is well established. Group-learning situations in which students are required to explain, elaborate, or defend their positions to others have been found to be effective in addressing the knowledge dimension of students' conceptions (Errington, 1991). Group-learning strategy provides a mean of developing students' environmental conceptions using a knowledge-based approach. On the other hand, traditional values-education techniques may also be applied within a constructivist framework to help students become aware of and explore the consequences of their own values, for example, values clarification (see Rath et al., 1966) and values analysis (see Metcalf, 1972). Such approaches would, however, need to be part of an integrated approach in which environmental knowledge and behavior are also addressed. Educators are encouraged to consider value-based issues and this facilitates EE goals.

The results again agree with Littledyke (1997) who indicated that teachers whose style was less child-centered showed low interest in and more negative attitudes to science and EE. Proponents of the child-centered approach to education have typically argued that the school should be fitted to the needs of the child and not the child to the school. To make school curricula more relevant to the life experience of the learner, some progressive educators went so far to advocate that virtually all school learning activities be centered around the felt needs and interests of the child.

On the other hand, John Dewey indicated that the educational process must begin with and build upon the interests of the child; that it must provide opportunity for the interplay of thinking and doing in the child's classroom experience; that the teacher should be a guide and coworker with the pupils, rather than a taskmaster assigning a fixed set of lessons and recitations; and that the school's goal is the growth of the child in all aspects of its being. In other word, Dewey's view stressed the child-centered rather than the subject-centered education (Saqqaf, 1994, P.56).

A different approach to child-centered education arose as a result of the study and care of the physically and mentally handicapped. When such methods proved successful with handicapped children, the question arose whether they might not yield even better results with ordinary children.

Child-centered Approach has strong support, currently, to be adopted in EE (Palmer & Neal, 1994, pp. 77-79). Students generally are held back by the adult frame of mind, which closes around them, generating a barrier to understanding of environmental issues. Therefore, the child-centered Approach to EE would be suitable to create an environment-friendly school.

In fact, the researcher sees that the responses, for this item, may not reflect the reality. Perhaps some respondent educators selected this choice to

win favor because of the Hawthorne effect* (Odeh & Malkawi, 1991, pp. 127-129). On the other hand, environmental concepts and ideas have been featured regularly within the Jordanian school curriculum, since the MoE set up the movement of educational development in 1989.

In addition, the Department of Curriculum in MoE provided guidelines for teaching EE and upgraded the matrix of environmental concepts from time to time, both aimed at integrating different disciplines through adopting a child-centered, problem solving strategy. Moreover, according to the researcher's own experience, teachers often teach the textbook items, outlined therein, through a more rigid scheme of work that isolates these items within their traditional disciplines, hence disregarding the MoE guidelines.

To accomplish lasting, meaningful, and effective change, Strike and Posner (1985) indicated that the teaching and learning in EE should involve a growth in understanding, as well as a willingness to depart from previously held attitudes and beliefs and to make commitments to new ways of interacting with the world. Which means that a balanced EE program will incorporate a range of strategies designed to address all three dimensions of EE (environmental knowledge, attitudes/values, and behavioral orientations).

6.1.5 Discussion of the Results Related to Question No. 5

(What are the most serious aspects of EE that formal educators in Jordan are giving emphasis to?).

Educators' responses yielded to the following order of EE aspects: first, the aspect that has critical emphasis is 'the personal responsibility for the conservation of the environment'; second, the aspects that have moderate emphasis are 'awareness of local environmental issues,' and 'environmental ethics'; and third, the aspects that have minor emphasis are 'environmental

* Hawthorne Effect: the influence of the researcher's presence on the outcome of the study.

knowledge,’ and ‘understanding and awareness of environmental issues in other countries’.

This result goes well together with the main guiding principles for EE, which denote that EE should foster and arouse a sense of personal responsibility (UNESCO, 1993; Adara, 1996). In the Final Report of a UN seminar, which was held in Tokyo, in 1993, it was stated that: ”EE should foster and arouse a sense of personal responsibility, greater motivation and commitment towards the resolution of the environmental situation” (UNESCO, 1993).

In addition, Bell and Russell (1998) stated that the students had to connect to the environmental issue on a personal level. Therefore, environmental learning should become a way of life for taking personal responsibility for all decisions that affect the environment. As a result, educators need to know how to engage the students on a personal level rather than in grand abstractions. This should be a key consideration when educators prepare EE programs.

Personal responsibility includes several activities, such as recycling, home energy conservation, cycling or walking where possible/transport sharing, and donation to environmental organization. On the other hand, personal responsibility occurs when students took action entirely on their own, such as by inviting a guest speaker to speak at their school. This action suggested that students had learned action procedures and had gained empowerment and ownership, such as personal responsibility.

Since personal responsibility for the conservation of the environment is considered as the most serious aspect of EE, formal educators can get benefits from some international experiences in this regard. For example, the Water Education for Teachers Project (WET) of the Western Regional EE Council

(WREC) maintains a unique character in its emphasis on personal responsibility relating to water issues. Special attention is paid to the relationship of people to water. On the other hand, the WET project is the best relevant project for the situation in Jordan since the water shortage is the most persistent environmental issue. Fortner (1995) explained the objectives and the implementation of the project in the classroom.

EE activities in Jordanian schools maintain a unique character in its emphasis on personal responsibility relating to water issues. Special attention is paid to critical water issues, and the relationship of people to water is the unifying theme of all the offerings from environmental organizations.

Regarding *the awareness of local environmental issues*, it seems that educators encourage their students to work on local issues, which are easy to investigate and, perhaps, to resolve. Fien & Corcoran (1996) considered that EE is responsive to local context and local environmental issues should provide a focus for the development of EE projects.

On the other hand, when educators give emphasis on raising students' awareness of local environmental issues, they participate in solidifying a connection between schools and communities, and hence, encourage community service, involve parents, and provide a real-life context for students to use their knowledge (Layrargues, 2000).

Moreover, the participation of community members, especially parents, in EE will make school students appear as educators. Evan and others (1996) showed that school students are better informed on environmental issues than their parents. They found an EE program received by students indirectly influenced their parents' attitudes towards the environment.

The researcher sees that the suitable model that invests local environmental issues in teaching is Greenall Gough and Robottom Model (1993). They used the study of water quality in a coastal school as an example to explain the components of their proposed model. Their model is based on the social purposes of EE. In fact, it was a comprehensive environmental action program, which required the students to be involved in a long-term action project that included research, record keeping, correspondence, and so on.

In addition, the *Action Competence Model*¹⁰ proposed by Jensen and Schnack (1997), which was adopted in Danish schools, is a worthwhile experience to be considered by formal educators in Jordan. Action competence programs in Danish schools are focused upon the consideration and resolution of local issues through cooperation with the local community.

In light of these models, and other educational models, which agreed with the current trends in EE, the researcher proposed a framework to environmental issue investigation model that could be fitted easily into Jordanian schools, as shown in Chapter 7.

Regarding the environmental ethics, the results showed that educators' concerns exceeded what knowledge about the environment the students needed to learn. They emphasize how to recognize environmental ethics in order to establish environmentally responsible behaviors.

There is an ethical responsibility on the part of environmental educators both to help students become skilled in their citizenship role, and to defer to the student's own beliefs and values in terms of what he or she chooses to do. However, since human ethics control the relations with the environment, the

¹⁰ Action Competence Model emphasizes the development of practical skills and participatory abilities through the consideration and resolution of local environmental problems.

weakness of the bases of present ethics themselves seem to be part responsible for the issue of environmental problems.

Since increasing teachers' commitments to EE is a widely accepted goal, this study addressed the main current question regarding teaching and learning in EE. This question is why some teachers are infusing EE more than other teachers to their educational settings. A theoretical perspective has evolved that links teachers' characteristics, skills, attitudes and significant life experiences to teaching EE.

Towards a Model of Confidence in Teaching Environmental Education

These results could provide a theoretical framework that captures the potential for inclusion of such demographic variables in shaping teachers' natural tendency to teach EE despite the predictable existence of barriers.

Demographic variables may prove influential as independent constructs or as a combination between life experience construct and demographic variables. For example, teachers who as children engaged in a variety of outdoor activities, read nature magazines and books, spent time at a nature center, and participated in organized outdoor experiences may have continued these experiences throughout their lives, and these experiences may have influenced their commitment to EE. However, other teachers may have had college classes that involved hands-on EE or had in-service EE workshops that provided the stimulus for teaching EE. Therefore, both the life experience and the demographic variables are important in determining which life experiences may influence commitment to teaching EE.

The results also propose that the demographic variables may have a direct relationship to the development of beliefs that underlie teachers' attitudes

toward teaching EE, teachers' subjective norms, or teachers' perceived behavioral control related to teaching EE. In addition, the results demonstrate the potential relationship that may occur between the demographic variables and a teacher's intention to teach EE. I believe that the constructs of attitudes, subjective norms, and perceived behavioral control also have direct influence on teachers' intentions to teach EE that then directly influences the likelihood that the actual behavior will be carried out.

Past EE research has indicated that even if teachers have strong intentions to teach EE, the actual behavior may not occur because of existing barriers (Ham & Sewing, 1988). The results predict that the stronger the teachers' commitments to teach EE, the greater the probability that they will overcome existing barriers and actually carry out the behavior.

As an implication for further research, it is necessary here to propose a model that provides a theoretical representation of the interactions among the constructs defined in field theory, the theory of planned behavior (TPB), life-span developmental theory, and research on demographic variables that influence environmentally responsible behavior and apply to teachers' commitments to teaching EE. The model should provide a preliminary foundation for future research and invites continued inquiry into the developmental antecedents that influence teachers' commitments to teaching EE. The understanding gained through this research may provide important insights into ways to prepare EE teachers.

In order to construct such model there is a need to evaluate the hypothesized relationships among and between the demographic variables. This process requires a multivariate approach. Multiple linear regression, factor analysis, and path analysis are some methods that may be used when examining the relationships among and between the constructs. However, past life experiences, attitudes, beliefs, as well as other constructs in the

model are seemingly unobservable variables that can be measured in numerous ways, and structural equation modeling may provide a rich method for examining both the directional relationships within the constructs of the model as well as examining the ability of the model, in its entirety, to explain antecedents that influence commitment to teaching EE. In summary, such model should offer a basis for research that can provide insight into why some teachers and not others are committed to teaching EE.

6.1.6 Discussion of Additional Comments

Regarding the additional comments that were attached to the questionnaires, it could be concluded that respondents' knowledge cannot be entirely put concisely in responses to such direct questions. In addition, most respondents left the additional comments sheets blank; this reveals that people's attitudes toward response to educational questionnaires are comparatively low levels.

Just as there is a wide range of definitions for EE, there is a great diversity in the characteristics and understanding of EE by the formal educators in Jordan. Some educators have written a set of guidelines for EE, such as the knowledge of environmental processes and systems, skills for understanding and addressing environmental issues, and personal and civic responsibility. Others educators have indeed suggested that EE should be the new focus and justification for the general education. However, the comments showed that formal educators in Jordan focused on what is to be learned.

In general, formal educators fall into two different groups. The first group takes a more traditional approach of EE that build on past practices but lead to an outcomes-oriented futures perspective. In other word, they likely consider environmental education as being only an education about the environment and usually within the context of a science, social studies, or geography class.

While the second group includes educators who can enhance understanding of environmental issues and provide an important platform for EE. They highlighted the importance of another common approach such as education *in* the environment where experiential learning fosters both awareness and concern *for* the environment. These components would promote a sense of responsibility and active pupil participation in resolving environmental problems.

Thus, developing the content of these new educational dimensions- education about, in, and for the environment- will require educators at all levels to reach beyond school walls to involve parents, industry, communities, and government in the educational process. One way to begin the process is to create environmentally safe and healthy school buildings and grounds where daily routines and facilities reflect attention to environmentally sound practices.

On the other hand, teacher education programs should consider the style of beliefs dominant among educators, as well as the processes and concepts, which need to be taught, so that environmentally appropriate pedagogy can be developed. Furthermore, such programs must also incorporate ethical consideration of human relationships with other living things and their ecological systems.

The comments reveal that some educators think that EE is a way to keep the school area tidy and teach learners not to litter, and only a small number of educators supported recycling campaigns and other progressive activities and programs which are recognized today in other countries.

Since EE is a critical tool to help people understand and deal with environmental problems, and help create a more sustainable society, there is a pressing need for the lessening of these EE barriers. In addition, the

investigation reveals that EE in the formal education sector has gone forward quantitatively as well as qualitatively.

Finally, the study highlighted the status and the difficulties of EE in Jordan, which call for educational reform and more research on environmental teaching and learning, leading to the investigation of what constitutes effective professional development for educators in Jordan. Ultimately, now more than ever, we need school students who think broadly in whole systems and who understand ecosystems, connections, patterns, and root causes. We should ensure that the interconnections between the environment, economy, and social structures become an integral part of formal education, starting with kindergarten and continuing through elementary and secondary school and on through training at the college, university, and professional levels.

6.2 Discussion of the Findings Related to Nonformal EE.

This part of the study is to discuss the data related to the nonformal EE programs in Jordan, as perceived by selected environmental awareness program leaders.

First and foremost, the tangible amount of EE programs sponsored by environmental conservation organizations in Jordan could represent the first sign for a resurgence of public environmental interest and more community action that would hopefully take place at all levels.

6.2.1 Discussion of the Results Related to the General Information

The general feature of the findings is that the majority of the EE programs are conducted by the nongovernmental organizations, nevertheless that the sample of the study consisted of approximately equal numbers of governmental and nongovernmental organizations.

Regarding the EE leader's period of working in the organization, the respondents of nongovernmental organizations belong to the short period of working in the organization (1-5 years), while the governmental respondents belong to somewhat longer period (6-10 years). We can understand this observation when we know that the officials in nongovernmental organizations get low salaries, so they often consider that their work is a temporary job.

As for the major subjects of the respondents, the findings showed that not only no one hold a major degree in educational matters, but also that only 36.4% of them received training or education in EE, or on how to deliver environmentally oriented programs. It is likely that the directors in charge of environmental questions have an educational background in environmental sciences or engineering but have little knowledge of educational and social developments.

This means that there is a defect in the employment system in these organizations. Thus, we can say that the deficiency of specialized persons in these educational positions is one of the reasons for the general unsatisfactory environmental attitudes and behaviors among Jordanian peoples. This result consists with what is taking place in the reality. In most Jordanian schools, teachers respond to a lack of subject knowledge by bringing experts into the schools or the classrooms. The experts, however, turn out to be fervent young environmentalists whose understanding of science is probably no greater than available in the schools curriculum anyway and whose understanding of children and education is considerably less than the teacher's. Unfortunately, environmental leaders are mostly concerned with scientific and technological perspectives, but rarely they have the adequate training for understanding the socio-cultural development and understanding the educational status and development.

The members of the organizations and the target groups of the environmental programs represent, generally, most segments of population in Jordan. Most organizations open the membership opportunities to the public and direct their programs to the general audience. In certain cases, some organizations select carefully the members and the target groups. For example, housekeepers are the target group of some environmental awareness programs and assessment studies conducted by JES; also, the hunting sector is one of the most important members in RSCN. However, the efforts of these two organizations cannot cover all Jordan's population.

This situation requires the participation of all environmental conservation organizations to put down shared plans and prepare environmental activities that can reach all segments of population in Jordan.

All environmental NGOs provide their members with networking opportunities and have already constructed web pages or have them under construction. This is to be expected, since Jordan is the first among the Arab countries, to become involved in the international technological developments. Computer sciences and skills are introduced into schools starting from the first grade and most Jordanians have an access to the Internet, either by personal computer or by Internet cafes. This Hi-tech and high level of public awareness in technology in Jordan encouraged the environmental NGOs to provide their members with networking opportunities. On the other hand, the environmental governmental organizations have not yet paid attention to the role of technology in developing human lives.

6.2.2 Discussion of the Results Related to EE Activities

Since all respondents indicated that their organizations have EE programs, Jordan is fortunate to have many groups concerned with improving the environmental situation in the country, and, also fortunate to have significant

NGO's, like the JES and the RSCN, that are very active in promoting EE programs in their areas of specialization. Jordan has developed modest skills in EE to promote the protection of the country's limited resources.

Awareness programs have increased in recent years in Jordan. Great numbers of Jordanians may get occasional messages about the environment, and others have some deeper experience through school clubs and NGO campaigns.

Indicators in Jordan, such as the improvement in health and nutritional status, access to resources, access to education, the increase in basic freedom, and community participation, all form a fertile soil to promote environmental awareness in an efficient and short time. The tables of different activities, which showed in Chapter 5, provide evidence of the improvement that Jordan is witnessing in health and education sector, which at the end constitutes an asset and strength in the implementation of EE programs.

The survey data indicated that 63.6% of the respondents have an EE plan of action to chart a course of action to meet the goals of EE, while the materials provided indicated that there is little depth in these plans, and, that they do not concentrate on certain sectors of the community.

It was hoped that these organizations would design an environmental plan of action that targets specific geographic areas through a priority-setting process, and recommend public policy, which would enable the action plans.

The action plans of some organizations have determined the management structure and funding mechanism. For developing these plans, the organizations need to determine evaluation indicators for EE, which may base on shared decision-making and leadership, coordinated actions, individual and collective organizational accountability for funds and program outcomes, and management for results.

Nonformal EE has the potential to enhance the work of the formal education system. The NGOs' involvement in the national public awareness campaigns should be noted. The survey data showed that three NGOs provide schools with valuable support. JES, RSCN and FoE are the only organizations that assist schoolteachers in implementing EE into school curriculum.

The environmental conservation organizations can design and deliver training to schoolteachers and governmental officers interested in applying principles and ideas of EE to their subordinates. In addition, these organizations provide material for pupils to carry out projects, arrange events and join sponsored activities. Children can become better informed in their conversations with friends or family about how to adjust their lifestyles to be less harmful.

It is an obligation of environmental conservation organizations to engage in a process whereby schoolteachers and other community members come to identify their problems and needs, seek solutions among themselves, mobilize the necessary resources, and execute a plan of action or learning. Generally, it could be suggested that the environmental conservation organization can assist schoolteachers in meeting EE professional needs. In addition, these organizations generate and utilize available resources and skills to meet the varied needs of the community residents.

The survey results, in general, showed that no EE study has been recorded. At the same time, some respondents mentioned that they consider that the school exams are sufficient in assessing the environmental knowledge and attitudes held by schools students. Nevertheless, the exams at schools stress the objectives of traditional subjects, such as science, math, history, and so on, but not the objectives of environmental literacy. In order to establish an EE assessment in Jordanian schools, formal educators should consider environmental learning as an assessment issue.

6.2.3 Discussion of the Results Related to the Coordination of EE Activities with Other Agencies

The data showed that 81.8% of the respondents' organizations have shared EE programs or activities with other agencies. The most notable shared programs were with GCEP. In spite of the fact that most of the responding organizations commented that GCEP is not ready to support the programs of their organizations, the GCEP seems the most reasonable point to look for leadership and to encourage the coordination and collaboration among groups with EE programs.

On the other hand, to improve the implementation of EE in Jordanian schools, 90.9% of the organizations which have shared programs with MoE, but only 36.4% of the surveyed organizations have systematic coordination with the MoE and contact persons in schools. These organizations are: GCEP, JES, RSCN and FoE.

Some respondents rejected the idea of improving the implementation of EE in schools. They indicated that, in this way, EE efforts would be too narrowly focused. They mean that the challenge is that EE efforts have to reach new audiences other than just school students. When most people hear the term 'EE', they think about students, and specifically, they think of young kids in school. Although students and educators are a critical target group, they thought that EE efforts have missed some other important audiences, including business leaders, urban poor, senior citizens, the general public, policy makers, and parents.

6.2.4 Discussion of the Results Related to the SCCN

The SCCN can play a great role in developing EE in Jordanian schools if these clubs coordinate their activities with the community organizations and get sufficient support from the environmental conservation organizations, other than RSCN.

There is an absence of supervisors' participation in organizing and designing EE activities for SCCN. Obviously, a certain shift of focus, to include activities in connection with the SCCN projects in Jordan, would open the gates to an area that has been neglected in practical teacher education. To do so, Schreier (1998) has recommended:

...some of the supervisors' job patterns have to be changed in ways that need to be developed then established by the supervisors themselves.... The desirable demonstration needs to be circumscribed in a common effort. Yet such labor appears justified by the benefits to be reaped from the added-on perspective...That it is the practical side that needs to be reinforced and the links between academe and schools that need to be empowered-what better way would there be to have student teachers understand the school community and its needs than to get them involved in the environmental clubs' activities.

In fact, most of SCCN are still inactivated. The SCCN are suffering from inadequate instructional materials and EE kits, lack of time, lack of funds, and most of the SCCN responsible teachers have not been trained in EE concepts. These barriers and problems may be caused by the shortcomings of the role of these clubs in achieving EE objectives.

6.2.5 Discussion of Additional Comments

Most environmental awareness program leaders complained that formal educators do not participate effectively in formal and nonformal shared programs. They see that formal educators assist in no more than providing NGOs with the students, who suppose that they are enthusiastic enough to participate in such environmental activities and programs, regardless of their need for such programs. In addition, formal educators consider EE to be extra curriculum or optional activity. Their comment agreed somewhat with Braus (1995) who indicated that most environmental educators have to learn how to deal with EE programs and the diversity that currently exists in schools and communities.

The main suggestion regarding the possible ways of coordination between environmental conservation organizations and any other organization or agency in Jordan, was the establishment of a national EE office. The primary goals of this office should be to coordinate formal and nonformal EE programs and to assist educators and administrators throughout all levels of the education system in the incorporation of EE, as required or recommended by the MoE. In addition, such national office could coordinate the typical services would include inservice EE programs, assistance in infusing EE into district and school curricula, resource libraries, school networking programs, and EE literacy assessment projects.

Another comment is related to the dissatisfaction among the respondents regarding the present environmental information situation. The present status has good features that invite development as well as weak points that need abatement.

Moreover, providers and users of environmental information aspire to maximizing the already existing channels of information sources and training that would bring about quality information services. However, the practical implementation of effective improvement measures is very promising, particularly in modern electronic data communication technologies. Some of those needs are the electronic information media, such as CD-ROM and online search, which shows the serious need for an integrated communication system at all Levels: national, regional and international.

However, we are fortunate in having a wealth of very active environmental conservation organizations in Jordan, which schools can call upon to help them promote environmental understanding and action. One must hope that plans will make an equally strong commitment to EE and provide the necessary resources to enable schools to take up the challenge.

Finally, the results indicated that EE, both formal and nonformal, couldn't lead to the desired outcomes, until an empowering authority coordinates EE activities between formal and nonformal educational settings. The empowering authority should be a committee consisting of representatives from the formal and nonformal education sectors. At the same time, representatives from the participating agencies should direct the EE plan of action to determine how it can best be managed, staffed and financed. The coordinating schedule should be prepared within the guidelines of the National Strategy for EECA and the philosophy of education in Jordan. The main application of the coordinating schedule, in turn, is to improve the environmental awareness, values, and behaviors of the Jordanian citizens.

Chapter Seven

CONCLUSION, SUMMARY AND RECOMMENDATIONS

7.1 Conclusion

Much has been done in Jordan towards understanding the environment and recognizing the importance of public awareness and participation in protection of the environment. Environmental problems have heightened public awareness and have led to a considerable number of activities conducted by formal and nonformal sectors. These sectors have started several activities to achieve the goals and objectives of EE.

Regarding EE in formal settings, the overall conclusion is that most formal educators have interests in the issue of the environment, but at the same time, most of them do not infuse EE into their teaching activities, due to the lack of knowledge about how to teach EE.

While there are many successful education efforts underway within the formal education sector, EE development remains in the early stages of personal concern in most schools. However, in spite of its lack of subject status, EE, as a cross-curricular theme, has a relatively high priority at the curriculum development level. Support for EE is not yet well developed within the school system. Most schools have no policy provision concerning EE, nor have they identified the role of coordinators. If EE is to be found, it is haphazardly included in sciences.

The factors that discourage formal educators from infusing EE into their educational settings include limited administrative support, poor resources in

many schools, and lack of curriculum time. In addition, most formal educators consider that teaching EE is associated with child-centered teaching approach and that emphasis should be placed on environmental values. There is a lack of knowledge about how to infuse EE into educational settings.

It is important for educators to work more closely together and not duplicate efforts. The formal education sector could address the lack of effective coordination of EE activities that done by nonformal sectors, by assigning an EE coordinator in each educational directorate. More than one environmental organization holds EE programs at one and the same school, while other schools have nothing. Consequently, we achieve the justifiable distribution of EE efforts within schools.

On the other hand, EE is a relatively common phenomenon in Jordan's community, and has increased considerably with the growth of the environmental organizations. More than 11 nonformal organizations (governmental and nongovernmental) in Jordan are implementing several EE programs that vary from superior scientific level to picking up litter campaigns. Many organizations make opportunities available for pupils to participate in conservation through becoming involved in practical applications of the principles concerned (learning by doing). Most EE programs are isolated, limited to a single institution, and loosely connected.

Government organization efforts are increasingly addressing environmental issues as they become more pressing. At the same time, their efforts appear to be unrelated to the efforts of NGOs, or even to efforts of the same group over time. It may be broadly stated that governmental organizations devote few staff specialists and few financial resources to environmental awareness campaigns. Most awareness programs consist of a single effort, on one subject, provided to a general audience with little or no reference to other awareness efforts.

Several remarkable efforts within the nongovernmental organizations in Jordan have been initiated to increase awareness and sensitivity to environmental problems. With regard to formal education, the most noteworthy effort is done by JES, RSCN and FoE, and the most tangible achievement is the establishment of the School Clubs for the Conservation of Nature (SCCN) in association with the RSCN.

Jordanian institutions, which carry out EE, lack the capacity to effectively develop and implement EE programs to complement legal and technological instruments. Efforts are often irregular, lack funding, professional capacity and long term planning, and fail to use the appropriate means to reach the target audience.

The conditions described cause an unnecessary doubling of efforts, waste of money and efforts as well as inefficient and ineffective programs. To alleviate the problem, it is recommended to establish a national office for EE and communication. In addition, the findings showed that formal and nonformal educators wanted more educational resources and training related to EE.

Finally, Jordanian citizens have more opportunities for educational experiences in their daily lives than ever before. Formal education is only the beginning. Today, we can gain information and knowledge through the media, workplaces, and environmental conservation organizations. Nonformal education offers 'learning by doing' experiences as well as traditional modes of learning. As indicated by formal educators and environmental awareness programs leaders, the need for these nonformal educational experiences is urgent. Formal educators and environmental awareness program leaders should work more closely together. Beside that, the organizations with similar missions should team up more often and not waste limited resources by duplicating efforts.

7.2 Summary

This study addressed the main current question regarding teaching and learning in EE. This question is why some teachers are infusing EE more than other teachers to their educational settings. A theoretical perspective is offered that links teachers' commitments to teaching EE to beliefs and attitudes about teaching EE, as well as to significant life experiences. Therefore, the study explains the reasons such a theory may be useful in EE research and training; summarize the synthesis and reasoning that led to the theory; and outline the theory and its implications for further research.

The study discussed four areas of existing research and theory provide a basis for the theoretical development: field theory, the theory of planned behavior, life-span developmental theory and the theory of commitment to EE. Each theory is examined for its value in describing teachers' self-confidence in teaching EE and its explanatory power for use in the proposed EE Model.

The purpose of the present study was to investigate the status of EE in Jordan through surveying the current situation of formal and nonformal EE programs, or educators' thoughts and practices regarding EE, in order to determine significant patterns and indicators, that may improve in the implementation of EE in Jordanian schools and locating what interventions serve to eliminate or minimize EE constraints and barriers.

Accordingly, the population of the study consisted of two categories. The first is the formal educators at the MoE in Jordan and the sample selected was 347 formal educators. The second is the environmental awareness programs leaders within environmental conservation organizations and the sample selected was 11 of 15 environmental organizations.

Consequently, two special instruments were developed. The basic format of the instruments was based on the guidelines for EE programs, which were developed by the Wisconsin Center for EE in the United States. The instruments were reviewed according to the reliability procedures results and the comments of the validation panel members from the Department of Curriculum and Instruction at Sultan Qaboos University in Oman. After that, the last versions were examined by the researcher's supervisor. In the analysis there were six independent variables: *gender*; *educational experience*; *academic qualifications*; *occupation*; *teaching subject*; and *training received in EE*.

The results indicated that about 37% of formal educators in Jordan currently infuse education about the environment into their educational settings. Males of formal educators in Jordan tend to infuse EE into their educational settings more than females do. Formal educators with higher *academic qualifications* and *educational experiences* tend to infuse EE into their educational settings more than those with lower *academic qualifications* and *educational experiences*. On the other hand, formal educators who received training in EE tend to infuse EE into their educational settings more than those who did not.

Regarding *occupation*, formal educators tend to infuse EE into their educational settings in the following order: educational activities officials, curriculum developers, supervisors, and finally, teachers. In relation to *teaching subjects*, formal educators tend to infuse EE into their educational settings in the following order: Fine Arts, Science, Religion, Arabic, English, Math, Social Studies, and finally, Sports.

The most serious factors that prevented more teaching of environmental topics were summarized into three categories. First, facilitators (they need more support from their administrations, they do not have enough funding,

and more preparation time); second, the lack of knowledge about EE (they do not have the knowledge to effectively monitor EE activities, they need more EE training programs, and they need better access to educational resources of EE); and, third, the importance of EE (the low priority which has been ascribed to EE).

58.1% of formal educators who indicated that they infuse EE into their educational settings, see that the best teaching methods are those with emphasis on environmental values, not on environmental knowledge; and 77.5% consider that child-centered approach is more appropriate for EE teaching and learning than subject-centered approach.

Formal educators indicated that the most serious aspects of EE that they are giving emphasis to, are in the following order: personal responsibility for the conservation of the environment; awareness of local environmental issues; environmental ethics; environmental knowledge and understanding; and awareness of environmental issues in other countries.

The analysis of the volume of EE activities and coordination with other agencies, accomplished by formal educators in Jordan, showed that less than 30% indicated their institutions (departments or schools) hold EE programs or activities, and less than 20% has shared EE programs with other agencies, such as community organizations, or environmental conservation organizations or higher education institutions. Alongside that, the quantitative analysis of EE programs and additional comments were summarized and classified in Chapter 5.

On the other hand, the results showed several remarkable efforts within the environmental conservation organizations have been initiated to increase awareness and sensitivity to environmental problems. However, less than

20% of environmental awareness program leaders have received training in EE, or on how to deliver environmentally oriented programs.

The members of governmental organizations and the target groups of the programs cover most segments of the population in Jordan. Regarding environmental conservation organizations, it was found that respondents indicated that their organizations have a considerable body of EE programs.

Most EE programs and activities are undertaken by environmental NGOs. The Jordan Environment Society (JES), Royal Society for the Conservation of Nature (RSCN), and Friends of the Environment (FoE) society are three key players at the national level in Jordan. JES has a range of environmental awareness programs, involving seminars, workshops, training, field activities and written materials. RSCN focuses on public awareness of protected areas and wildlife, and school programs addressing diverse environmental issues, through establishing School Clubs for the Conservation of Nature (SCCN). FoE has tangible EE programs that concentrate mainly on schools students.

In general, nonformal EE programs can be classified into four categories: awareness programs directed to the general public; awareness programs directed to school students; publications and evaluation studies; and training programs.

Finally, the findings of the study showed that there are a great deal of EE programs in Jordan, but the lack of environmental attitudes and behaviors are due to the poor EE resources in many schools; lack of knowledge about EE among formal educators; limited administration development; and lack of coordination between formal and nonformal sectors. These findings represent significant patterns and indicators that may help in the implementation of EE in Jordanian schools.

7.3 Recommendations

At different stages of this work, especially in the discussion of the findings (Chapter 6), several suggestions were offered. In this Chapter, based on the findings of the study, more recommendations and proposals for change are made.

7.3.1 Recommendations for the MoE:

1. Due to the lack of EE facilities and resources, school laboratories are candidate to be the centers of EE programs in schools and the starting points for outdoor activities. Therefore, EE can find a home and borrow the needed materials from other school disciplines. At the same time, EE may participate in utilizing the available equipment effectively, and develop the practical skills of the students.

The researcher believes that practical skills would be improved if the students do more practical work at school; consequently, they can be active in outdoor environmental activities and successful in participation in environmental organizations' activities. At this point, attention should be made to the problems facing school laboratories. For example, there is not sufficient laboratory equipment in many Jordanian schools; the teachers normally demonstrate experiments and students are not actively involved. Therefore, the students do not gain the practical skills and self-confidence in the practical work. Even where the equipment exists, the practical work is excluded from the evaluation of students' achievements.

The MoE should improve the laboratories to increase the effectiveness of laboratory work in schools. Students should have the opportunity to participate in the laboratory and should perform experiments themselves rather than merely observe what the teacher is doing.

Technicians should know how to prepare laboratories for practical work. The assessment of students' performance in laboratory work should be taken into account, especially in the final examinations. In addition, an appropriate budget is needed for laboratories, therefore, community organizations and environmental conservation organizations can participate in this endeavor, rather than sitting back waiting for support from the international environmental organizations.

Generally, the state of laboratory work at school level must be modified in order to raise the level of pupils' skills and to increase their familiarity with practical works, in order to improve their achievements in outdoor environmental activities.

2. Since the data showed that there is a distinct lack of knowledge among the majority of formal educators regarding teaching and learning in EE, it is very important to clarify the aims and components of EE to the formal educators in Jordan, and to determine precisely what skills students are expected to acquire by attending EE programs. Moreover, the professional development of formal educators, as agents of change, would have central roles in helping to create the broad social context necessary for environmental sustainable development.

In addition, this situation should urge environmental educators to advocate the epistemological model for EE programs in both formal and nonformal settings. The model should be composed of the four interacting systems: the people, the environment, economics, and technology. The systems of the model would be organized in the framework of three conceptual schemes: (i) the interaction of biological and cultural inheritance with economics and technology; (ii) the interdependence of people and their environment; and (iii) people

as the principal agents of change in environment, through the technologies they develop (Brennan, 1986; Motawe, 1992, pp. 42-46).

This case strongly supports the paramount need of taking a human resource development approach to develop the formal education sector. Attending to the training needs is extremely important. Therefore, the training programs may become the catalysts for further dissemination of the innovations being introduced regarding EE.

Teacher training programs can be developed by EE experts employed by MoE. In this case, the first task is to formulate a comprehensive teacher training plan, which should include clear statement of objectives; time sequence regarding when offerings will occur throughout the school year; provision for experiences to occur on school sites; development of written material that will offer information as well as methodology; and involvement of teachers at all grade levels and subject areas (Nanda, 1997, pp. 69-70).

Environmental educators, who will be trainers of formal educators, need to be enrolled in EE training programs directed by experts from countries that have some tangible achievement regarding EE. These programs should include topics related to the nature and objectives of EE; policy options to curriculum planning and mapping in EE; the active role that formal educators are supposed to take in delivering nonformal EE programs; the role of EE coordinators; assessment of learning in EE; and teaching ecological concepts and principles through systematic analyses of local environment. In addition, such programs should focus on social teaching approach for EE, such as community-based learning approaches; values and ethics education; and story telling.

Moreover, trainers in Jordan could get benefits from the documents that published by NAAEE as part of the National Project for Excellence in EE in the United States. For instance, the book “*Guidelines for the Initial Preparation of Environmental Educators*” offers recommendations about basic knowledge and abilities educators need to provide high quality EE. These recommendations cover preservice K-12 teacher education and EE courses, formal and nonformal education. Recommendations also apply to those professionals who will serve as environmental educators part time and full time.

3. Since formal educators indicated that more funding would influence them to infuse EE into their educational settings, decision makers should take into consideration the availability of all necessary materials and equipment, funding, and qualified teaching staff. In addition, the selection process of activities should depend on the local environmental issues in Jordan, and at the same time, they should not ignore the global issues.

In addition, developing environmental kits for schools, such as on biodiversity, which may include background information, a compendium of outstanding resources on biodiversity education, a video and student materials (Gayford, 2000). Moreover, the experience in developing environmental kits from other countries would be helpful.

4. The researcher believes that the MoE can play a considerable role in developing EE in schools in several ways, such as by the use of research-based assessment of teachers. It may direct teachers to make EE content analysis of their courses. Within this process, one of the

options is to direct teachers to dismantle the compulsory and optional activities on the environmental aspects to integrate them into the mandatory core subjects, using environmental content.

By doing so, EE would become part of the formal education for all students and teachers, and therefore, the status of environmental issues in the school would be raised. On the other hand, teachers who do not infuse EE into their teaching would have to be familiarized with these issues in order to facilitate learning about them. Later on, the educational directorate may support the teachers who made the best content analysis in actually redesigning the curriculum along the lines they proposed.

5. Some of the supervisors' job patterns have to be developed, or changed in new ways. The higher education institutions could reinforce the theoretical and practical sides of this suggestion. These institutions can train supervisors in ways to understand the nature and the scope of EE; the school community and its needs; research-based assessment of teachers; as well as how to get involved in training teachers who have responsibilities for the environmental clubs' activities.
6. Since Jordanian music and songs are a part of the old traditional Arab folk, music has been introduced into school curriculum as free activities. However, little attention is paid to the indigenous folk songs, therefore, it has to be analyzed and articulated to be implemented in a constructive way in the schools. How can education in Jordan make use of the folk songs? What can EE do in this respect? Answers to these questions have to be worked out.
7. The structure of the educational system in Jordan plays a considerable role in the adoption of EE programs. Therefore, the scathing reality of

educational administration in Jordan educational system needs to be developed. Administrators and headmasters should be more aware of the environmental issues and the requirements of EE, in order to help the employees to infuse EE into their educational settings.

8. Since the survey data showed that formal educators gave emphasis on raising students' awareness of local environmental issues, they also consider that the best teaching method is one which emphasized the child-centered approach over the subject-centered approach. At this point, formal educators seem to participate in solidifying a connection between schools and communities. Raising students' awareness of local environmental issues encourages community service, involves parents, and provides a real-life context for students to use their knowledge. In other words, schools are likely to work on local issues that are easy to investigate, and perhaps, to resolve.
9. In an attempt to support policy and curriculum initiatives, the researcher recommends to adopt an environmental problem solving approach. Therefore, he proposed the following framework of an instructional model that is supposed to be relevant to the situation of Jordanian schools and proper to set up cooperation between formal education sector and community organizations.

The Proposed Instructional Model:

The model offers considerable potential for local environmental issues, child-centered learning approach and school-community collaboration. It is based on the *Group Investigation Model*¹¹, which traces its roots to several earlier educational thinkers. John Dewey (1916) viewed the

¹¹ Group Investigation Model is a cooperative learning strategy that places students in groups to investigate a given topic. It uses student help and cooperation as a major learning vehicle. Unlike other strategies, its primary focus is the investigation of the specific subject or topic.

classroom as a microcosm for society. Schools needed to help student learn to work together on meaningful projects so that they could do the same in society. Group investigation model can help students identify and solve problems that were meaningful to them.

Another educator who influenced the development of the Group Investigation Model was Herbert Thelen (1960). Thelen stressed the importance of active inquiry in student learning. He felt that learning was most effective when it involved the search for an answer to some question or problem. Like Dewey, Thelen felt that inquiry was most meaningful when pursued in a social context. Group Investigation Model Provides an opportunity for students to pursue meaningful questions in groups of their peers (Bulqees & Marie, 1990, pp. 166-173; Eggen & Kauchak, 1996, pp. 301-309), and the *Environmental Action Project*¹² proposed by Greenall Gough and Robottom (1993).

The proposed model allows the students to identify local environmental issues, undertaking hands-on activities, collecting information from the community members, making decisions, planning and implementing environmental projects, and finally, to present their conclusions for solutions to the environmental problem. The model is divided into six steps, outlined in Table 7.1, followed by a closing ceremony. These steps could be undertaken over about a 12-week period.

¹² Environmental Action Project supports the involvement of the students in some first hand aspect of the issue through practical experience, especially an aspect that seeks a solution. The students are involved in a long-term action project that includes research, record keeping, correspondence and so on.

Table 7.1: The Proposed Instructional Model Steps.

Step I:	Defining the Problem
Step II:	Environmental Hands-On Activities
Step III:	Community Action Tour
Step IV:	Generating Alternative Solutions
Step V:	Preparing for Environmental Action
Step VI:	Presenting the Results and Evaluating

Each step of the model has two separated components: session and complementary applications. The session includes five serial activities that could be completed during one meeting. These five activities of each individual step are outlined in Table 7.2.

Table 7.2: The Activities of Each Step of the Proposed Model.

Activities 1:	Warm Up
Activities 2:	Group Objectives
Activities 3:	Case Study
Activities 4:	Time for Reflection
Activities 5:	Group Planning

Each activity will be accompanied by a sidebar containing the following information: process; objectives; timeframe; skills; materials; and lesson outline. The following is a description of the step activities:

1. *Warm Up:* The goal of this activity is to stimulate the student to become involved actively in the learning process while he feels relaxed and interested. The teacher will use these activities to give the students an opportunity to express themselves, make students share their findings-except in first session, organize the students into groups, each group consists of 4-6 students, and help them feel comfortable from the beginning of the session. By the end of this activity, students will have achieved self-reliance and be motivated to the following learning activity.
2. *Group Objectives:* Group objectives could be set by each group to meet the goal, according to their chosen environmental issue. The objectives should be action-oriented, feasible within the time allotted, and effective to achieve the positive social and environmental change desired in the community. By the end of this activity, the student will recognize what his group to do after the session.
3. *Case Study:* The goal of this activity is to introduce an environmental case study that will help the students to fulfill the goal and objectives of the session. This activity will help the students to get benefits of the others' experiences. The case studies of each step cover a variety of concepts, since the teacher can concentrate on those that are more relevant and valuable to the group's issue. Case studies may include real life experiences, environmental activities, science experiments, open-ended stories, and so on.
4. *Time for Reflection:* an opportunity for reflection is offered for the students, concerning activities to be accomplished outdoors, that allow them to absorb and evaluate the benefits from the case studies, they have done.
5. *Group Planning:* This final activity of the session is to plan a course of action and assign responsibilities to different members of the group.

The goal of this activity is to put the action plan into practice, which will chart the direction for the final groups' project.

By the end of each session, the groups will come up with an outdoor application plan, and by the end of applying the model, the students conduct environmental action projects.

7.3.2 Recommendations for Environmental Conservation Organizations:

1. In order to have successful EE programs, a proper coordination between formal educators and nonformal education leaders must be established. Clearly, when dealing with education in nonformal settings, coordination problems and potential unwillingness of the participants are major constraints. EE strategy for Jordan will definitely require more coordination between the various agencies, both formal and nonformal sectors, so as to avoid unnecessary repetition, ensure continuity, and reduce fragmentation.

The researcher recommends that the presence of a national coordinating office should in no way curtail the present activities of most institutions. The proposed office should be designed to strengthen the links between formal and nonformal educators and enhance training opportunities for educators at formal and nonformal institutions.

The establishment of an EE office should be based in GCEP and comprised of GCEP, environmental conservation organizations, the MoE, and the Higher Education Council. A mandate governing the national office must be developed and endorsed.

This office should assess periodically the status of environmental literacy; prepare an EE action plan; staff the EE grants program; promote and assist in the development of EE learner outcomes; promote and aid in the development of EE preservice and inservice teacher training; cooperate with governmental and nongovernmental sectors on EE programs; develop, implement, and evaluate nonformal EE programs; initiate research into EE; and coordinate EE conferences on a periodic basis. If any of these factors is not coordinated well enough, then the efforts of EE would be disrupted and many negative effects would appear.

Moreover, the environmental information and data is dispersed among various agencies, governmental and nongovernmental, the national office is the candidate to develop an EE library and database. The office should aim at bringing together individuals with similar institutional responsibilities to discuss problems, to share experiences, competencies and resources, to identify needs, and to plan activities. In this regard, the national office is supposed to form an environmental conservation organizations forum with a governing mandate.

2. The process of EE must be available to all segments of the population, not just to school students, in order to instill knowledge, skills, attitudes and values relating to environmental protection, and natural resources conservation, through nonformal education. The following groups should be targeted: mayors to address local communities; engineering associations and environmental commissions members to address associations' members; religious leaders to breach and lead prayers which support EE; teachers to

address students' needs; NGO's staff to address the community at large; and school clubs' members to address their peers.

3. Environmental conservation organizations' staff members often enter into the materials development activity without a full level of awareness of school environment, and how much time is going to be needed. Developing learning activities and materials requires investments in staff time and resources. Training of staff in the use of integrated materials has meant that literacy facilitators and nonformal education program animators have had to further develop their knowledge and skills in educational areas where their expertise may have been weak.
4. Environmental awareness program leaders can contribute by working with formal educators to set priorities to ensure that their support for EE programs is allocated to those that are effective, produce measurable results, and survive long enough to have a real impact. At the same time, organizations can participate in mentoring programs and internships.
5. The nonformal sector should form a pressure group in order to stimulate higher education institutions to recognize the aims of EE. These aims should be clear to the faculty, staff and students, and the extent to which they are being achieved should be evaluated continuously with an eye to further improvement. We should ensure that the teaching staff, especially in educational faculties, is adequately qualified to infuse EE into their courses. Therefore, they need to attend workshops and group sessions directed by out-of-country EE experts. In addition, students should have a chance to learn and teach how to develop the basic abilities of objective observation, measurement, forming a hypothesis, and testing it, and prediction.

6. We need to expand public access to opportunities to learn about environmental issues as they relate to the private, work, and community lives of individuals. Government, the scientific community, educators, and the media should ensure that information provided to the public is useful, and clearly presented. The vehicles, by which information is furnished - such as the Internet, the media and publication - are continually changing and require ongoing training, skill acquisition and upgrades in equipment.
7. Building trust and respect between nonformal EE leaders and formal educators is a critical element to successful EE programs. While many environmental conservation organizations have infused EE elements into their work, few formal educators have participated in them. Similarly, few environmental organizations have strong technical capacities for the implementation of EE into schools. Establishing viable working relationships between the two groups has necessitated both a willingness to learn from each other as well as developing an understanding of how the other sector works or goes about its business.

7.3.3 Recommendations for Further Research

The findings of this study have been worthwhile on the road of developing EE in Jordan, but it is not complete, and further research is suggested below.

1. A national survey should be carried out into the state of SCCN in the government schools as a basis for improving them, and spreading the clubs in all schools, in particular, and improving EE, in general. For instance, SCCN coordinators in schools should be interviewed to learn

more about the strengths and weaknesses of these programs and to share with others seeking to change their efforts to promote student learning in and through EE.

2. A study should be carried out into improving students' practical skills at Jordanian schools, since these skills are required to conduct EE activities. In the same regard, another study should be carried out into the best ways of assessing students' performance in EE in Jordanian schools.
3. To track the status of EE at the national level, given that, some components of EE that were being developed at the time of the study may now be in place, whereas other components reported in place may have been eliminated through legislation or school policy, a repeated survey after several years, will show how steadily comprehensive EE programs are growing in Jordan. On the other hand, the replicated version of this study in Jordan or in another developing country should also check the validity and reliability of the instruments used in this study, and the use of other instruments to measure the variables of this study. Moreover, the replication of this study in a country where one can observe similar characteristics with Jordan would be worthwhile to conduct. Such a replicated study could enable someone to make a comparison between two or more systems in different countries showing more or less the same characteristics.
4. As revealed by the analysis, the selected independent variables jointly explained about 16% of the variance on the dependent variable (infusion of EE into educational settings), thus, 84% of the variance remained unexplained. A further study, which focuses on another group of independent variables related to the educational environment and classroom climate, is necessary, in order to maximize the amount

of the explained variance on the dependent variable. A study should be carried out into evaluating the effectiveness of the proposed instructional model in the present study (see page 253).

5. Regarding environmental information, it is recommended that researchers undertake studies to investigate the situation of information in the environment sector in Jordan, and to highlight the strengths and weaknesses of the present situation; to organize and control the data collection, storage, and information dissemination; to identify the needs of the environmental information systems, such as networks and technology; and to bridge the data gap and improve information availability for sustainable development.

REFERENCES

- Abdallah, A.M. (1990). An Evaluation of First Year Practical Chemistry in Jordan Universities. *Unpublished Ph.D. Thesis*, University of East Anglia, UK.
- Abdeljawad, A.A. (1996). *Environmental Education*. A-Dar Al-Arabiah, A-Zaqazeeq University, Egypt.
- Abrams, M.H. (1979). *The Norton Anthology of English Literature*. Vol. 2, (4th ed). W.W. Norton & Company, Inc. New York.
- Abu Diah, S. (1988). *Jordan Political Thinking*. Dar Al-Basheer, Amman, Jordan.
- Abu Zaid, M. (1997). *Final Report for Assessing the Environmental Attitudes Among Preparatory and Secondary Levels in Arab Countries*. Report Submitted to the Committee of Environmental Information and Education Program in Arab Countries.
- Adara, O.A. (1996). Strategies of Environmental Education in Social Studies in Nigeria by the Year 2000. *Environmental Education Research*, Vol. 2, Issue 2, pp. 237-47.
- Agib, I. (1992). Environmental Education in the Arab Countries. *Convergence*, Vol. 25, Issue 2, pp. 75-77.
- Ahlawat, K., Billeh, V., Akasheh, T., & Shahbaz, M. (1994). *National Survey of Environmental Knowledge and Awareness of Eighth and Tenth Grade Students in Jordan*. National Center for Educational Research and Development, (NCERD), Series No. 20, pp. 1-54.
- Ahmed, A.A. (1989). *Jordan Environment Profile-Status and Abatement* (in Arabic). Amman, Jordan.
- Ahmed, M.S. (1996). Environmental Education in Islam. *Unpublished Master Thesis*, Yarmouk University, Irbid, Jordan.
- Ajzen, I. (1985). Front Intentions to Actions: A Theory of Planned Behavior. In J. Kuhl & J. Beckmann (Eds.), *Action-Control: From Cognition to Behavior*. Heidelberg: Springer.
- Ajzen, I., & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. New Jersey Prentice-Hall.
- Alawneh, Z. (1999). We Need National Strategy for Environmental Education, Communication, and Awareness not Guidelines. *Risalat Al-Byeah* (The Journal of Environmental Message) (in Arabic). Vol. 8, No. 4, pp. 42-45.
- Aleksh, E. (1989). The Recommendations of the Educational Development Conference (in Arabic). *Risalat Almualim* (Teacher's Message), Ministry of Education, Amman, Jordan, Vol. 29, Issue 5, pp. 83-94.
- Al-Faysal, H.M. (1997). An Analytical Evaluative Study of the Content of Earth and Environmental Science Textbooks for the Secondary Stage in Light of

- Environmental Literacy and its Elements. *Unpublished Master Thesis*, Yarmouk University, Irbid, Jordan.
- Ali, S.M. & Hassan, G.A. (1994). *Water Recourses in Jordan* (in Arabic). Dar-Elamal, Amman, Jordan.
- Al-Omary, G. (1994). Status of Environmental Law in Jordan. *Environmental Research and Studies: International Environmental Law*. Friedrich Naumann Stiftung, Konigswinter. National Environmental Information and Education Program. Jordanian Environment Society, Vol. 5, pp. 131-34.
- Al-Zerekly, K. (1989). *Al-A'lam* (Biographical Dictionary). Vol. 9, (8th Ed). Dar El-Ilm Lilmalayin, Beirut, Lebanon.
- Ashley, M. (2000). Science: an Unreliable Friend to Environmental Education. *Environmental Education Research*, Vol. 6, Issue 3, pp. 269-80.
- Asopa, S.K. (1992). Environmental Ethics: A Hindu Perspective. *The International Journal of Environmental Education and Information*, Vol. 11, Issue 3, pp. 147-62.
- Attamimi, E.K. (1991). The Revealed Religions as Agencies to Conserve the Environment. *Environmental Research and Studies*. Friedrich Naumann Stiftung, Konigswinter. National Environmental Information and Education Programme. Jordan Environment Society, Vol. 1, pp. 109-26.
- Awad, A. & Abu-Zaineh, F. (1982). *Collection Data and Choosing Samples in Social and Educational Studies*. Educational Research and Development Center. Yarmouk University, Irbid, Jordan.
- Badacsonyi, E. (1987). The Laws of Aesthetics are the Laws of Nature. In Baez, A.V., Knamiller, G.W., & Smyth J.C. (Eds.), *The Environment, Science and Technology Education*. Science and Technology Education and Future Human Needs Series, Oxford, Pergamon Press, Vol. 8, pp. 183-87.
- Ballantyne, R.R. & Packer, J.M. (1996). Teaching and Learning in Environmental Education: Developing Environmental Conceptions. *The Journal of Environmental Education*, Vol. 27, Issue 2, pp. 25-33.
- Ballantyne, R.R., Fien, J., & Packer, J.M. (2001). School Environmental Education Program Impacts upon Student and Family Learning: a Case Study Analysis. *Environmental Education Research*, Vol. 7, Issue 1, pp. 3-37.
- Bardwell, L. (1991). Success Stories: Imagery by Example. *The Journal of Environmental Education*, Vol. 23, Issue 1, pp. 5-10.
- Barnes, A. & Ferry, J.K. (1992). Creating a Niche for the Environment in the Business School Curriculum. *Business Horizons*, pp. 3-8.
- Batanouny, K.H. (1998). Environmental Education for Sustainable Development in the Developing Countries. *Al-Tarbiya*, Vol. 20, Issue 24, pp. 65-69.
- Bell, A.C. & Russell, C.L. (1998). Environmental Learning and the Study of Extinction. *The Journal of Environmental Education*, Vol. 29, Issue 2, pp. 4-11.

- Bequette, F. (1993). Environmental Education in Action. *The UNESCO-Courier*. Vol. 46, pp. 23-25.
- Bixler, R. D. & Floyd, M.F. (1999). Hands On or Hands Off? Disgust Sensitivity and Preference for Environmental Education Activities. *Journal of Environmental Education*, Vol. 30 Issue 3, pp. 4-12.
- Blum, A. (1984). What Do Israel High School Students Know and Believe about Environmental Issues? *International Journal of Environmental Education and Information*, Vol. 3, No. 4, pp. 338-48.
- Blum, A. (1987). The Use of Simulation Games in Environmental Education. In Baez, A.V., Knamiller, G.W., & Smyth J.C. (Eds.), *The Environment, Science and Technology Education*. Science and Technology Education and Future Human Needs Series, Oxford, Pergamon Press, Vol. 8, pp. 409-12.
- Boersching, S. & De Young, R. (1993). Evaluation of Selected Recycling Curricula: Educating the Green Citizen. *The Journal of Environmental Education*, Vol. 24, Issue 3, pp. 17-22.
- Bowers C.A. (1993). *Education, Cultural Myths, and the Ecological Crisis*. Albany, NY, State University of New York Press.
- Bowring, T. (1938). *The First Book of Geography for Children*. London, J. Green, p. 1. (Cited in Marsden, 1997).
- Bratton, S.P. (1990). Teaching Environmental Ethics from a Theological Perspective. *Religious Education*, Vol. 85, Issue 1, pp. 25-33.
- Braus, J. & Wood, D. (1993). *Environmental Education in the Schools: Creating a Program That Works*. Washington, DC, Peace Corps.
- Braus, J. (1995). Environmental Education: Bioscience. *Supplement Science Policy*, Vol. 45, Issue 6, pp. 45-52.
- Brennan, M. (1986). A Curriculum for Conservation of People and their Environment. *The Journal of Environmental Education*, Vol. 17, Issue 4, pp. 1-22.
- Brim, O.G., & Ryff, C.D. (1980). *Life Span Development and Behavior*, 3, In P.B. Baltes & O.G. Brim (Eds.), New York: Academic Press.
- Bulqees, A. & Marie, T. (1990). *Nathariat Ata'alum* (Learning Theories) (2nd Ed) (in Arabic). Al-Furqan Press, Amman, Jordan.
- Carlsson, U. & Mkandla, S. (1999). Environmental Education: Global Trends and Local Reality. *The Journal of Environmental Education*, Vol. 18, Issue 3, pp. 203-10.
- Carson, R. (1962). *Silent Spring*. Houghton Mifflin, New York.
- Chapman, D.J. (1999). So You Want to Teach for the Environment... *Environmental Education Research*, Vol. 5, Issue 3, pp. 267-73.
- Chen, P.J. (1997). Environmental Educators, it is Time to Design a Whole Curriculum Now. *Environmental Education Research*, Vol. 3, Issue 2, pp. 233-38.

- Colvin, J.G. (1993). Workshop in the Forest: a Model International Environmental Exchange Program in Ecuador. *The Journal of Environmental Education*, Vol. 24, Issue 3, pp. 23-25.
- Coombs, P. (1974). *Attacking Rural Poverty*. A Toolkit for Volunteer Leaders. (Cited in Etling, www.sil.org/lingualinks/principl.htm, in English, October 1998).
- Corral-Verdugo, V. & Frias-Armenta, M. (1996). Predictors of Environmental Critical Thinking: A Study of Mexican Children. *The Journal of Environmental Education*, Vol. 27, Issue 4, pp. 23-28.
- Dalin, P. & Rust, V.D. (1996). Towards Schooling for the Twenty-First Century. In Hopkins, D. & Reynolds, D. (Eds.), *School Development Series*. Redwood Books, Trowbridge, Wiltshire, UK.
- De Young, R. & Monroe, M.C. (1996). Some Fundamentals of Engaging Stories. *Environmental Education Research*, Vol. 2, Issue 2, pp. 171-88.
- Deen, Mawil Y. Izzi. (1998). Islamic Environmental Ethics, Law, and Society. In Pojman, Louis P. (ed.) (1998). *Environmental Ethics. Readings in Theory and Application*. Belmont, CA: Wadsworth Publishing.
- Dennis, L. J. & Knapp, D. (1997). John Dewey as Environmental Educator. *The Journal of Environmental Education*, Vol. 28, Issue 2, pp. 5-9.
- Devall, B. & Sessions, G. (1985). *Deep Ecology: Living as if Nature Mattered*. Salt Lake City, UT, Peregrine Smith Books.
- Dewey, J. (1980). Democracy and Education. In Boydston, J.A. (Ed.), *John Dewey: The middle works, 1899—1924*, Vol. 9. Carbondale and Edwardsville, Southern Illinois University Press, Original Work Published in 1916.
- Dewey, J. (1987). Freedom. In Boydston, J.A. (Ed.), *John Dewey: The Later Works, 1925—1953*, Vol. 11. Carbondale and Edwardsville, Southern Illinois University Press, Original Work Published in 1937.
- Eagles, P.F. & Muffitt, S. (1990). An Analysis of Children's Attitudes toward Animals. *The Journal of Environmental Education*, Vol. 21, Issue 3, pp. 41-44.
- Eggen, P.D. & Kauchak, D.P. (1996). *Strategies for Teachers*. Allyn & Bacon, Needham Heights, MA.
- El-Zubier, Z. (1991). Intermediate Level Environmental Education in Sudan: a Proposal for a New Program. *The Journal of Environmental Education*, Vol. 11, No. 2, pp. 93-110.
- Emmons, K.M. (1997). Perspectives on Environmental Action: Reflection and Revision Through Practical Experience. *The Journal of Environmental Education*, Vol. 29 Issue 1, pp. 34-45.
- Errington, E. (1991). Role Playing and Environmental Issues. *The Australian Journal of Environmental Education*, No. 7, pp. 1-15.

- Etling, A. (1998). *A Toolkit for Volunteer Leaders*. (www.sil.org/lingualinks/principl.htm, in English, October, 1998).
- Evan, S.M., Gill, M.E., & Marchant, J. (1996). Schoolchildren as Educators: The Indirect Influence of Environmental Education in Schools on Parents' Attitudes towards the Environment. *Journal of Biological Education*, Vol. 30, Issue 4, pp. 243-48.
- Evernden, N. (1992). *The Social Creation of Nature*. Baltimore, MD, The Johns Hopkins University Press.
- FCES (Fertile Crescent Environmental Society) (1999). *Annual Report*. Amman, Jordan.
- Fien, J. & Corcoran, P.B. (1996). Learning for a Sustainable Environment: Professional Development and Teacher Education in Environmental Education in the Asia-Pacific Region. *Environmental Education Research*, Vol. 2, Issue 2, pp. 227-37.
- Fien, J. & Rawling, R. (1996). Reflective Practice: A Case Study of Professional Development for Environmental Education. *The Journal of Environmental Education*, Vol. 27, Issue 3, pp. 11-21.
- Fien, J. & Tilbury, D. (1995). *Learning for a Sustainable Environment: an Agenda for Teacher Education in Asia and the Pacific*. Bangkok, UNESCO.
- Fien, J. (2000). 'Education for the Environment: A Critique'-An Analysis. *Environmental Education Research*, Vol. 6, Issue 2, pp. 79-192.
- Filho, L.W. (1996). An Overview of Current Trends in European Environmental Education. *The Journal of Environmental Education*, Vol. 28, Issue 1, pp. 5-10.
- Firth, R. (1995). Postmodernity, Rationality, and Teaching Environmental Education. *International Research in Geographical and Environmental Education*, Vol. 4, No. 2, pp. 44-64.
- Fortner, R. (1995). Introduction. *Science Activities*, Vol. 31, Issue 4, pp. 9-12.
- Francis, M.C., Banner, R.E., & Ramussen, A.G. (1993). A Model for Environmental Education in Natural Resources. *The Journal of Environmental Education*. Vol. 24, Issue 4, pp. 22-25.
- Gabel, D.L. (1994). *Handbook of Research on Science Teaching and Learning*. A Project of the National Science Teachers Association. Macmillan Publishing Company, New York.
- Gayford, C.G. & Dillon, P.J. (1995). Policy and the Practice of Environmental Education in England: A Dilemma for Teachers, *Environmental Education Research*, No. 1, pp. 173-85.
- Gayford, C.G. (1998). The Perspectives of Science Teachers in Relation to Current Thinking about Environmental Education. *Research in Science & Technological Education*, Vol. 16, Issue 2, pp. 101-14.

- Gayford, C.G. (2000). Biodiversity Education: a Teacher's Perspective. *Environmental Education Research*, Vol. 6, Issue 4, pp. 347-61.
- GCEP (The General Corporation for the Environmental Protection) (1998). *Jordan Country Study on Biological Diversity*. The Study Technically Supported by UNEP and Funding from the Global Environment Facility (GEF).
- GCEP (The General Corporation for the Environmental Protection) (1999). *The National Strategy for Environmental Education, Communication, and Awareness (EECA)* (in press).
- Ghazleh Abu-, M. (2000). Environmental Education Activities in Jordan. *Risalat Almualim* (Teacher's Message) (in Arabic). Ministry of Education, Amman-Jordan, Vol. 40, No. 1, pp. 159-70.
- Ghonaimi, Z.A. (1996). *Islamic Environmental Education and Sea Protection Against Pollution*. The Islamic Educational, Scientific, and Cultural Organization (ISESCO). (Translated from Arabic language by Jilali Saib, Mohammed V University, Morocco).
- Gifford, R., Hay, R., & Boros, K. (1983). Individual Differences in Environmental Attitudes. *The Journal of Environmental Education*, Vol. 14, Issue 2, pp. 19-23.
- Gigliotti, L.M. (1990). Environmental Education: What Went Wrong? What can be done? *The Journal of Environmental Education*, Vol. 22, Issue 1, pp. 9-12.
- Glass, L.W. (1982). An Inservice Energy Education Program for Elementary School Teachers. *Journal of Research in Science Teaching*. Vol. 19, No. 6, pp. 469-74.
- Gough, S. & Reid, A. (2000). Environmental Education Research as Profession, as Science, as Art and as Craft: Implications for Guidelines in Qualitative Research. *Environmental Education Research*, Vol. 6, Issue 1, pp. 47-57.
- Grace, M. & Sharp, J. (2000). Exploring the Actual and Potential Rhetoric-reality Gaps in Environmental Education and their Implications for Preservice Teacher Training. *Environmental Education Research*, Vol. 6, Issue 4, pp. 331-45.
- Greenall Gough, A. & Robottom, I. (1993). Towards a Socially Critical Environmental Education: Water Quality Studies in a Coastal School. *Journal of Curriculum Studies*, Vol. 25, No. 4, pp. 301-16.
- Greenall Gough, A. (1993). *Founders in Environmental Education*. Geelong, Deakin University Press.
- Hadidi, A. (1985). *Jordanian Environment: Geography and History*. Dar Al-Kindi, Amman, Jordan.
- Ham, S. & Sewing, D. (1988). Barriers to Environmental Education. *The Journal of Environmental Education*, Vol. 19, Issue 2, pp. 17-24.
- Harn, S.H., Rellergert-Taylor, M.H. & Krumpel, E.E. (1988). Reducing Barriers to EE. *The Journal of Environmental Education*, Vo. 9, No. 2. pp. 25-33.

- Harris, G. (1958). *Jordan: Its People, its Society, and its Culture*. New Haven, CT, Hraf Press.
- Haury D.L. (1998). Education for Environmental Sustainability. *ERIC DIGEST*, No. EDO-SE-98-12.
- Hausbeck, K.W., Milbrath, L.W., & Enright, S.M. (1992). Environmental Knowledge, Awareness, and Concern among 11th Grade Students: New York State. *The Journal of Environmental Education*, Vol. 24, Issue 1, pp. 27-34.
- Heimlich, J.E. (1993). Nonformal Environmental Education: Toward a Working Definition. *ERIC Bulletin*, No. SEB93-3.
- Henerson, M.E., Moris, L.L., & Fitz-Gibbon, C.T. (1978). *How to Measure Attitudes*. London, Sage Publications. (Cited in Awad & Abu-Zaineh, 1982, p. 173).
- HKJ (The Hashemite Kingdom of Jordan) (1992). *Jordan Country Report to the United Nations Conference on Environment and Development (UNCED)*, Brazil.
- HKJ (The Hashemite Kingdom of Jordan) (1996). *National Environmental Action Plan*.
- Holtz, R.E. (1996). Environmental Education: A State Survey. *The Journal of Environmental Education*, Vol. 27, Issue 4, pp. 9-12.
- Horton, R.L. & Hanes, S. (1993). Philosophical Considerations for Curriculum Development in Environmental Education. *ERIC Bulletin*, No. SE 053 465, SEB93-4.
- Howe, R. & Disinger, J.F. (1991). Environmental Education Research News. *The Environmentalist*, Vol. 11, No. 1, pp. 5-8.
- HQ (*The Holy Quran*).
- Hsu, S.J & Roth, R.E. (1996). An Assessment of Environmental Knowledge and Attitudes Held by Community Leaders in the Hualien Area of Taiwan. *The Journal of Environmental Education*, Vol. 28, Issue 1, pp. 24-31.
- Hungerford, H.R., Litherland, R.A., Peyton, R.B., Ramsey, J.M. & Volk, T.L. (1988). *Investigating and Evaluating Environmental Issues and Actions Skill Development Modules*. Champaign, IL, Stipes Publishing Co.
- Iozzi, L.A. (1989). What the Research Says to the Educator, Part 1: Environmental Education and the Affective Domain. *The Journal of Environmental Education*, Vol. 20, Issue 3, pp. 3-9.
- IUCN (International Union for Conservation of Nature) (1970). *Resolution Adopted at the IUCN International Working Meeting on Environmental Education in the School Curriculum*. Nevada, IUCN.
- IUCN/UNEP/WWF (1980). *World Conservation Strategy: Living Resources for Sustainable Development*. Nevada, IUCN.

- Jensen, B.B. & Schnack, K. (1997). The Action Competence Approach in Environmental Education. *Environmental Education Research*, 3, pp. 163-78.
- JES (Jordanian Environment Society) (1999). Introduction to the National Strategy for Environmental Education, Communication, and Awareness (EECA). *Risalat Al-Byeah* (The Journal of Environmental Message) (in Arabic). Vol. 8, No. 4. pp. 3-8.
- Jickling, B.J. (1992). Why I don't Want my Children to be Educated for Sustainable Development, *The Journal of Environmental Education*, Vol. 23, Issue 4, pp. 5-8.
- Jim, C. (1992). Intrinsic Value in Environmental Ethics: Beyond Subjectivism and Objectivism. *Monist*, Vol. 75 Issue 2, pp. 227-36. Academic Search Elite, AN: 9608122462, ISSN: 0026-9662.
- Jordan Times* (1991). No. 1711, April 2, 1991, open page.
- Jreisat, J.E. (1997). Environmental Management: the Will and the Way in Jordan. In Jabbra, J.G. & Jabbra, N.W. (Eds.), *Challenging Environmental Issues, Middle Eastern Perspectives*. Brill, New York, pp. 18-30.
- Juneidi, M.J. (1999). *Wild Plant of Jordan*. Department of Libraries and National Documentation. Amman, Jordan.
- Kahler, D. (1998). *Linking Nonformal Education to Development: NGO Experiences*. World Education, Farnsworth Street, Boston, MA.
- Kashakesh, K. (1998). *The Issue of the Environment in Jordan: Legislation and Conservation* (1st Ed). Marowah Press, Irbid, Jordan.
- Katz, E. (1994). Judaism and the Ecological Crisis. In Tucker, Mary Evelyn & Grim, John A. (Eds.) *Worldviews Philosophy and the Environment*. Maiyknoll, New York 10545: Orbit books.
- Keniry, J. (1995) *Ecodemia: Campus Environmental Stewardship at the Turn of the Twenty First Century: Lessons in Smart Management from Administrators, Staff and Students*. Washington, DC, National Wildlife Federation.
- Kharoof, R. (2000). Water Resources and Awareness in Water in Jordanian Schools. *Risalat Almualim* (Teacher's Message) (in Arabic). Ministry of Education, Amman-Jordan, Vol. 40, No. 2, pp. 171-79.
- Khoshoo, T.N. (1987). Environmental Education: The Indian Experience: NonFormal Education. In Baez, A.V., Knamiller, G.W., & Smyth J.C. (Eds.) *The Environment, Science, and Technology Education*. Science and Technology Education and Future Human Needs Series, Oxford, Pergamon Press, vol. 8, pp. 401-408.

- Khouri, R.C. (1996). The Arab Nation: Trends, Assets, and Directions. *Jordan Times*, No. 3466, April 21, p. 13.
- Kirk, M. & Wilke, R. (1997). A Survey of the Status of State-Level Environmental Education in the United States. *The Journal of Environmental Education*, Vol. 29, Issue 1, pp. 9-17.
- Knamiller, G.W. (1987). Issue Based Environmental Education in Developing Countries. In Baez, A.V., Knamiller, G.W., & Smyth J.C. (Eds.), *The Environment, Science and Technology Education*. Oxford, Pergamon Press, Vol. 8, pp. 157-60.
- Kunz, D.E. (1989), *The effects of a Project Learning Tree Workshop on Preservice Teachers' Attitudes: Toward Teaching EE*. Unpublished Master's thesis, The Pennsylvania State University, State College.
- Lachapelle, D. (1991). Educating for Deep Ecology, *Journal of Experimental Education*, Vol. 14, No. 3, pp. 18-22.
- Layrargues, P.P. (2000). Solving Local Environmental Problems in Environmental Education: a Brazilian case study. *Environmental Education Research*, Vol. 6, Issue 2, pp. 167-78.
- Lee, J.C. (1997). Environmental Education in Schools in Hong Kong. *Environmental Education Research*, Vol. 3, Issue 3, pp. 359-72.
- Lewin, K. (1942). Field Theory and Learning. *Yearbook of the National Society for the Study of Education*. Vol. 41, part 2, pp. 215-242.
- Lieberman, G.A. (1987). The Resource Management Education Program. In Baez, A.V., Knamiller, G.W., & Smyth J.C. (Eds.), *The Environment, Science and Technology Education*. Science and Technology Education and Future Human Needs Series, Oxford, Pergamon Press, Vol. 8, pp. 189-94.
- Lisowski, M. & Disinger, J.F. (1991). The Effect of Field-Base Instruction on Student Understandings of Ecological Concepts. *The Journal of Environmental Education*, Vol. 23, Issue 1, pp. 19-23.
- Littledyke, M. (1997). Science Education for Environmental Education? Primary Teacher Perspectives and Practices. *British Educational Research Journal*, Vol. 23, Issue 5, pp. 641-60.
- Machado, P. A. (1997). Information and Participation: Required Instruments for the Improvement of Environmental Rights. *Environmental Policy & Law*, Vol. 27, Issue 4, pp. 285-92.
- Mansaray, A. & Ajiboye, J.O. (1997). Environmental Education and Nigerian Students' Knowledge Attitudes and Practices: Implications for Curriculum Development. *The International Journal of Environmental Education and Information*, Vol. 16, No. 3, pp. 317-32.
- Marsden, W.E. (1997). Environmental Education: Historical Roots, Comparative Perspectives, and Current Issues in Britain and the United States. *Journal of Curriculum & Supervision*, Vol. 13, Issue 1, pp. 6-30.

- Massad, M. (1995). The Educational Supervisors Problems in Jordanian Schools as Perceived by Teachers, *Risalat Almualim* (Teacher's Message) (in Arabic). Ministry of Education, Amman-Jordan, Vol. 36, Issue 3. pp. 63-72.
- Massad, M. (2000). Classroom Environment: Problems and Solutions. *Risalat Almualim* (Teacher's Message) (in Arabic). Ministry of Education, Amman-Jordan, Vol. 40, No. 1, pp. 16-24.
- McCormick, J. (1998). *The Global Environmental Movement* (2nd Ed). John Wiley and Sons, New York.
- McDuff, M. (2000). Thirty Years of Environmental Education in Africa: the Role of the Wildlife Clubs of Kenya. *Environmental Education Research*, Vol. 6, Issue 4, pp. 383-96.
- Mcleish, E. (1993). Environmental Education: The Vital Link. *Environmental Management and Health*, Vol. 4, No. 4, pp. 31-33.
- Meadows, D. (1990). *Harvesting our Hundredfold*. Kenya, UNEP.
- Mehta, J. (1987). Environmental Education and Community Involvement. In Baez, A.V., Knamiller, G.W., & Smyth J.C. (Eds.) *The Environment, Science, and Technology Education*. Science and Technology Education and Future Human Needs Series, Oxford, Pergamon Press, vol. 8, pp. 397-399.
- Membiela, P., Nogueiras, E., & Sugrez, M. (1993). Students Preconceptions about Urban Environmental Problem and Solid Waste. *The Journal of Environmental Education*. Vol. 24, Issue 2, pp. 30-34.
- Metcalf, L. (1972) (Ed.). *Values Education: Rationale, Strategies and Procedures*. Washington, DC: National Council for the Social Studies.
- MMRAE, (Ministry of Municipal, Rural Affairs and Environment) (1989). *Human Settlement and the Environment* (in Arabic).
- Mocker, D.W. & Spear, G.E. (1982). Lifelong Learning: Formal, Nonformal, Informal, and Self-Directed. *ERIC Document Reproduction Service*, No. ED 220 723.
- MoE (Ministry of Education) (1994). The Educational Law No.27 for 1994. *Risalat Almualim* (Teacher's Message) (in Arabic). Ministry of Education, Amman-Jordan, Vol. 35, No.4, pp. 163-79.
- Monroe, M. & Kaplan, S. (1988). When Words Speak Louder than Actions: Environmental Problem Solving in the Classroom. *Journal of Environmental Education*, Vol. 19, No. 3, pp. 38-41.
- Monroe, M. (1991). The Effect of Interesting Environmental Stories on Knowledge and Action-Taking Attitudes. *Unpublished Ph.D. Thesis*, University of Michigan, Ann Arbor. (Cited in De Young & Monroe, 1996).
- Motawe I.E. (1992). *Environmental Education: Theoretical and Practical Study*. Dar Al-Marefa, Al-Eskandaria, Egypt.
- Mutlaq, E.M. (1997). The Effectiveness of School Clubs for the Conservation of

- Nature (SCCN) on Students' Environmental Knowledge and Awareness in Jordan. *Unpublished Ph.D. Thesis*, School of Education, University of Holy Joseph, Beirut, Lebanon.
- NAAEE (The North American Association for Environmental Education) (2000). *Guidelines for the Initial Preparation of Environmental Educators*. Washington DC.
- Nanda, V.K. (1997). *Environmental Education*. Anmol Publications, PVT LTD, New Delhi, India.
- Nash, R.F. (1989). *The Rights of Nature: A History of Environmental Ethics*. Madison University of Wisconsin Press.
- NCERD (National Center for Educational Research and Development) (1994). *National Survey of Environmental Knowledge and Awareness of 8th and 10th Grade Students in Jordan*. Report.
- NEEAP (National Environmental Education Advancement) (1998). *Project Components of State-Level Comprehensive Environmental Education Program: Definitions of Components*, www.neeap.uwsp.edu/StatusofEE/status.htm.
- Negra, C. & Manning, R.E. (1997). Incorporating Environmental Behavior, Ethics, and Values into Nonformal Environmental Education Programs. *The Journal of Environmental Education*, Vol. 28, Issue 2, pp. 10-22.
- NES (National Environment Strategy) (1991). *National Environment Strategy for Jordan: A Resource Book of Information and Guidelines for Action*. Department of Environment, Jordan's Ministry of Municipal, Rural, and Environmental Affairs. Technical Advice by IUCN, Gland, Switzerland.
- Odeh, A. & Malkawi, F. (1991). *Research Method in Education and Psychology* (2nd Ed). Dar Al-Amal, Amman, Jordan.
- OECD (Organization for Economic Co-Operation and Development) (1994). *Environment, Schools and Active Learning*. Final Report of the Environment and Schools' Initiatives Project (ENSI), Paris, France .
- OECD (Organization for Economic Co-Operation and Development) (1997). *Environmental Communication for Sustainable Development*. Paris, France.
- Oppenheim, A.N. (1966). *Questionnaire Design and Attitudes Measurement*. London, UK. (Cited in Odeh & Malkawi, 1991, pp. 195).
- Orr, D.W. (1992). *Ecological Literacy: Education and the Transition to a Postmodern World*. Albany, NY, State University of New York Press.
- Palmer, J. & Neal, P. (1994). *The Handbook of Environmental Education*. London, Routledge.
- Palmer, J. (1993). Development of Concern for the Environment and Formative Experiences of Educators. *The Journal of Environmental Education*, Vol. 24, Issue 3, pp. 26-30.

- Palmer, J., Goldstein, W. & Curnow, A. (1995). *Planning Education to Care for the Earth*. IUCN, Gland, Switzerland.
- Patai, R. (1958). *The Kingdom of Jordan*. Princeton, NJ, Princeton University Press.
- Payne, P. (1999). Postmodern Challenges and Modern Horizons: Education 'for Being for the Environment'. *Environmental Education Research*, Vol. 5, Issue 1, pp. 5-35.
- Payne, P. (2001). Identity and Environmental Education. *Environmental Education Research*, Vol. 7, Issue 1, pp. 67-88.
- Peretz, D. (1978). *The Middle East Today* (3rd ed). Holt, Rinehart & Winston Press, New York.
- Peter, R.S. (1989). *How to Develop and Present Staff Training Courses*. Nichols Publishing.
- Peters, R. (1993). Participatory Citizenship: A Learned Way of Living: Global Horizons. The Center for Applied Ecosocial Studies, Plaistow, NH. *ERIC Document*, No. ED369676.
- Pojman, Louis P. (1998). *Environmental Ethics. Readings in Theory and Application*. Belmont, CA: Wadsworth Publishing.
- Rabadi, J. (1996). Environmental Education in Jordan. *Al-Reem*, No. 58, pp. 4-6.
- Ramadan, S.A. (1990). *Assessment of Regional Water Quality Issues in the Middle East*. UNESCO/WHO/UNDP. Amman, Jordan.
- Raths, L.E., Harmin, M., & Simon, S.B. (1966). *Values and teaching*. Columbus, OH: Merrill.
- Rauch, F. (2000). Schools: a Place of Ecological Learning. *Environmental Education Research*, Vol. 6, Issue 3, pp. 245-58.
- Reed, H.B. & Loughran, E.L. (1984). *Beyond Schools: Education for Economic, Social, and Personal Development*. Amherst, Community Education Resource Center, University of Massachusetts.
- Reid, I. & Sa'di, I. (1997). Jordanian and British Primary Schoolchildren's Attitudes towards the Environment. *Educational Studies*, Vol. 23, Issue 3, pp. 473-81.
- Rickinson, M. & Robinson, L. (1999). Environmental Education Research in the Classroom: a Shared Methodological Reflection by the Teacher and the Researcher. *Environmental Education Research*, Vol. 5, Issue 1, pp. 77-94.
- Riechard, D.E. (1993). Risk Literacy: Is it the Missing Link in Environmental Education, *The Journal of Environmental Education*, Vol. 25, Issue 1, pp. 8-12.
- Robertson, C.L. & Krugly-Smolka, E. (1997). Gaps Between Advocated Practices and Teaching Realities in Environmental Education. *Environmental Education Research*, Vol. 3, Issue 3, pp. 311-27.

- Robottom, I. (1987). Towards Enquiry-Based Professional Development in Environmental Education. In Robottom, I. (Ed.), *Environmental Education: Practice and Possibility*, Geelong, VIC, Deakin, University Press, pp. 83-119.
- Rode, H. (1997). *The Impact of Special Programs on the Implementation of New Curricula: The Case of Environmental Education in Germany*. Research Report No. 143. Paper presented at the Annual Meeting of the American Educational Research Association, Chicago, IL, March 24-28, (ERIC Document No. ED421385).
- Rooyen, H.V. (1998). Education for the Environment in the Post-Apartheid South African School System: An Overview. *The International Journal of Environmental Education and Information*, Vol. 17, No. 2, pp. 117-36.
- Rosan, M. (1997). *The Great Arab Revolt*. Yarmouk University, Irbid, Jordan.
- Roth, R.E. & Perez, J. (1989.) Twelfth Grade Student Knowledge and Attitudes toward the Environment in the Dominican Republic: An Assessment. *The Journal of Environmental Education*, Vol. 20, pp. 10-14.
- Rovira, M. (2000). Evaluating Environmental Education Program: Some Issues and Problems. *Environmental Education Research*, Vol. 6, Issue 2, pp. 143–55.
- Ruskey, A., & Wilke, R. (1994). *Promoting Environmental Education: An Action Handbook for Strengthening Environmental Education in Your State and Community*. Amherst, WI: University of Wisconsin-Stevens Point Press.
- Samuel, H.R. (1993). Impediments to Implementing Environmental Education. *The Journal of Environmental Education*, Vol. 25, Issue 1, pp. 26-29.
- Sandlos, J. (1998). The Storied Curriculum: Oral Narrative, Ethics, and Environmental Education. *The Journal of Environmental Education*, Vol. 30, Issue 1, pp. 5-10.
- Saqqaf, A. Al (1994). Towards a Philosophy of Environmental Education: A Descriptive, Analytic Study. *Unpublished Master Thesis*, Yarmouk University, Irbid, Jordan.
- Sarathy, P. (1987). Nonformal Public Environmental Education: Introduction. In Baez, A.V., Knamiller, G.W., & Smyth J.C. (Eds.), *The Environment, Science and Technology Education*. Science and Technology Education and Future Human Needs Series, Oxford, Pergamon Press, Vol. 8, pp. 351-53.
- Schafer, R.J. (1981). Education and Resource Managers: A Partnership with a Future. In Bowman, M.L. (Ed.) *Teaching Natural Resource Management through Environmental Education Activities*, pp. 3-12. (ERIC Document Reproduction Service Number ED 214 752).
- Schindler, F. H. (1999). Development of the Survey of Environmental Issue Attitudes. *The Journal of Environmental Education*, Vol. 30, Issue 3, pp. 12-17.

- Schreier, P.H. (1988). The Open-Ended Story Generates Creative Ideas. *The International Journal of Social Education*, Vol. 3, No. 2, pp. 24-33. (ERIC Database, Document No. EJ389760).
- Schreier, P.H. (1998). *Improving Teacher Education at Jordanian Universities*. A Report Presented to the Administration Unit, E.E.C. Countries NCHRD.
- Scott, W. & Oulton, C. (1998). Environmental Values Education: An Exploration of its Role in the School Curriculum. *Journal of Moral Education*, Vol. 27, Issue 2, pp. 209-25.
- Sebasto S.N.J. (1998). Environmental Education in the University of Illinois Cooperative Extension Service: An Educator Survey. *The Journal of Environmental Education*, Vol. 29, Issue 2, pp. 21-31.
- Sebasto S.N.J. (2000). Potential Guidelines for Conducting and Reporting Environmental Education Research: Qualitative Methods of Inquiry. *Environmental Education Research*, Vol. 6, Issue 1, pp. 9-26.
- Shuman, D.K. & Ham, S. (1997). Towards a Theory of Commitment to Environmental Education Teaching. *The Journal of Environmental Education*, Vol. 28, No. 2, pp. 25-32.
- Simmons, D.A. (1989). More Infusion Confusion: A Look at Environmental Education Curriculum Materials. *The Journal of Environmental Education*, Vol. 20, Issue 4, pp. 15-19.
- Simmons, D.A. (1991). Are we Meeting the Goal of Responsible Environmental Behavior?: an Examination of Nature and Environmental Education Center Goals, *The Journal of Environmental Education*, Vol. 22, Issue 3, pp. 16-21.
- Simmons, D.A. (1996). Teaching in Natural Areas: What Urban Teachers Feel is Most Appropriate. *Environmental Education Research*, Vol. 2, Issue 2, pp. 149-58.
- Simpson, J.D. & Budd, W.W. (1996). Toward a Preventive Environmental Education Curriculum: The Washington State University experience. *The Journal of Environmental Education*, Vol. 27, Issue 2, pp. 18-25.
- Smyth, J.C. (1995), Environment and Education: A View of a Changing Scene. *Environmental Education Research*, No. 1, pp. 3-20.
- Srinivasan, L. (1983). *Perspectives on Nonformal Adult Learning: Functional Education for Individual, Community, and National Development*. World Education, Boston, MA.
- Stables, A. & Bishop, K. (2001). Weak and Strong Conceptions of Environmental Literacy: Implications for Environmental Education. *Environmental Education Research*, Vol. 7, Issue 1, pp. 89-97.

- Stables, A. (1996). Reading the Environment as Text: Literary Theory and Environmental Education. *Environmental Education Research*, Vol. 2 Issue 2, pp. 189-96.
- Stapp, W.B. (1969). The Concept of Environmental Education. *The Journal of Environmental Education*, Vol. 1, Issue 1, p. 31.
- Stapp, W.B. (1974). Historical Setting of Environmental Education. In Swan J. & Stapp W.B. (Eds.), *Environmental Education: Strategies Toward a More Livable Future*, New York: John Wiley and Sons, pp. 42-49.
- Stevenson, R.B. (1987.) Schooling and Environmental Education: Contradictions in Purpose and Practice. In Robottom, I. (Ed.), *Environmental Education: Practice and Possibility*, Geelong, VIC, Deakin University Press, pp. 69-79.
- Stone, J.M. (1989). Preparing Teachers as Environmental Educators. *Contemporary Education*, Vol. 60, Spring Issue, pp. 159-62.
- Subbarini, M.S. & Al-Hamad, R. (1994). *Man and Environment: Environmental Education*. Kitany Library, Irbid, Jordan.
- Subbarini, M.S. (1989). *Toward a Curriculum for Environmental Education*. Dar Al-Amal, Irbid, Jordan.
- Subbarini, M.S. (1990). Key Issues in Environmental Education. *Environmental Issues*, No. 38, Kuwait Environment Protection Society.
- Subbarini, M.S. (1993). Biocentrism as an Approach to Environmental Ethics: An Islamic Determiner for Environmental Education. *The International Journal of Environmental Education and Information*, Vol. 12, No. 3, pp. 207-12.
- Subbarini, M.S. (1997). The West Asia Environmental Network: An Example of Networking for Developing Countries. *The International Journal of Environmental Education and Information*, Vol. 16, No. 1, pp. 41-52.
- Szagun, G. & Mesenholl, E. (1993). Environmental Ethics: An Empirical Study of West Germany Adolescents. *The Journal of Environmental Education*, Vol. 25, Issue 1, pp. 37-44.
- Tell, S. & Yaser, S. (1987). *The Condition of the Environment of Jordan* (in Arabic). A Study Sponsored by the Department of the Environment at the Ministry of Municipality and Rural Affairs, Jordan.
- Thomas, I., Kyle, L. & Alvarez, R.A. (1999). Environmental Education Across the Tertiary Curriculum: A Process. *Environmental Education Research*, Vol. 5, Issue 3, pp. 319-38.
- Tilbury, D. (1992). Environmental Education within Preservice Teacher Education: the Priorities of Priorities. *The International Journal of Environmental Education and Information*, Vol. 11, No. 5, pp. 267-80.

- Tilbury, D. (1995). Environmental Education for Sustainability: Defining the New Focus of Environmental Education in the 1990's. *Environmental Education Research*, Vol. 1, Issue 2, pp. 195-212.
- Tubasy, A. (1996). The Role of Mass Media in Changing Human Behavior Toward the Environment in Jordan (in Arabic). *Unpublished Master Thesis*, University of Jordan, Amman, Jordan.
- UAER (United Arab Economic Report) (1994). *A Report Published by Arab Monetary Fund, the League of Arab States, the Arab Fund, and the Organization of Arab Petroleum Exporting Countries*.
- UNCED (United Nations Conference on Environment and Development) (1992). *Agenda 21: Program of Action for Sustainable Development*. United Nations. Department of Public Information, New York.
- UNESCO (United Nations Educational, Scientific and Cultural Organization) (1977). The Tbilisi Declaration. *Connect*, UNESCO/UNEP Environmental Education Newsletter, Vol., No. 1, pp. 1-8.
- UNESCO (United Nations Educational, Scientific, and Cultural Organization) (1978). The world's first intergovernmental conference on environmental education in Tbilisi. Columbus, OH: *ERIC/SMEAC Information Reference Center*. (ED 179408).
- UNESCO (United Nations Educational, Scientific and Cultural Organization) (1980). *Declaration of the Tbilisi Intergovernmental Conference on Environmental Education in the Light of the Tbilisi Conference*. UNESCO, pp. 11-100, Paris, France.
- UNESCO (United Nations Educational, Scientific and Cultural Organization) (1987). *The International Strategy for Environmental Education and Training*. UNESCO, Paris, France.
- UNESCO (United Nations Educational, Scientific and Cultural Organization) (1993). *Final Report of a Regional Seminar: Environmental Education and Teacher Education in Asia and the Pacific*. Tokyo, National Institute for Educational Research.
- UNESCO (United Nations Educational, Scientific and Cultural Organization) (1998). A model project in Brazil. *UNESCO Courier*, Vol. 51, Issue 1, p. 44.
- UNESCO-UNEP (1990). Environmentally Educated Teachers-the Priority of Priorities? *Connect*, Vol. XV, No. 1.
- USDE (United States Department of Education) (1993). *Reaching The Goals: Goal 5-Adult Literacy and Lifelong Learning Office of Educational Research and Improvement*. Washington DC, Government Printing Office.
- Van Koevering, T.E., & Sell, N.J. (1983). An Analysis of the Effectiveness of Energy Education Workshops for Teachers. *Science Education*, Vol. 67No. 2, pp. 151-58.

- Vulliamy, G. (1988). Environmental Education in Third World Schools: Rhetoric or Realism? In Briceno, S. & Pitt, D.C. (Eds.), *New Ideas in Environmental Education*. New York, Croom Helm.
- Wallace, R.H. (1971). *Nature Study in the United States, in Board of Education Special Reports on Educational Subjects*. Vol. 10, Education in the United States of America. London: HMSO.
- Wals, A.E. & Alblas, A.H. (1997). School-Based Research and Development of Environmental Education: A Case Study. *Environmental Education Research*, Vol. 3, Issue 3, pp. 253-68.
- Wals, A.E. (1994). Action Research and Community Problem Solving: Environmental Education in an Inner City. *Educational Action Research*, No. 2, pp. 163-83.
- Wals, A.E., Beringer, A., & Stapp, W.B. (1990). Education in Action a Community Problem Solving Program for Schools. *The Journal of Environmental Education*, Vol. 21, Issue 4, pp. 13-20.
- Walter, G. (1996). Environmental Education. *European Education*, Vol. 28, Issue 3, pp. 71-82.
- Walter, S.L. (1997). *Formal Versus Nonformal Education*. (www.sil.org/lingualinks/library, in English, November, 1997).
- WCED (The World Commission on Environment and Development) (1987). *Our Common Future* (Brundtland Commission). Oxford, Oxford University Press.
- White, Lynn (1967). The Historical Roots of Our Ecological Crisis. *Science*, Vol. 155, pp. 1203-1207, Copyright by the American Association for the Advancement of Science.
- Wilke, R.J, Peyton, R.B., & Hungerford, H.R. (1987). Strategies for the Training of Teachers in Environmental Education. UNESCO-UNEP, International Environmental Education Program, *Environmental Education Series*, No. 25. UNESCO Division of Science, Technical and Environmental Education, Paris, France.
- Williams, R. (1992). *Environmental Education and Teacher Training-Preparing for Change and Participation*. Occasional Paper 3, Education Network for Environment and Development. Brighton, University of Sussex.
- Wilson, R.A. & Smith, J. (1996). Environmental Education and the Education Literature. *The Journal of Environmental Education*, Vol. 27, Issue 2, pp. 40-43.
- Winch, C. & Gingell, J. (1999). *Key Concepts in the Philosophy of Education*. Routledge, 11 New Fetter Lane, London.
- www.envirocitizen.org. *Center for Environmental Citizenship is Dedicated to Educating, Training, and Organizing a Diverse, National Network of Young Leaders to Protect the Environment* (without date).

- Yates, F. (1984). *The Art of Memory*, London, Ark.
- Yates, S. & Aronson, E. (1983). A Social-Psychological Perspective on Energy Conservation in Residential Buildings. *American Psychologist*, No. 38, pp. 435-44.
- Yaziz, M. (1985). *Environmental Ethics*. Final Report of the Subregional Training Workshop in Nonformal Environmental Education in Asia, Organized by University Pertanian Malaysia in Cooperation with JEEP, Serdang, Selangor, Malaysia, pp. 10-22.
- Young, A. & Maggs, J.E (1987). In Baez, A.V., Knamiller, G.W., & Smyth J.C. (Eds.) *The Environment, Science, and Technology Education*. Science and Technology Education and Future Human Needs Series, Oxford, Pergamon Press, Vol. 8, pp. 119-126.
- Young, A. & McElhone, M.J. (1986). *Guidelines for the Development of Nonformal Environmental Education*. UNESCO-UNEP International Environmental Education Programme, Paris, France.
- Abu-Zaineh, F. (1988). *Statistics in Psychology and Education* (3rd Ed). Al-Taqwa Bookshop, Amman, Jordan.
- Zimmermann, L.K. (1996). Knowledge, Affect, and the Environment: 15 Years of Research (1979-1993). *The Journal of Environmental Education*, Vol. 27, Issue 3, pp. 41-45.

DECLARATION

I Qasem Saleh Ali Al-Newashi declare this dissertation to be my own work; I have made no use of sources other than the literature quoted, and I have clearly marked all direct quotations and any references to other works in the text.

Signature

Qasem Alnewashi

Date:

Appendix I

Environment Protection Law, No. (12), 1995

The Hashemiet Kingdom of Jordan, General Corporation for the Environment Protection (GCEP)

Article 1- This Law (called The Law of Protection of the environment, 1995) will be effective as of its date of publication in “The Official Gazette”.

Article 2- The following words and expressions, wherever it is mentioned in this Law, shall have the meanings assigned to them as below, except where the context otherwise requires:

The Minister: the Minister of the Municipal and Rural Affairs and the Environment.

The Council: Protection of the Environment Council

The Chairman: Chairman of the Council

The Corporation: The General Corporation for Protection of the Environment.

The General Manager: General Manager of die Corporation.

Treasury: Treasury of Protection of the Environment.

Environment: The medium, which supports all living things, i.e. humans, animals, plants, and includes water, air, earth, and all that influence this medium.

Elements of the Environment: Water, air, earth and all components and derivatives thereof.

Pollution: The presence of all that is harmful to the Environment and affects it elements in a negative manner or that will impair its natural balance.

Protection of the Environment: Conservation of the Environment and prevention of its pollution or its deterioration or decrease in its effectiveness.

The Court: Court of the First Instance

Article 3- A -An official general corporation called the “General Corporation for Protection of the Environment” shall be established as a corporate entity which has administrative arid financial independence, and has, in this respect, the right to act in all legal procedures including the ownership of liquid assets or property and acceptance of gifts, endowments, inheritance and Waqf and execution of contracts and loans and shall be represented by the Civil Attorney General in court cases raised by it or against it.

B-The Corporation shall be attached to the Minister.

Article 4- The Corporation aims to promote protection of the Environment and the improvement of its various elements and the execution of [his policy in cooperation with the relevant authorities.

Article 5- In order to realize the specified objectives of this Law, the Corporation shall, in co-ordination and with the co-operation of the relevant authorities, perform the following tasks and have the following powers:

A- Setting-up of general policies for the protection of the Environment, preparation of the national strategies needed, its development and setting-up of plans and programs for its execution.

B-Measurement of elements of the Environment and their follow-up through the laboratories accredited by the Council. The Council shall specify the method of evaluation and accreditation of these laboratories.

C-Preparation of Specifications and Standards for the elements of the Environment.

D-Implementation of research and studies related to elements of the Environment.

E-Supervision of public and private establishments and others, to evaluate the extent of compliance with the approved specifications and standards of the Environment.

F-Setting-up of regulations, conditions and environmental specifications needed for agricultural, developmental, commercial, industrial, housing and other projects and related services to monitor and approve the project as a precondition for licensing or renewal of its license.

G-Setting - up of regulations for the movement of material dangerous and harmful to the Environment; and their classification, storage, transport, destruction and disposal and determining the conditions for preventing entry into the Kingdom by regulations issued in accordance with stipulations of this Law.

H- Setting-up of basis and conditions for establishing natural reserves and national parks, its supervision and at] relevant matters in regulations in accordance with stipulations of this Law.

I- Preparation of plans for environmental emergencies.

J-Publish printed material concerning the environment.

Article 6- The Council shall consist of the Minister as Chairman and the following members:

A-General Manager - Vice Chairman

B-Under Secretary. Greater Amman Municipality

C-General Secretary. Aqaba Region Authority

D-Manager. Civil Defense Department

E-General Secretary. Ministry of Municipal, and Rural Affairs and the Environment,

F-General Secretary. Ministry of Health

G-General Secretary. Ministry of Agriculture

H-General Secretary. Ministry of Water and Irrigation

I-General Secretary. Ministry of Energy and Mineral Wealth

J-General Secretary. Ministry of Industry and Commerce

K-General Secretary, Ministry of Planning

L-General Secretary. Ministry of the Interior

M-General Secretary. Ministry of Education.

N-General Secretary. Ministry of Labor.

O-General Manager, General Corporation of Housing and Urban Development.

P-President, Jordanian Environment Society.

Q-President. Royal Society for Preservation of Nature.

R-President, Royal Scientific Society.

S-President. Jordanian Society for Combat, of Desertification and Development of Badia.

T-Three persons of experience and specialization selected by the Minister for a renewable period of two years.

Article 7- A-The Council shall convene once every two months, and whenever it is requested by the Chairman or his Vice Chairman, in case of his absence. The meeting is considered lawful if attended by the simple majority of its members including the Chairman or the Vice Chairman.

B -The Council shall carry through resolutions by the simple majority vote of those present. In case of equal votes, the side with which the Chairman votes shall prevail.

C-The Council may invite non-voting experts and consultants to attend their meetings, to provide expert opinion on matters on the agenda without having the right to vote.

Article 8 - The Council shall be entrusted with the following duties and empowered with the following authorities:

A-Resolution of the general policy for Protection of the Environment and its national strategy, and the plans and programs pertaining to it.

B-Resolution of the Specifications and Standards for elements of the Environment.

C-Resolution of the Corporation's draft annual budget and its submission to the Cabinet of Ministers.

D-Resolution of the Corporation's final accounts and annual report.

Proposing draft laws and regulations related to the Environment.

F-Issue instruments and resolutions for the execution of Articles of this Law and the regulations issued in accordance with it.

G-Approval of emergency plans for confronting environmental disasters.

H-Issue instruments for determining rates charged by the Corporation for services rendered pertaining to the Environment.

I-Consideration of matters pertaining to the Environment brought to the Council by the Minister or the General Manager.

Article 9- The Corporation shall be considered the appropriate authority for Protection of the Environment in the Kingdom, and all official and private establishments shall execute the instruments and decisions, which are issued in accordance with this Law and Regulations; and shall be subject to the penal and civil responsibility, decreed in this Law or any related law.

Article 10- The Corporation shall undertake to strengthen the relationships between

the Kingdom and other states, organizations, international and regional, in matters related to Preservation of the Environment, and consider joining them to follow-up its execution.

Article 11- The General Manager shall carry out the following tasks and shall assume the following responsibilities:

A -Implementation of the Council's resolutions.

B-Coordination and co-operation with other agencies in the implementation of projects.

C-Management of the Corporation's staff and employees affairs to ensure the best performance in the progress of work.

D-Preparation of a draft annual budget of the Corporation, its final accounts and the annual report, and submission to the Council.

E-Preparation of draft laws and regulations related to the Corporation and submission to the Council.

F-Exercise of any other duties and responsibilities, which are delegated to him by the Council.

Article 12- The financial revenues of the Corporation shall consist of the following:

A-Rates charged for services rendered.

B-Loans, donations and aid rendered by foreign parties to the Corporation after approval by the Cabinet of Ministers.

C-Monies assigned in the General Budget.

D-Money in the Treasury of Protection of the Environment.

E-Any other revenues agreed to by the Cabinet of Ministers.

Article 13- The Treasury for Protection of the Environment in the Corporation shall be established to expend for the protection of the Environment and to preserve its elements in the process of realizing the goals and the objectives expressed in this Law and Regulations issued in accordance.

Article 14- A- The financial revenues to the Treasury shall consist of aid, gifts, and endowments donated to the treasury from public agencies, private establishments, and other Arab, regional and international organizations subject to the approval of the Cabinet of Ministers.

B -The procedures pertaining to depositing these funds in the treasury, managing them and their expenditure shall be in accordance with the instructions issued by the Council for this purpose.

Article 15- The Corporation shall set-up the basis for procedures needed to evaluate the effect of a project on the Environment to ensure its compliance with the requirements and the continuance of the development.

Article 16- The Corporation shall lead, in cooperation and co-ordination with other parties specialized in Environmental Affairs, whether local, regional or international, in the Preservation of the Environment from pollution in respect of the water, air, soil, plant, animal and marine sectors as spelled out in this Law.

Article 17- The Corporation shall lead, in coordination with the concerned parties, to conduct the following in the water sector:

A- Issuance of general standards and specifications for water in all its uses.

B-Supervision of water sources as to pollution.

Article 18- The Corporation shall lead, in coordination with the concerned parties, to conduct the following in the air sector:

A-Issuance of specifications and standards specifying the percentages of pollutants allowed in (he air.

B- Determining the locations of sites which are considered a source of air pollutants.

C- Executing the centers and regulations for supervision and testing of quality of air in the Kingdom.

D-Supervision of air-pollution diffusion and its sources: and taking actions to control its diffusion.

E-Regulating and supervising the processes of burning fuel for the purposes of generation of energy and others by individual or public and private organizations.

F-Controlling the effects of processes of treatment of garbage in all ways and means used for this purpose.

D-Controlling the diffusion of organic vapors to comply with the specifications and standards and percentage limits specified.

Article 19- The Corporation shall, in coordination with the concerned parties in the soil sector: participate in the following:

A -Supervising the sources of soil pollution and their control to the limits allowed for in the Environmental Regulations.

B -Ascertaining the reasons for soil slides, desertification, and taking action to control them.

Article 20- The Corporation shall, in cooperation with the concerned parties, carry out the following:

A-Prevent entry of dangerous waste materials in to the Kingdom or uncontrolled disposal of the same.

B -Set-up a classification for waste materials to define degree of danger and required treatment process.

Article 21- The specifications and conditions, relating to any natural land or marine reserve or for any national park set up for the preservation and protection of the Environment shall be defined.

Article 22- A- The General Manager, or his representative who has been authorized in writing, shall enter into any industrial, commercial, trade, construction or any other site or establishment to ensure its conformance and the conformity of its works with the specified environmental requirements. The regulations in this paragraph shall be applied in cooperation and coordination with the parties with authority on these sites and establishments.

B-The General Manager, or his representative who has been authorized in writing,

shall warn any Site or establishment which does not abide with these regulations, and shall specify a period for it to conform. If an offender should fail to satisfactorily rectify the situation then that establishment shall be taken to court. However, the General Manager can close down a site, establishment, or place of work if the offence is judged to be serious enough to warrant such action.

C -The Court may order the closure of a place of work, site, or establishment, and order it to rectify the problem during a period specified by the Court. A fine of 50 JD to 100 JD may be imposed for every day it fails to comply with the regulations after the specified period.

D-The violator of any regulation stated in this Article shall be fined not less than 300 JD and not more than 500 JD for repetition of the offence for a second time, and jail for a period of minimum 30 days but not more than 3 months in the case of repetition for a third time or more.

Article 23- No person or legal entity can discharge any pollutant or harmful material into the marine environment, in the territorial waters or on the coastal area within the limits and distances, which the Minister specifies upon the recommendations of the General Manager.

Article 24- A- The captain of any ship, boat, or freighter shall be punished by a fine of not less than 10,000 JD or jail for not less than one year, or both sentences, for disposing of any pollutant within the territorial waters or on the coastal areas as specified.

B-In addition to Paragraph (A) the offender shall be charged to remove the pollutant and make good any damage caused within the period specified by the Court. In case of failure to act, the corporation shall carry out the work at his own expense plus 2.5% for administrative expenses, but keep the ship, boat, or freighter with all its freight under custody till monies owed are paid.

Article 25- A fine of not less than 10,000 JD and not more than 25,000 JD or a jail sentence of not less than 6 months and not more than one year or both sentences shall be imposed on anyone who picks any coral or sea shells and removes them from the sea or is harmful to them in any way.

Article 26 - A-It is an offence to dispose of any material, harmful to the health of the environment, to a water source whether it is solid, liquid, gaseous, radioactive, or thermal. Also, it is an offence to store any of these materials near to any source of water, that is within the distance from these sources specified by the Minister and as recommended by the General Manager.

B- Precluded from Paragraph (A) of this Article are the following materials as specified in the instructions issued by the Minister and as recommended by the General Manager:

1-Materials used to treat other materials so that they will comply with the Specifications and Standards.

2-Materials used for pestilence control including weeds, insects, and rodents within the assigned Specifications.

3-Materials used for time purposes of scientific tests and research after treatment in

accordance with the assigned Specifications.

4-Offenders under Paragraph (A) of this Article shall be punished by a penalty of a fine not less than 2000 JD and not more than 10.000 JD or a jail sentence of not less than 3 months and not more than two years or both sentences, and shall be sentenced to remove the causes of this offence within the period specified by the Court. In case of failure to act, the Corporation shall rectify the situation at the offenders expense in addition to 25% for administrative expenses, and a penalty of not less than 50 JD and not more than 200 JD per day for failing to act to rectify the offence after the period specified.

Article 27: A- The sources of noise and the Specification of its upper limit for those sources, and the method of avoiding it or lessening of it to the lowest limit, allowed for the Environmental in accordance with the instructions issued by the Council.

B-Whoever commits an offence against Paragraph (A) of this Article and the instructions issued in accordance shall be punished by a penalty of not less than 100 JD and not more than 500 JD or jail afoot less than one week or more than one month or both sentences.

Article 28: A-The owners of plants or vehicles that emit environmental pollutants must install apparatus which prevent or reduce the discharge of such pollutants and to control the solid parts before emission from the plant or vehicle into the air to the limits allowed in accordance with the instructions which the Council issues in that respect.

B-If the owner of a plant commits an offence stated as illegal in Paragraph (A) of this Article and does not rectify it within time period specified by the General Manager or his authorized representative then the General Manager may report this offence to the Court which has the power to issue the decision to close this plant and penalize the owner. A penalty of not less than 100 JD and not more than 500 JD or jail sentence for a period not less than 7 days and not more than 30 days or both may be imposed. The court will also charge the owner to conform with these regulations during the period it specifies, if the offender does not conform within the specified period then the Court can force him to pay an amount of not less 50 JD and not more than 100 JD per day of delay.

C-All owners of vehicles or their drivers who contravene Paragraph (A) of this Article and do not conform with these regulations within the period specified by the General Manager or his authorized representative shall have his vehicle impounded in addition to the penalties mentioned in the Traffic Law.

D-Those who commit any of the offences mentioned in this Article shall be sentenced to twice the upper limit of the fine or jail term mentioned in Paragraph (B) of this Article upon the discretion of the Court in case of repetition of the offence, and three times the jail sentence in case of repetition for a third time or more.

Article 29: The Court shall look into the offences, to which this Law applies quickly in accordance with the powers and procedures mentioned in the Law dealing with the Procedures of Courts of Law.

Article 30: All officers, staff, and employees working in the Department of the Environment in the Ministry of Municipal and Rural Affairs and the Environment

shall be transferred to the Corporation upon issuance of this Law.

Article 31: A -The Corporation shall enjoy the exemptions and facilities extended to Ministries and Departments of the Government.

B -The treasury of the Corporation shall be considered as public money and shall be collected in accordance with the Law applicable to the collection of Government revenues.

Article 32: A-At the end of each financial year, the General Manager shall submit, a report to the Council covering the progress of work of the Corporation and its future plans. The report will be submitted not later than the end of January of the following year.

B-The Corporation's accounts shall be organized and kept in accordance with proper accounting procedures, and shall be audited by the Auditing Office.

Article 33: The Minister may delegate authority to the General Manager or the Governor for any of his responsibilities and authorities mentioned in this law.

Article 34: The Cabinet of Ministers may issue regulations as necessary to execute this Law including the regulations pertaining to rates and securities which the Corporation charges for services offered by it, in accordance with this Law.

Article 35: Any text in any other Law, which contradicts this Law, is hereby nullified.

Article 36: The Prime Minister and the Ministers are entrusted with the execution of this Law.

September 2, 1995

Appendix II

Jordan's Commitment to Environmental Conventions and Agreements

Title	Signed
International Convention for the Prevention of Pollution of the Sea by Oil	8/8/63
Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water	12/8/63
Convention on the Creation of a Committee to Fight Desert Locust in the Near East	14/11/66
International Plant Protection Convention	24/4/70
Treaty on the Prohibition of the Emplacement of Nuclear Weapons and other Weapons of Mass Destruction on the Sea Bed and the Ocean Floor and in the Subsoil Thereof	11/2/71
Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological and Toxin Weapons, and Their Destruction)	17/4/72
Amendments to the International Convention for the Prevention of Pollution of the Sea by Oil, Concerning Tank Arrangements and Limitation of Tank Size	8/12/72
Amendments to the International Convention for the Prevention of Pollution of the Sea by Oil, Concerning the Protection of the Great Barrier Reef	8/12/72
International Conventions for the Prevention of Pollution from Ships	17/3/75
Convention Concerning the Protection of the World Cultural and Natural Heritage	5/5/75
Convention on Wetlands of International Importance Especially as Waterfowl Habitat (RAMSAR)	10/1/77
Convention on the Prevention of Marine Pollution by Dumping Wastes and Other Matters	23/8/78

Convention on International Trade in Endangered Species of Wild Fauna and Flora	8/1/81
Protocol to Amend the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (RAMSAR)	15/3/84
Convention on Early Notification of a Nuclear Accident	2/10/86
Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency	2/10/86
Basel Convention on the Transboundary Movements of Hazardous Wastes and their Disposal, Basel 1989	22/3/89
Vienna Convention for the Protection of the Ozone Layer	31/5/89
Montreal Protocol on Substances That Deplete the Ozone Layer	31/5/89
Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment	7/2/89
Convention on Biological Diversity	11/6/92
United Nations Framework Convention on Climate Change	11/6/96

Appendix III

Status of Environmental Education in Jordan: Formal Educators' Questionnaire

GENERAL INSTRUCTION

This survey is divided into five sections. The purpose of the first section is to obtain general information about your personal educational experiences. Sections 2 through 5 are designed to obtain specific information about your educational practices and situations regarding EE.

All information is completely confidential to the research study. If you have any questions or concerns, please contact Qasem Al-Newashi at:

Tel: 7500221 or Email: qasem17@usa.net

**Thank you for taking the time to complete this
questionnaire.**

(Optional) Only if you would like to receive a summary copy of the study results, please write:

Your name:

Mailing address:

Email:

This study was conducted under the supervision of the Faculty of Education at the University of Hamburg, Hamburg, Germany.

SECTION 2: INFUSION OF EE INTO PROGRAMMING

For items 8 through 17, please select the response that best describes your agreement or disagreement with the following **reasons for NOT infusing environmental concepts into your programming.**

No	Items	Strongly Disagree	Disagree	Tends to Disagree	Tends to Agree	Agree	Strongly Agree
8	There are concepts other than EE that are more important to be infused into my programming.						
9	I do not have the knowledge to effectively monitoring EE activities.						
10	I do not have enough funding.						
11	I do not have enough time						
12	My educational department is not conducive to take responsibilities about the environment.						
13	Environmental concepts are unrelated to my subject area.						
14	Education about the environment is not appropriate for the grade level I have responsibilities of.						
15	Basically, I am not interested in the issue of environment.						
16	I am not interested in EE or environmental learning						
17	The school curriculum does not provide opportunity for infusing environmental concepts into my programming.						

For items 18 through 22, please select the response that best describes your agreement or disagreement with the following statements regarding **whether the situation would influence you to infuse environmental concepts into your programming.**

No.	Items	Strongly Disagree	Disagree	Tends to Disagree	Tends to Agree	Agree	Strongly Agree
18	Better access to resources and aids for teaching about the environment.						
19	More inservice education courses on EE teaching methods.						
20	More funding.						
21	More preparation time.						
22	More support from my administration.						

SECTION 3: EE ACTIVITIES

The purpose of this section is to collect general information regarding the EE activities and practices in your department (or school).

23. Does your department (or school) hold any programs or activities with regard to EE?

YES: If the answer is yes, please provide the titles of these programs or activities _____

NO

24. Do you have an EE plan and/or manual to help teachers develop EE programs and activities?

YES: If the answer is yes, please provide the title of the plan and/or manual:

NO

25. Is there a listing within your department (or school) of outdoor programs such as nature centers, zoos, museums, parks, etc.?

YES: If the answer is YES, please specify:

NO

26. Are there strategies for involving teachers in efforts to expand or strengthen EE in your area?

YES: If the answer is YES, please specify:

NO

SECTION 4: COORDINATION WITH OTHER AGENCIES

This section designed to collect information that may help coordinating EE programs between different agencies to improve spreading EE in Jordanian schools.

27. Does your department (or school) has shared EE program(s) with the environmental conservation organizations?

YES: If the answer is YES, please specify:

Name(s) of the organization (s):

Name(s) of the shared programs (or activities):

NO.

28. Does your department (or school) has shared EE program(s) with community organizations or agencies other than the environmental conservation organization?

YES: If the answer is YES, please specify:

NO

29. Does your department (or school) has any coordination with other schools or higher education institutions to deliver the required activities to EE programs?

YES: If the answer is YES, please specify:

NO : If the answer is NO, please specify if it is being developed?

SECTION 5: TEACHING AND LEARNING IN EE

For items 32 and 33, please choose the position that best describes ***your teaching style with regard to EE*** (tick under the statement which represents your position):

32	Strong Emphasis on Values	Emphasis on Values	Tend to Emphasis Values	Tend to Emphasis Knowledge	Emphasis on Knowledge	Strong Emphasis on Knowledge

33	Highly Child Centered	Child Centered	Tend to Child Centered	Tend to Subject-Centered	Subject-Centered	Highly Subject-Centered

34. What ***emphasis do you give to the following aspects of EE*** in the context of the subject area you are responsible of?

EE aspects	Not Important	Marginal Important	Tend to not Important	Tend to Important	Quite Important	Essential
a) Personal responsibility toward the conservation of the environment						
b) Environmental Knowledge and understanding						
c) Environmental Ethics						
d) Awareness of local issues						
e) Awareness of issues in other countries						

Appendix IV

Status of Environmental Education in Jordan: Environmental Organizations' Questionnaire

GENERAL INSTRUCTION

The goal of this questionnaire is interest in finding out which EE initiatives are in place in your organization, and which initiatives are being developed. Please respond to all questions to the best of your knowledge by ticking the appropriate boxes for your responses to each question and writing comments as instructed.

All information is completely confidential to the research study. If you have any questions or concerns, please contact Qasem Al-Newashi at: Tel: 7500221 or

Email: qasem17@usa.net.

Thank you for taking the time to complete this questionnaire.

Name of your Organization:

The affiliation of your Organization (please check one):

Governmental Non-governmental

Organization address:

P.O. Box:

Telephone #:

Fax #:

Email address:

This study was conducted under the supervision of the Faculty of Education at the University of Hamburg, Hamburg, Germany.

SECTION 1: GENERAL INFORMATION

The purpose of this section is to obtain some general information about the person who completing this questionnaire and the organization that he belongs to.

1. What is your gender? Male Female
2. In total, how many years have you been working in your organization?
 1 to 5 6 to 10 11 to 15 16 to 20 over 20 years
3. What is your highest certificate? B.A. (or B.Sc.) M.A. PhD
4. What is the field of your highest certificate?
 Education Science Literature or Languages Fine Arts or Sport
5. Did you receive education in Environmental Education (EE) or on how to deliver environmentally oriented programs?
 YES:

 NO
6. Select the categories that the members of your organization belong to (you can tick more than one):
 Schools teachers and students University faculty and student
 Community members government agents
 private business agents
 other categories: ()
7. Does your organization provide the members with networking opportunities, professional development, and communication about environmental concerns?
 YES: If the answer is YES, please write the address of the network web page:

 NO.

SECTION 2: EE ACTIVITIES

This section concerning with the programs and activities that your organization sponsors or conducted under its supervision.

8. Does your organization hold any environmental education programs or activities?

YES: If the answer is yes, please provide the titles of these programs or activities

.....
.....
.....
.....

NO

9. Does your organization have a plan of action for EE?

(EE plan whose purpose is to chart a course of action and to provide an implementation schedule for meeting the goals of EE. These plans set forth the goals and objectives for EE within the region in which the organization located.)

YES: if your answer is YES, please specify the year enacted? It will be great if you attach a copy of the plan.

.....
.....
.....

NO.

10. Does your organization assist teachers for incorporating EE into school curriculum?

YES

.....
.....
.....

NO

11. Does your organization have EE curriculum guide or other publications, which provide direction to the development of EE program at the schools level?

YES: If the answer is YES, please provide the title of the publications:

NO.

12. Does your organization apply any EE study or assessment procedures (including standardized testing, authentic-performance assessment measures, and other evaluation methods) to assess the students' knowledge and attitudes towards the environment, or to determine the extent to which EE curricula and instruction having the desired impact on students.

YES: please provide the title of the study:

NO

13. Please write your suggestions or recommendations to spread EE in Jordanian schools:

Only one more Section to go!

SECTION 3: COORDINATION WITH OTHER AGENCIES

This section designed to gather information which may help coordinating EE program between the environmental organization and other agencies to improve spreading EE in Jordanian schools.

14. Is there shared EE programs or activities between your organization and other environmental conservation organizations?

YES: If the answer is YES, please attach any document about the coordination with other organization.

NO.

15. Does your organization share EE program(s) with community organizations or agencies other than the environmental conservation organization or agencies?

YES: If the answer is YES, please specify:

NO

16. Is there a systematic coordination with the Ministry of Education?

YES: If the answer is YES, please specify the type of the coordination?

NO.

17. Does your organization have EE contact persons in the schools?

YES: If the answer is YES, is that contact person usually:

administrators teachers students

others (specify):

NO.

18. Do you have any coordination with higher education institutions to deliver the EE programs or activities?

YE

S: If the answer is YES, please specify the type of the coordination?

NO.

19. Did your organization contribute in the National Strategy for EE, Communication and Awareness (EECA)?

YES: If the answer is YES, please specify what are your participations.

NO

20. Please, use the following area to write down your suggestions about the possible ways of coordination between your organization and any other organization or agency in Jordan?

Thank you for completing this questionnaire

A

Formal Educators' Questionnaire (*in Arabic*)

بسم الله الرحمن الرحيم

عزيزي القائد التربوي الفاضل

السلام عليكم ورحمة الله وبركاته

:

□

:

:

:()



$$\square \quad \square : .1$$

$$20 \quad \square \quad 20-16 \quad \square \quad : \quad 15-11 \quad \square \quad 10-6 \quad \square \quad 5-1 \quad \square \quad .2$$

$$\square \quad \square \quad \square : \quad \square \quad .3$$

$$\left(\quad \left(\quad \right) \right) : \quad \square \quad .4$$

$$\square : \quad \square \quad \left(\quad \right) \quad \square \quad .5$$

$$\begin{array}{ccc} \square & \square & \square \\ \square & \square & \square \end{array} : \quad \begin{array}{ccc} \square & \square & \square \\ \square & \square & \square \end{array} \quad .6$$

7.

$$(5) \quad .22 : \quad \square \quad 8$$

$$: \quad \square$$

_____ : _____

							8
							9
							10
							11
							12
						()	13
							14
							15
							16
							17

(22-18)

_____ : _____

							18
							19
							20
							21
							22

.27

.....
.....
.....
.....

.28

.....
.....
.....
.....

.29

.....
.....
.....

.30

.31

.....
.....
.....
.....
.....
.....

2 7 ()



:

33 32

							:	32

							:	33

:

.34

								(
								(
								(
								(
								(

A I

Environmental Conservation Organizations Survey (*in Arabic*)

بسم الله الرحمن الرحيم

السيد _____ المحترم

السلام عليكم ورحمة الله وبركاته

□ : () □ :
:()
: :
:()

:() .8
.....
.....

() : □ .9
.....
.....

. □ .10
: : □
.....
.....
.....

() () .11
: : □
.....
.....
.....

() .12
: : □
.....
.....
.....

() .13
.....
.....

() () .14

.....
..... .15

.....
..... () .16

..... : :
.....
..... .
..... .17

() :
 () :
.....
..... .
..... .18

..... : :
.....
..... .
..... () .19

..... 1999 : :
.....
.....
..... .20

..... :
.....
.....

Appendix VII

Reliability Analysis of Section Two of Formal Educators Questionnaire

Item No.	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Alpha if Item Deleted
8	49.6667	6.4772	.2647	.7755
9	49.7980	9.7864	.0665	.7790
10	50.6970	2.8925	.6188	.7402
11	50.8182	3.9262	.2113	.7741
12	49.8434	5.7165	.4636	.7626
13	49.9848	5.3449	.3092	.7662
14	49.8687	4.7339	.4357	.7616
15	49.7475	8.4740	.2967	.7718
16	51.2778	3.7397	.7367	.7254
17	52.0404	3.6227	.4361	.7559
18	51.2909	9.1574	.0347	.7834
19	51.2778	6.7397	.7367	.7254
20	52.0404	4.6227	.4361	.7559
21	52.5211	9.5323	.0426	.7643
22	51.2677	3.9686	.4372	.7557
23	50.2071	3.2716	.2129	.7749
24	51.0051	4.6548	.3753	.7619
25	49.9343	5.4931	.3775	.7611

N of Cases = 18
N of Items = 18
Alpha = .7732

Appendix VIII

Reliability Analysis of Section Five of Formal Educators Questionnaire

Item No.	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Alpha if Item Deleted
35	52.5041	31.1865	.3574	.8294
36	52.4309	31.7718	.2454	.8341
37	52.1626	33.0389	-.0516	.8659
38a	47.4390	26.9040	.7770	.8029
38b	47.1545	29.8366	.5069	.8219
38c	47.1707	28.7657	.7389	.8111
38d	47.4390	26.9040	.7770	.8029
38e	51.9593	32.9246	.2233	.8352

N of Cases = 12

N of Items = 8

Alpha = 0.8339

Appendix IX

Letter of Recommendation from the University of Hamburg



Universität Hamburg

Fachbereich Erziehungswissenschaft

Institut 8
Didaktik der Geographie, Geschichte, Poli-
tik und des Sachunterrichts

Prof. Dr. Dr. h.c. Helmut Schreier

UHH • FB 06 • INSTITUT 8

To Whom It May Concern

Tel. 040 – 81 12 89 Fax 040 – 81 73 23
Tel. 040-42838-4743
E-Mail: sschreier@t-online.de

REQUEST TO SUPPORT STUDY BY MR. QASEM S. AL-NEWASHI

Mr. Qasem S. Al-Newashi of Umm Qais, Jordan, is an external doctoral student at the University of Hamburg. He is engaged in a study on **Environmental Education in Jordan**, both a description of its state and suggestions for its improvement, under my supervision. For his thesis, he needs to collect data from relevant sources by way of questionnaire.

May I ask your kind support for this study by answering the questions of the attached questionnaire.

After completion of the study, you will receive a summary of its results.

Sincerely

Prof. Dr. Dr. h.c. Helmut Schreier

July 9, 2000

Universität Hamburg • Tür zur Welt der Wissenschaft

FB Erziehungswissenschaft • Von-Melle-Park 8 • 20146 Hamburg • www.erzwiss.uni-hamburg.de

Appendix X

Authorization letter from Jordan's Ministry of Education

بسم الله الرحمن الرحيم
وزارة التربية والتعليم



٥٥٥٤٤

الموافق ٢٠٠٠/٧/١٧

التاريخ ١٤٢١/٤/١٥

الرقم ١٠/٣

السيد مدير عام المناهج والتعليم والاشراف التربوي
السيد مدير عام الرياضة المدرسية والنشاطات التربوية والكشفية
السيد مدير التربية والتعليم لمنطقة عمان الاولى
السيد مدير التربية والتعليم لمنطقة عمان الثانية
السيد مدير التربية والتعليم لمنطقة عمان الثالثة
السيد مدير التربية والتعليم لمنطقة عمان الرابعة
السيد مدير التربية والتعليم لمنطقة اربد الاولى
السيد مدير التربية والتعليم لمنطقة اربد الثانية
السيد مدير التربية والتعليم للواء الكورة
السيد مدير التربية والتعليم للواء بني كنانة
السيد مدير التربية والتعليم للواء الرمثا
السيد مدير التربية والتعليم للواء الاغوار الشمالية
السيد مدير التربية والتعليم لقصبة الزرقاء
السيد مدير التربية والتعليم للواء الرصيفة

الموضوع : البحث التربوي

السلام عليكم ورحمة الله وبركاته

يقوم الباحث قاسم صالح علي العواشي باجراء دراسة بعنوان (برنامج مقترح لتنسيق نشاطات التربية البيئية الرسمية وغير الرسمية في الاردن) وذلك استكمالاً لمتطلبات الحصول على درجة الدكتوراه من قسم المناهج والتدريس / جامعة هامبورغ في المانيا ، ويحتاج ذلك الى تطبيق استنانه على عينه من المشرفين والمعلمين التابعين لمديرييتكم . يرجى تسهيل مهمة الباحث المذكور وتقديم المساعدة الممكنة له .

مع وافر الاحترام

وزير التربية والتعليم
د. منية الحوراني

نسخة/ للسيدة رئيسة قسم البحوث والدراسات والاستشارات التربوية

ن.ز

تلكس : ٢١٣٩٦

ص.ب (١٦٤٦)

فاكس ٥٦٦٦٠١٩

هاتف : ٥٦٠٧١٨١

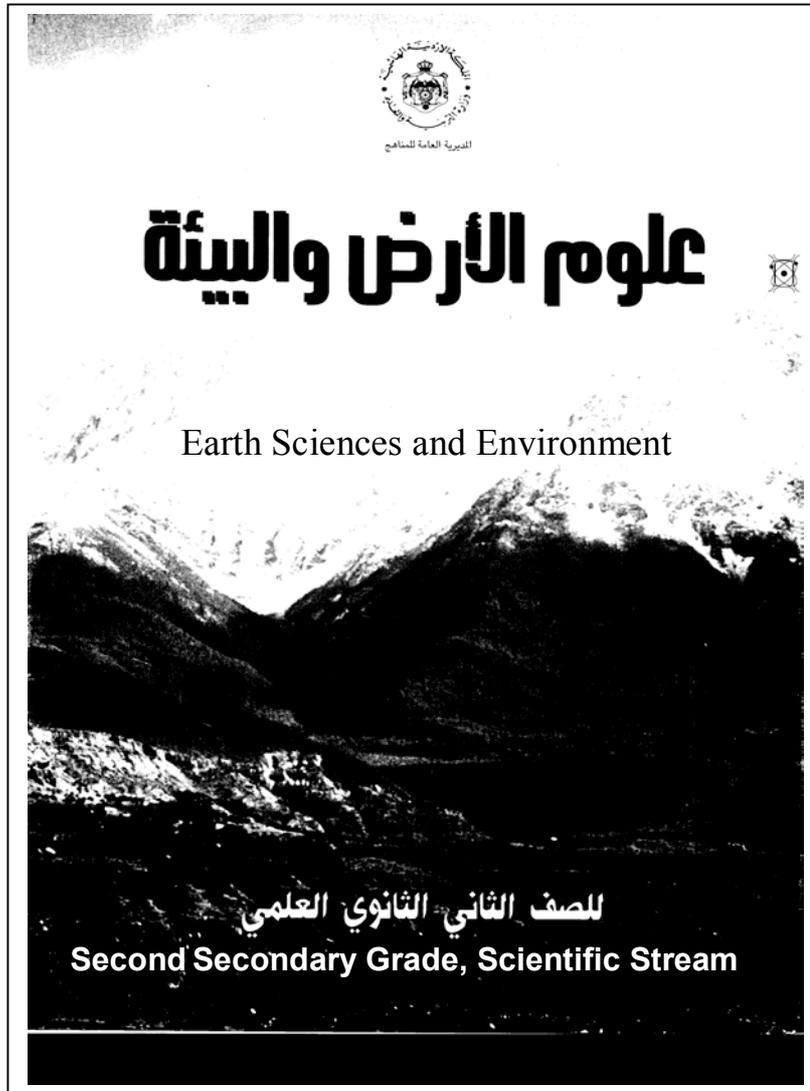
قرار رقم ٩٨/٦٧

Appendix XI

EE in Jordanian School Curriculum: Separate Subject Approach

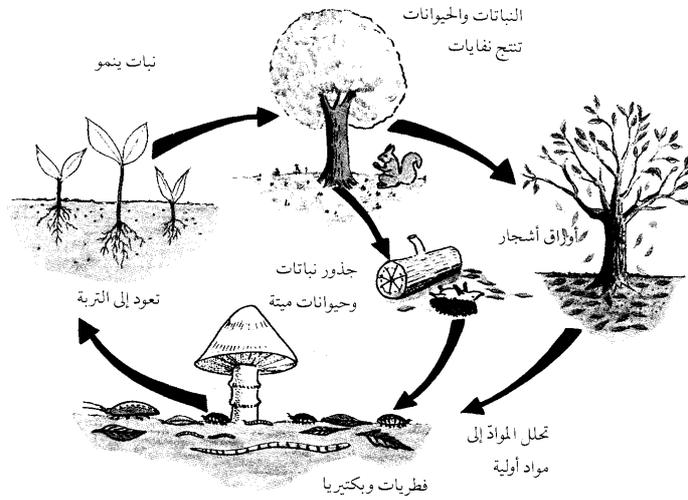
First: The Textbook of *Earth Sciences and Environment* for Second Secondary Grade/ Scientific Stream.

The following is the cover page of the textbook followed by some selected pages* .



* Since the language of the textbooks is in Arabic, I selected the pages that include figures, charts, or pictures in order to make sense what the topic is.

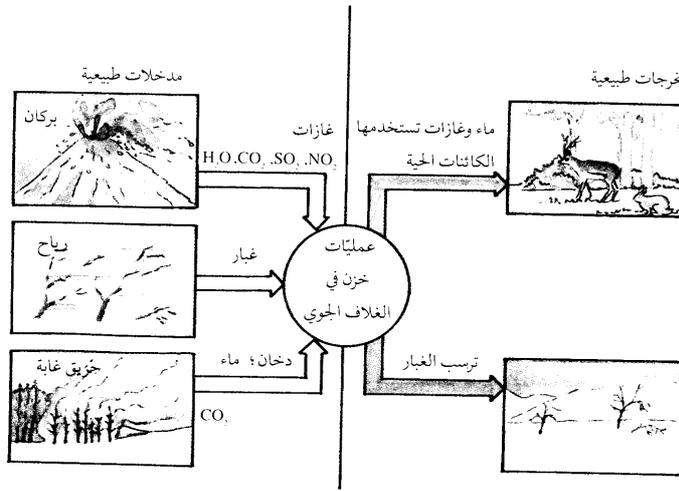
النفايات Wastes



الشكل (٢ - ١) : إعادة استخدام المواد في النظام البيئي.

والنفايات عموماً هي موادٌ تلقىها أو تولدها الكائنات الحية في النظام البيئي الطبيعي، ويتعامل هذا النظام معها على أساس أنها مصدر يستخدم بكفاءة وفاعلية، ويعاد استخدامه ضمن دورة واضحة.

١ - أنواع النفايات



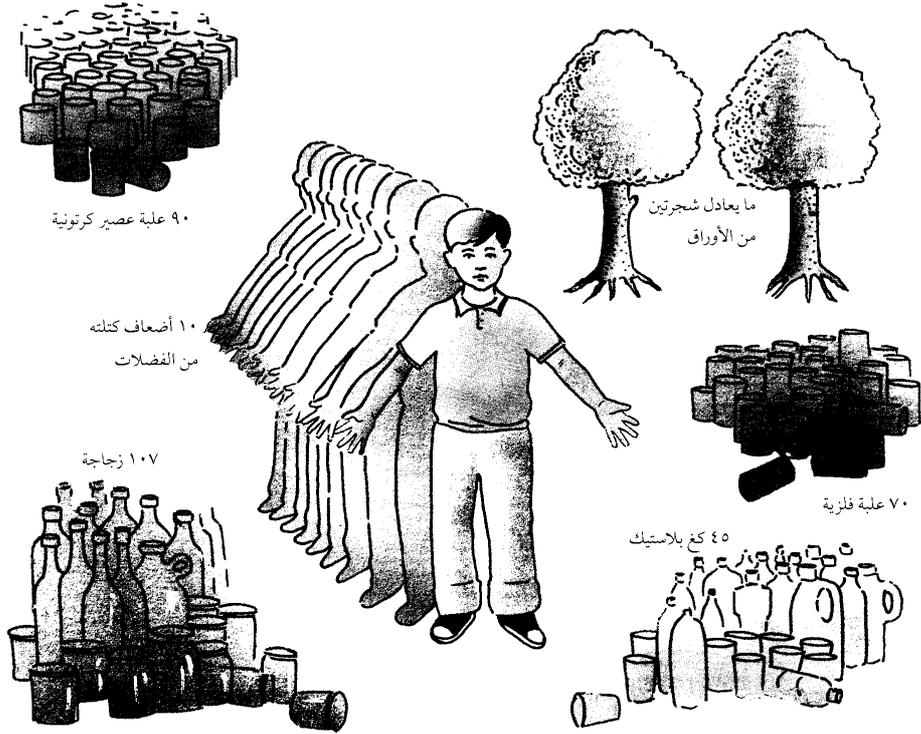
الشكل (٢ - ٢) : النفايات في النظام البيئي الطبيعي.

يطرح في النظام البيئي الطبيعي ثلاثة أنواع من النفايات : الأولى صلبة مثل دقات الغبار، وفضلات الكائنات الحية وبقاياها؛ والثانية سائلة مثل الماء والسوائل؛ والثالثة غازية مثل بخار الماء وأكاسيد الكبريت والكربون والنتروجين وغيرها. ويوضح الشكل (٢-٢) كيفية تعامل النظام البيئي الطبيعي مع هذه النفايات وفقاً دورة معينة.

Source: Earth Sciences and Environment Textbook, 2nd Secondary Grade, Scientific Stream, p. 20.

Types of wastes and method of treatment are presented. Several options are available for waste management. The most desirable is to reduce the quantity of waste at its source or to recycle the materials for some other productive use.

ما النفايات (الصلبة) التي يلقيها الإنسان في النظام البيئي؟ لتعرف ذلك انظر الشكل (٢ - ٣).
 لاحظ أن النفايات الصلبة التي يطرحها الإنسان في النظام البيئي متعددة الأشكال، وتتكون من: موادَّ فلزية، كمخلفات أنشطة التعدين؛ ومواد عضوية مصنعة من مشتقات النفط، كالمسوجات والبلاستيك؛ ومواد عضوية طبيعية، مثل المواد الغذائية والأخشاب.



الشكل (٢ - ٣): النفايات الصلبة التي يلقيها الإنسان في البيئة في سنة واحدة.

كذلك يلاحظ أن بعضاً منها مثل المواد البلاستيكية مركبات معقدة لم يسبق للنظام البيئي أن تعامل مع مثلها. لذلك نجد أنها تحتاج إلى مدة زمنية طويلة حتى يتم التخلص منها عن طريق العوامل الطبيعية. وهكذا تصبح مشكلة تراكمها من المشكلات الرئيسية في النظام البيئي.

؟

ما مكوّنات النفايات التي تطرحها من منزلك؟

تسبب النفايات مشكلات متعدّدة للإنسان. لذلك لجأت معظم الدول إلى التفكير في كيفية التعامل مع النفايات الصلبة سواء عن طريق جمعها أو نقلها، أو التخلص منها، أو الاستفادة منها.

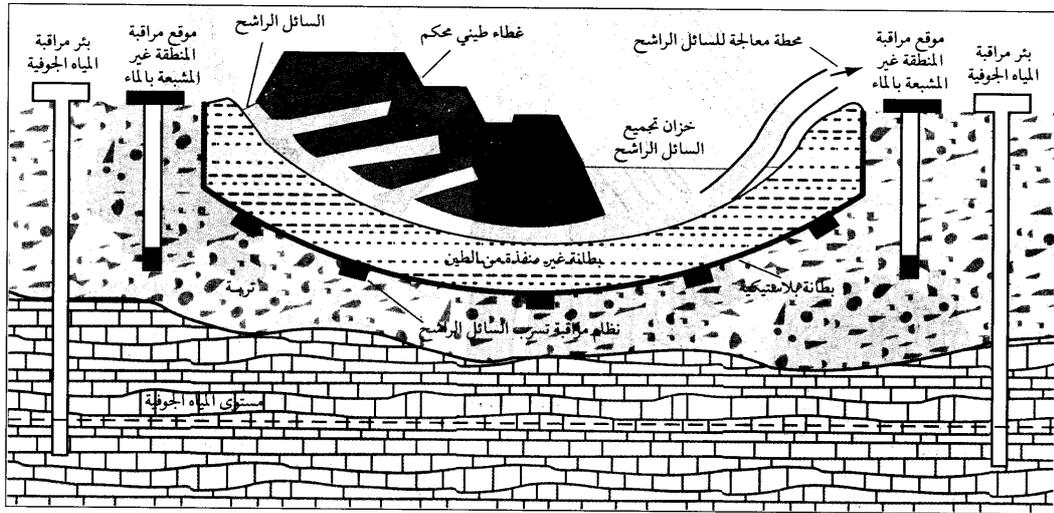
Source: Earth Sciences and Environment Textbook, 2nd Secondary Grade, Scientific Stream, p. 21.

All nonhazardous solid wastes from a community that requires collection and transport to a processing or disposal site are discussed separately. The sources of solid waste include residential, commercial, institutional, and industrial activities.

٢ - طرق التخلص من النفايات

الطمر الصحي Sanitary Landfill

يعد الطمر الصحي من أكثر الطرق انتشاراً في العالم للتخلص من النفايات. ويمثل الشكل (٢-٤) مكباً للنفايات يستخدم أسلوب الطمر الصحي السليم. وقد صمم لحماية البيئة من التلوث خاصة المياه الجوفية؛ كما استفيد من الغازات الناشئة عنه في توليد الكهرباء. ويتم إعداد مكبات الطمر الصحي عن طريق حفر حفرة كبيرة في التربة، يعتمد شكلها وحجمها على طبيعة التربة، وعدد السكان، ونمط استهلاكهم. ولمنع تأثير النفايات في المياه الجوفية يتم إنشاء مواقع المكبات في تربة رملية أو طينية وعزلها بوساطة طبقات من الطين أو الأسمنت أو البلاستيك مع توفير نظام الصرف الصحي للسوائل المتكوّنة؛ إذ يتم ضخ هذه السوائل إلى خزانات خاصة.



الشكل (٢ - ٤) : الطمر الصحي للنفايات.

إن تغطية النفايات بطبقة من التربة، ثم ضغطها باستخدام مدحلة، و زراعة النباتات الحرجية فيها (بعد الانتهاء كلياً من الموقع) لمنع انجرافها، يؤدي إلى التخمر والتحلل اللاهوائي الذي ينتج منه غاز الميثان، وهذا يُصنَّح إلى أسطوانة خاصة لتجميعه، ويستخدم وقوداً في توليد الكهرباء. ويؤخذ على هذه الطريقة احتمالية تلوث المياه الجوفية بفعل السائل الراشح، نتيجة تسربه لخزان المياه الجوفية، إضافة إلى تسرب الغازات الملوثة، واحتمالية حدوث انفجار في مواقع الطمر الصحي.

ب - الحرق والتربيد Incineration

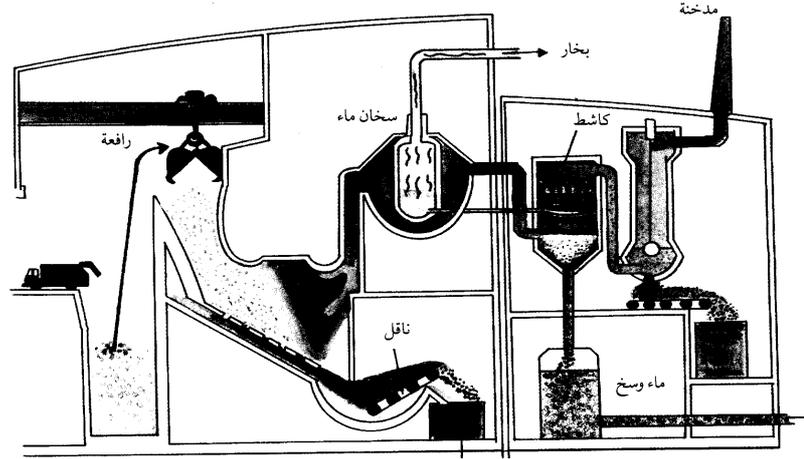
تستخدم هذه الطريقة لتقليل حجم النفايات في مكبات النفايات؛ إذ تحرق داخل أفران خاصة عند درجة حرارة ٩٠٠ - ٢٠٠٠°س. ويجب أن يستمر الحرق طوال الوقت دون توقّف. يستفاد من طاقة الاحتراق في تسخين مراحل المياه التي تغذي شبكات التدفئة؛ أو في إنتاج بخار

Source: Earth Sciences and Environment Textbook, 2nd Secondary Grade, Scientific Stream, p. 22.

Solid waste management. Land disposal is the most common management strategy for municipal solid waste. Refuse can be safely deposited in a sanitary landfill, a disposal site that is carefully selected, designed, constructed, and operated to protect the environment and public health. One of the most important factors relating to landfilling is that the buried waste never comes in contact with surface water or groundwater.

الماء، الذي يُستغلُّ في توليد الطاقة الكهربائية، أو تسخين مراحل مياه التدفئة المركزيّة بعيداً عن المرمدات. ويبيّن الشكل (٥-٢) آلية الحرق والاستفادة منها.

ويؤخذ على هذه الطريقة أن النفايات عند حرقها تلوث الهواء إضافة إلى أنها لا تحرق بكاملها، فيتبقى مع الرماد الجزء غير المحترق الذي يتم طمره في مكبات الطمر الصحي. ومن سمات هذا الجزء وجود تراكيز من العناصر الثقيلة.



الشكل (٥-٢) : حرق النفايات وترميدها.

٣ - طرق تقليل النفايات الصلبة والاستفادة منها

هل للنفايات الصلبة فوائد؟ ماذا تقترح للاستفادة من النفايات المنزلية؟

النفايات الصلبة مشكلة تحتاج إلى حل في دول العالم جميعها، خاصة المناطق المزدحمة بالسكان. وتعد التوعية بأهمية النفايات والاستفادة منها من أهم طرق تقليل حجم هذه المشكلة. ومن الطرق المتبعة في ذلك ما يأتي:

أ - توعية المواطن بنمط استهلاكه للمواد المختلفة.

ب - إعادة تصنيع بعض النفايات، مثل: الورق، والزجاج، والألومنيوم، والبلاستيك، والهياكل الفلزية، والملابس، والأثاث. ولعل وجود الوعي البيئي على مستوى الفرد والأسرة يؤدي إلى قيامها على فصل النفايات (الفصل الابتدائي). منزلياً قبل عملية الجمع. ويوضح الشكل (٢-٦) أنواعاً مختلفة من النفايات التي يجب أن تفصل منزلياً قبل التخلص منها. لاحظ أن عمليات الفصل والجمع للنفايات تكون إما على مستوى المنزل، أو الحي، أو المجتمع، ويعتمد ذلك على طبيعة هذه النفايات. فمثلاً، يمكن أن تفصل الأنواع المختلفة من الزجاج الملونة وغير الملونة منزلياً، للتخلص منها في حاويات مخصصة لكل نوع على مستوى الحي.

Source: Earth Sciences and Environment Textbook, 2nd Secondary Grade, Scientific Stream, p. 23.

Burning is a very effective method of reducing the volume and weight of solid waste. In modern incinerators, the waste is burned inside a properly designed furnace under very carefully controlled conditions. The combustible portion of the waste combines with oxygen, releasing mostly carbon dioxide, water vapor, and heat.

ب - المواد الكيميائية السامة Toxic Chemicals

وهذه مركبات غير قابلة للتحلل، أو تتحلل ببطء شديد. وهي من أكثر المواد سمية في الماء. وحين تصل إلى نظام توزيع الماء يصبح من الصعب التخلص منها. وتشتمل على المواد المشعة، ومبيدات الحشرات، والأعشاب، والعناصر السامة* (العناصر الثقيلة كالرصاص والزرنيخ وغيرها) والنفط الخام ومشتقاته، والهيدروكربونات المكلورة مثل الـ دي. دي. تي، ومركبات Poly-Chlorinated Diphenyls (PCDs). ومعظم هذه المواد مصنعة عضوياً، وتصل من المصانع والمزارع والبيوت إلى نظام توزيع المياه. وتكمن خطورتها في أنها بطيئة التحلل في الظروف الطبيعية ودرجة سميتها عالية تؤدي إلى الموت. وأفضل طريقة للتخلص من آثارها هي وضع تشريعات تلزم المصانع بإزالتها وعدم طرحها على صورة نفايات تصل في نهاية الأمر إلى مخزون المياه الجوفية.

٣ - المواصفات الأردنية للملوثات مياه الشرب

اشتملت هذه المواصفات على الخصائص الفيزيائية والكيميائية والبكتيرية بولوجية للمياه الصالحة للشرب، وللاستعمالات البشرية. واشتملت الخصائص الكيميائية على نسب المواد السامة للعناصر، كما في الجدول (٢-٢)، والمواد المشعة والمواد الكيميائية [الجدول (٢-٣)] التي لها تأثير في الصحة العامة، وفي صلاحية المياه للشرب.

الجدول (٢-٢) : عناصر المواد السامة في مياه الشرب.

العنصر	الرمز	الحد الأعلى المسموح به (مغ / لتر)
الرصاص	Pb	٠,٠٥
السيلينيوم	Se	٠,٠١
الزرنيخ	As	٠,٠٥
الكروم	Cr**	٠,٠٥
الأنثيمون	Sb	٠,٠١
الكادميوم	Cd	٠,٠١
الزئبق	Hg	٠,٠٠٥
الفضة	Ag	٠,٠١

فوجود عناصر المواد السامة في الماء الواردة في الجدول (٢-٢)، ولو بتراكيز منخفضة، يسبب أضراراً للإنسان، تظهر بعد أن تتراكم داخل جسمه بتراكيز معينة. وكل عنصر له ضرره المعروف؛ فالزئبق مثلاً يؤثر في الجهاز العصبي. لذلك فالأصل في مياه الشرب أن تكون خالية تماماً من العناصر الثقيلة، وإن وجد مثل هذه التراكيز المذكورة في الجدول، فلا ينصح باستعمال الماء مدّة طويلة من الزمن.

* لاحظ الجدول (٢-٢) بالنسبة للحدّ المسموح به من عناصر المواد السامة في مياه الشرب.

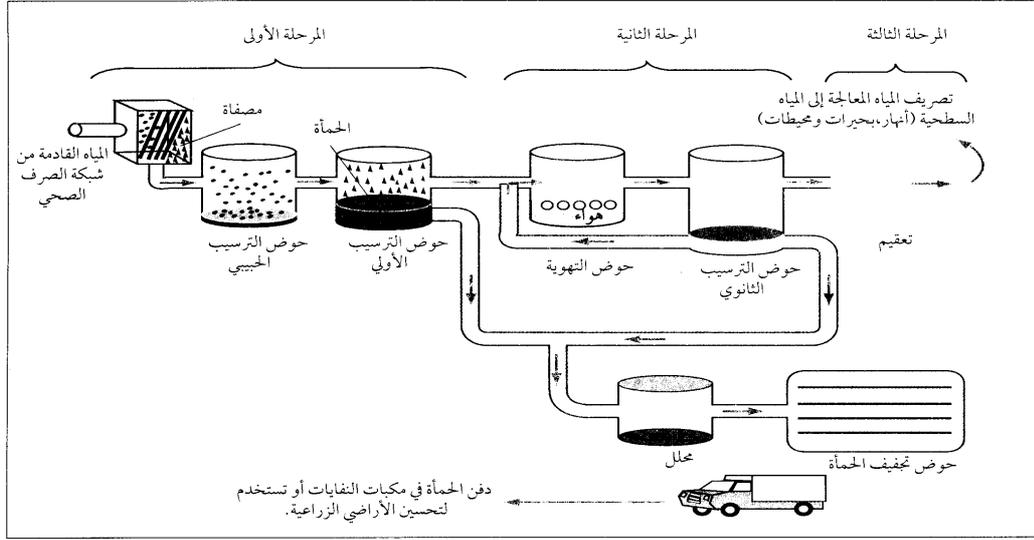
** الكروم الكلي (الثلاثي والسداسي)؛ إذ كان في الماضي يؤخذ الكروم السداسي لأنه الكروم السام. لكن لما كان الكروم الثلاثي يتحول إلى الكروم السداسي بعد عملية التعقيم بالكلورين (وهو عامل مؤكسد قوي)، فإنه بدأ الأخذ بالكروم الكلي في المواصفات الخاصة بالمياه.

Source: Earth Sciences and Environment Textbook, 2nd Secondary Grade, Scientific Stream, p. 29.

Toxic chemicals. Many complex chemicals are routinely applied to plants to prevent attack by insects, mites, and pathogens; to kill weeds; or to control growth.

Water quality standards set limits on the concentrations of impurities allowed in water. Standards also affect the selection of raw water sources and the choice of treatment processes.

كيف تتم معالجة المياه العادمة*؟ لتتعرف ذلك، انظر الشكل (٢ - ٧):



الشكل (٢ - ٧): معالجة المياه العادمة.

وهي مرحلة ميكانيكية، يتم فيها التخلص من ٣٠ - ٤٠٪ من الملوثات عن طريق مجموعة من المصافي التي تحجز الأجسام الكبيرة. بعد ذلك تدخل حوض ترسيب حبيبي؛ إذ ترسب الحصى الصغيرة والرمل، ثم تدخل حوض الترسيب الأولي. وقد يضاف بعض المواد الكيميائية للإسراع من عملية الترسيب.

وتدعى مرحلة المعالجة الحيوية. ويتم فيها إدخال الماء، بما فيه من نفايات عضوية، إلى مفاعل بيولوجي وإلى حوض التهوية، الذي يحتوي على بكتيريا هوائية تنتشر في أرجائه جميعها، وتحول المادة العضوية إلى مركبات راسبة تدعى الحمأة (Sludge). ويقال تركيز الأكسجين في ماء الحوض مع تكاثر البكتيريا الهوائية، ويتم إدخال الأكسجين بكميات كافية للمحافظة على تركيز ٣ مغ / لتر من الأكسجين المذاب. بعد ذلك تدفع الحمأة إلى حوض ترسيب ثانوي وترسب فيه. وعند انتهاء هذه المرحلة نكون قد تخلفنا من ٩٠٪ من الملوثات.

* تجدر الإشارة هنا إلى المعالجة الطبيعية، وهي إحدى طرق معالجة المياه العادمة وفيها يترك للعمليات الحيوية والكيميائية القيام بتحليل المواد العضوية المذابة والصلبة وإعادتها إلى النظام البيئي.

Source: Earth Sciences and Environment Textbook, 2nd Secondary Grade, Scientific Stream, p. 31.

Wastewater treatment. There are three levels of wastewater treatment: Primary treatment removes about 30-40% of total suspended solids. Secondary treatment removes about 90% percent of both suspended solids and BOD (Biological Oxygen Demand). When dissolved nitrate and phosphate levels must be reduced, tertiary (advanced) treatment methods are used. Tertiary processes can remove more than 95% of all the impurities from sewage, producing an effluent of almost drinking-water quality.

الجدول (٢-٤) : خصائص مياه سد الملك طلال في الأعوام ١٩٩٠ - ١٩٩٤م

القياسات	حجم المياه (مليون م ^٣)	TSS (مغ / لتر)	BOD (مغ / لتر)	COD (مغ / لتر)	PO ₄ ³⁻ (مغ / لتر)	مجموع النتروجين غير العضوي (مغ / لتر)	السنة
	٥٣	٦٥	٢٧	٩٦	٩,٠	٣٦,١	١٩٩٠
	٨٥	٤٥,٣	٢٢	٧٤	٦,٣	٣٥,٣	١٩٩١
	٢٠٦	٧٢	٢٠	٦٥	٣,٥	٢١,٥	١٩٩٢
	٩٦	٧٠	٤٠	١١٠	٨,٤	٢٥,٦	١٩٩٣
	١٠٠	٤٦,٦	٣٩	١٠٤	٧,٩	٤١,٢	١٩٩٤

يشير الجدول أعلاه إلى صلاحية مياه السد في عام ١٩٩٤ للمزروعات التي تتحمل الملوحة؛ إذ تبلغ القيم العُلْيَا الصالحة للزراعة في المواصفة الأردنية للقيم (COD, BOD, TSS) بالملي غرام / لتر: ٥٠، ٥٠، ١٥٠ على التوالي. أما الـ PO₄³⁻ ومجموع النتروجين غير العضوي فلها تأثير على مياه السد. فهما المادتان اللتان تسببان حدوث ظاهرة الإثراء الغذائي (Eutrofication) الأمر الذي يؤدي إلى استهلاك الأكسجين المتواجد في الماء وتصبح مياه السد مياهاً آسنة لا تصلح للحياة.

تَلَوُّثُ الهَوَاءِ Air Pollution

وهو من أخطر أنواع التلوث في العالم؛ لأنه يؤثر مباشرة في الصحة والمناخ؛ إذ تعزى تغيرات المناخ إلى تراكم ملوثات الهواء، وحدوث استنزاف في طبقة الأوزون، وظهور ظاهرة البيت الزجاجي (الأخضر) Greenhouse effect. وهذه الملوثات لم تكن موجودة أصلاً في الغلاف الجوي. فما ملوثات الهواء؟ وما مصادرها؟

١ - ملوثات الهواء Air Pollutants

تصنف ملوثات الهواء إلى ملوثات أساسية وثانوية.

أ - الملوثات الأساسية

١ . الأكاسيد

إن حرق كل أنواع الوقود الأحفوري، كالفحم الحجري والنفط والغاز الطبيعي، حرقاً كاملاً ينتج ثاني أكسيد الكربون (CO₂)، وبخار الماء، وثاني أكسيد الكبريت (SO₂)، وأكاسيد النتروجين (NO₂ ; N₂O ; NO) (التي يرمز إليها بصفقتها مجموعة NOx)؛ إضافة إلى العناصر الثقيلة التي تكون بحالة غازية أو صلبة دقيقة مثل الزرنيخ (As) والكاديوم (Cd) والرصاص (Pb) والزرنيق (Hg).
وحيث يكون الاحتراق غير كامل - في كثير من الحالات - استناداً إلى أسلوب الاحتراق، ينتج أيضاً أول أكسيد الكربون (CO) ودقائق عالقة من الكربون العنصري والعضوي، وهيدروكربونات عديدة الحلقات (PAH) Polycyclic Aromatic Hydrocarbons.

Source: Earth Sciences and Environment Textbook, 2nd Secondary Grade, Scientific Stream, p. 33.

Air pollution involves the release into the atmosphere of gases, finely divided solids, or finely dispersed liquid aerosols at rates that exceed the capacity of the atmosphere to dissipate them or to dispose of them through incorporation into solid or liquid layers of the biosphere. Electric power plants in Jordan cause air pollution in a clear way due to the emission of Sulfur Oxides, Hydrogen Sulfide, Carbon Dioxide, Carbon Monoxide, and Nitrogen Oxide. (The table shows water characteristics in King Talal Dam in Jordan).

ويدخل الهواء كثيرًا من هذه الملوثات من مصادر أخرى، كالبراكين، وحرائق الغابات، والمياه المعدنية، ودخان المصانع. وفوق ذلك، فإن كثيراً من المواقف المستعملة في البيوت تنتج غازات ملوثة، خاصة في فصل الشتاء، منها مواقد الفحم والحطب؛ كما أن لفافات التبغ وكثرة تدخين السجائر في غرف مغلقة ينتج أكاسيد النتروجين، إضافة إلى المركبات العضوية الملوثة للهواء.

٢ . المركبات العضوية المتطايرة Volatile Organic Compounds

تنتج في عوادم السيارات وحرق الفحم الحجري، مثل: المركبات الهيدروكربونية، كالميثان والبنزين ومركبات عضوية أخرى كالكلوروفورم.

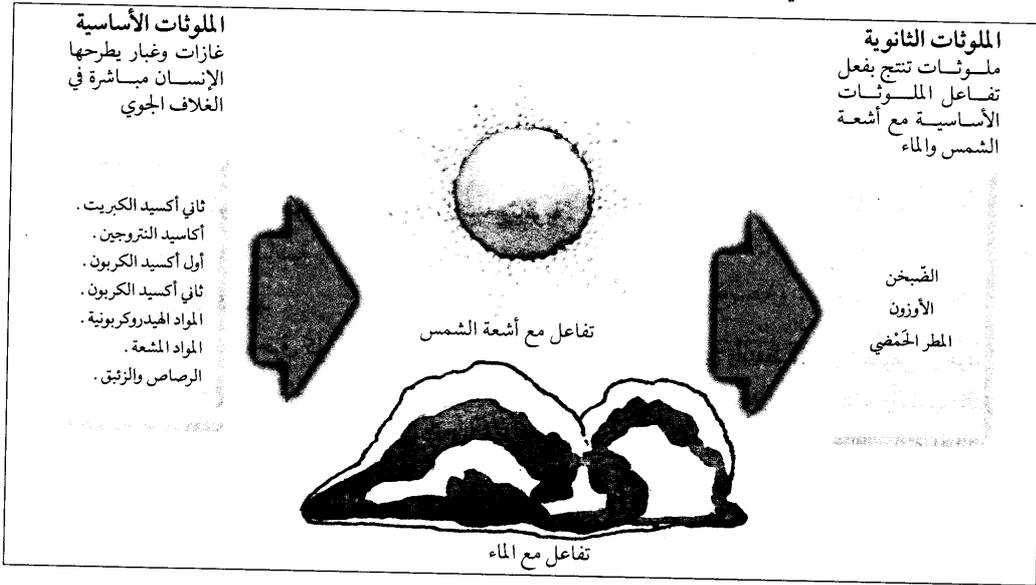
٣ . المركبات العالقة والقطيرات Suspended Particles & Droplets

توجد المواد العالقة في الهواء على شكل مواد صلبة، مثل: الغبار وجراثيم الكائنات الحية المتحوصلة، والرصاص، وأملاح الكبريت وأملاح النترات. أما القطيرات فتتمثل في النفط والمبيدات الحشرية وغيرها.

وترجع خطورتها لكونها ترسب في داخل الجهاز التنفسي. ويعتمد هذا على حجم الجسيمات وطبيعة مكوناتها، وقدرتها على ادمصاص مواد أخرى من الهواء الجوي.

ب - ملوثات الهواء الثانوية Secondary Air Pollutants

يمثل الشكل (٢ - ٨) تفاعل الملوثات الأساسية للهواء مع بعضها بعضاً أو مع ملوثات أخرى، أو مع الماء، أو مع أشعة الشمس، وإنتاج ملوثات جديدة مثل الضبخن (Smog)*، والأوزون، والمطر الحمضي، وتعرف هذه المواد المتكونة نتيجة هذا التفاعل، بالملوثات الثانوية.



الشكل (٢ - ٨) : تكون الملوثات الثانوية.

* هذه الكلمة منحوتة من كلمتين : Smoke (دخان) و Fog (ضباب).

Source: Earth Sciences and Environment Textbook, 2nd Secondary Grade, Scientific Stream, p. 34.

The figure shows the formation of secondary air pollutants, such as smog, fluorocarbons (CFCs), and acid rain. Secondary air pollutants result from the reaction between the primary air pollutants with sunlight, oxygen, or water. The term (smog) is derived from the words smoke and fog.

ويعزى تكون المطر الحمضي إلى وجود أكاسيد الكربون والكبريت والنروجين . وأعلى درجة إشباع لأكاسيد الكربون تعطيه رقماً هيدروجينياً ٦ , ٥ ، وقد تم إثبات ذلك مخبرياً . وتتكوّن أكاسيد النروجين نتيجة اتحاد الأوكسجين مع النروجين بمساعدة البرق والصواعق وفي عملية الاحتراق الداخلي في محركات السيارات . أمّا ثاني أكسيد الكبريت فينتج من البراكين ، ومن المصانع التي تُنتج حمض الكبريتيك أو التي تستعمله في صناعاتها . ويمكن توضيح كيفية تكون المطر الحمضي (الناتج بفعل حمضي النترك والكبريتيك) على النحو الآتي :

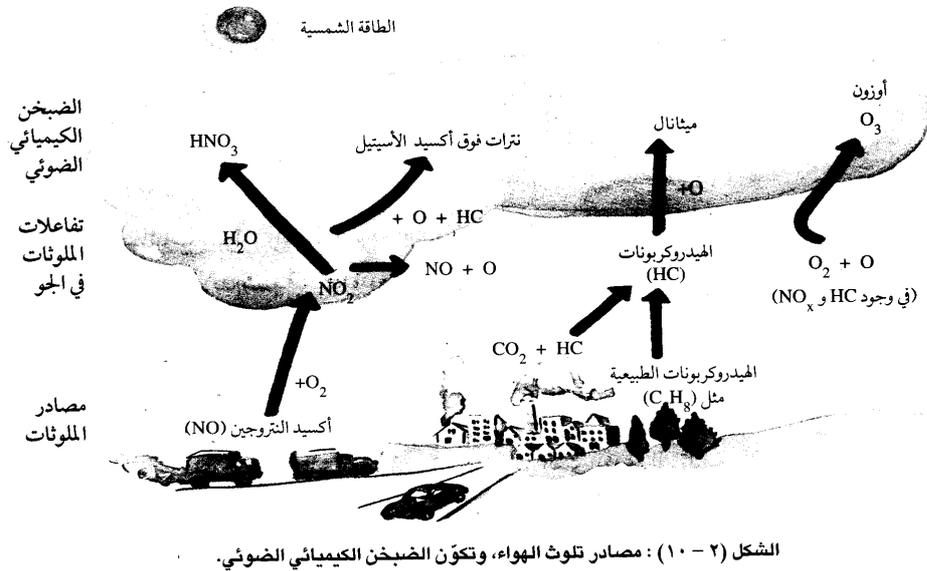


إن سقوط الأمطار الحمضية يغير الخصائص البيولوجية والكيميائية للمياه والتربة خاصة عند وجود نقص في كربونات الكالسيوم؛ كما يؤثر في حياة الأحياء المائية .

ج - تكوين الضبخن Smog

ماذا نتوقع أن يحدث للملوثات الهواء الناتجة من أنشطة الإنسان في المناطق الصناعية المكتظة بالسكان ، في حالة وجود سكون هوائي فيها؟ لا شك أنه سيؤدي إلى تركيز الملوثات على هيئة غيمة تتألف من مجموعة من الغازات والسوائل مع جزيئات صلبة ، وهذه الغيمة هي الضبخن (Smog) الذي أشرنا إليه سابقاً .

ويمكن التمييز بين نوعين من الضبخن حسب الفصل من السنة ، ونوعية الملوثات . النوع الأول يوضّحه الشكل (٢-١٠) ، الذي يبيّن مصادر الملوثات التي تتكون في فصل الصيف ، وهي أكاسيد



Source: Earth Sciences and Environment Textbook, 2nd Secondary Grade, Scientific Stream, p. 37.

The two chemical reactions show the formation of acid rain. The figure describes the formation of photochemical smog.

النتروجين والهيدروكربونات؛ إضافة إلى وجود الأشعة الشمسية، خصوصاً الأشعة فوق البنفسجية التي لديها القدرة على تحرير ذرة الأكسجين من أكاسيد النتروجين، فيؤدي ذلك إلى تكوّن الأوزون (وَفَقُّ المعادلات الواردة السابقة) والـ (PANs) Peroxyacetyl Nitrates. ويسمى هذا النوع الضبخن الكيميائي الضوئي (Photo Chemical Smog)؛ ويطلق عليه أحياناً ضبخن لوس أنجلوس. أما النوع الثاني فيتكوّن في فصل الشتاء نتيجة احتراق النفط أو الفحم في محطات توليد الكهرباء الضخمة، فينتج من ذلك تراكيز عالية من أكاسيد الكبريت والهيدروكربونات، مكوّنة ما يسمى الضبخن الكبريتي (Sulfurous Smog) ويطلق عليه أحياناً الضبخن اللندني.

٤ - مشكلات تلوث الهواء العالمية

لقد خلق الله الأوزون في هذه الطبقة لحماية للإنسان والكائنات الحية عامة، لأنه يمتص أشعة الشمس فوق البنفسجية الضارة؛ لكن سوء تصرف الإنسان أدى إلى استنزاف في طبقة الأوزون خاصة فوق القطب الجنوبي. ويوضح الشكل (٢ - ١١) وجود ثقب (تآكل) في المنتصف. ولدى مراقبته تبين أنه بدأ بالاتساع حتى كاد يصل إلى منطقة الغلاف الجوي الواقعة فوق جنوبي الأرجنتين عام ١٩٩٢.



الشكل (٢ - ١١) : صورة بواسطة القمر الصناعي لتركيز طبقة الأوزون في المناطق المختلفة

لعلك تتساءل: ما الذي أدى إلى استنزاف في طبقة الأوزون؟

توجد أسباب عديدة منها طبيعية مثل البراكين؛ وأخرى من فعل الإنسان نذكر منها: الغاز المسمى الكلوروفلوروكربون، وهو خليط من عددٍ من الغازات $(CF_3Cl, CFCl_3, CF_2Cl_2)$ يستخدم في كيميائيات الرش والردّاذات (Sprays)، وتنظيف الآلات الدقيقة، وصناعة الإسفنج، والصناعات القائمة على التبريد كصناعة التلاجات.

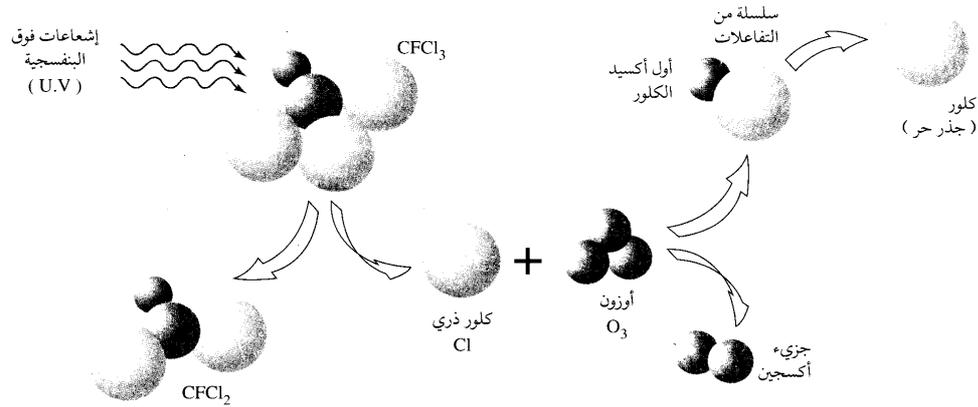
وتصعد هذه الغازات إلى أعلى بفعل تيارات الحمل حتى تصل الستراتوسفير، وتحدث سلسلة من التفاعلات الموضحة في الشكل (٢ - ١٢)؛ الأمر الذي يؤدي إلى تدمير الأوزون واضمحلاله.

* وحدة دوسون: هي وحدة لقياس الغازات في الغلاف الجوي. وتصل معدل كمية الأوزون قرابة ٣٠٠ وحدة، وهي تعادل طبقة سسكها ٣ مم على مستوى سطح البحر

Source: Earth Sciences and Environment Textbook, 2nd Secondary Grade, Scientific Stream, p. 38.

Global environmental issues: a- Ozone layer depletion.

The importance of the stratospheric ozone layer in shielding the Earth's surface from the harmful effects of solar ultraviolet radiation has been recognized for several decades. It was not until the early 1970s, however, that scientists began actually to grapple with the fact that even relatively small decreases in the stratospheric ozone concentration can have a serious impact on human health--an increased incidence of skin cancer, particularly among fair-skinned peoples.



الشكل (٢-١٢): تفاعلات مركبات CFCs مع الأوزون في طبقة الستراتوسفير .



- ادرس الشكل (٢-١٢)، واكتب معادلات استنزاف الأوزون في طبقة الستراتوسفير.
- وضح كيف يمكن الحد من مشكلة الأوزون في هذه الطبقة .

ب - تغير المناخ

مثلما تقوم البيوت الزجاجية (الخضراء) بالسماح لأشعة الشمس بالانسياب إلى الداخل وتحول دون تسرب الحرارة إلى الخارج، فإن غازات الدفيئة (CO_2 ، CH_4 ، N_2O ، O_3 ، CFCs) كلها شفافة نسبياً لأشعة الشمس فتسمح بنفاذها؛ إلا أنها تحتبس الحرارة المنبعثة من سطح الأرض، لأنها أكثر فاعلية في امتصاص الأشعة تحت الحمراء ذات الموجات الأطول. وتسمى هذه الظاهرة ظاهرة البيت الزجاجي.

ونتيجة لاحتراق الوقود الأحفوري فإنه يزيد من تركيز غازات الدفيئة خاصة غاز (CO_2)، في الغلاف الجوي. كذلك تتوقف كمية هذا الغاز في الجو على معدل إزالة الغابات، والتغيرات التي تطرأ على الغطاء النباتي، وعلى معدل استهلاكه عن طريق المصافي الطبيعية (أي النباتات)؛ إضافة إلى عملية ذوبانه في مياه المحيطات التي تقلل من تركيزه في الغلاف الجوي إلى حد ما.

ويؤدي تزايد تراكيز غازات الدفيئة في الغلاف الجوي مع الزمن إلى ارتفاع شامل لدرجة حرارة الغلاف الجوي بكامله. وهذا ما يسمى الاحترار العالمي (Global warming)؛ الأمر الذي يؤدي إلى

تغير الأنظمة المناخية على سطح الأرض. وقد ينتج من ذلك ما يأتي:

- تباطؤ الحياة النباتية والحيوانية، التي قد تجد نفسها في نظام مناخي مختلف قد يكون أكثر أو أقل ملاءمة لها.
- زيادة متوسط الأمطار ورطوبة التربة وتخزين المياه في مناطق، ونقص المياه في مناطق أخرى.
- ارتفاع مستوى سطح البحر بسبب انصهار الجليد في القارئات القطبية.

Source: Earth Sciences and Environment Textbook, 2nd Secondary Grade, Scientific Stream, p. 39.

The figure shows the chemical mechanism of ozone layer depletion by fluorocarbons (CFCs).

Global environmental issues: b- Global Warming

Global Warming is a potential increase in average global atmospheric temperatures resulting from the greenhouse effect.

- ٨ - تشكيل الكثير من الهيئات والمنظمات العالمية التي جندت الكثير من العلماء لعمل برامج للمتغيرات الطبيعية لمصادر البيئة والحياة البرية، والآثار المترتبة على ذلك، وتحديد الأخطار التي تهدد الأماكن الأثرية والسياحية، مثل التلوث الكيميائي للهواء.
- وقد قام الاتحاد الدولي لصون الطبيعة والمصادر الطبيعية (IUCN) بعمل دراسة شاملة لتحديد مشكلة تلوث البيئة وهدر مصادرها الطبيعية، بالتعاون مع منظمات عالمية مثل: اليونسكو ومنظمة الأغذية والزراعة الدولية واليونسف وبرنامج الأمم المتحدة للبيئة (اليونيب).

التوجيهات الإسلامية في حماية البيئة

يعد الإنسان من وجهة النظر الإسلامية حجر الأساس في الرسالات الإلهية؛ قال تعالى: ﴿أَحْسِبْتُمْ أَنَّمَا خَلَقْنَاكُمْ عَبَثًا وَأَنَّكُمْ إِلَيْنَا لَا تُرْجَعُونَ﴾ الآية (١١٥) المؤمنون. كما شرعت الأحكام والتعاليم للمحافظة على نوعه ولبقائه ﴿وَلَكُمْ فِي الْأَرْضِ مُسْتَقَرٌّ وَمَنْعٌ إِلَىٰ حِينٍ﴾ الآية (٣٦) البقرة. ثم هبني له من الظروف الطبيعية والحاجات ما يضمن استمرار بقائه، والقيام بكل أنشطته: ﴿هُوَ الَّذِي خَلَقَ لَكُمْ فِي الْأَرْضِ جَمِيعًا﴾ الآية (٢٩) البقرة.

وينظر الإسلام إلى أن ما في الأرض نعم إلهية يجب على الإنسان أن يحافظ عليها ويستغلها بحكمة ورشاد: ﴿إِنَّا كُلُّ شَيْءٍ خَلَقْنَاهُ بِقَدَرٍ﴾ الآية (٤٩) القمر؛ وفي هذا إشارة إلى التوازن البيئي. كذلك على الإنسان أن يجعل هذه النظم مصدر نعمة، وليس مصدر نقمة؛ فالحاجة إلى التعامل معها على أسس عقلانية أمر يؤكد الإسلام. وثمة أسس وتوجيهات عامة لفهم الفكر الإسلامي، تخص علاقة الإنسان في البيئة؛ أهمها:

١ - عمارة الأرض

خلق الله العالم لكي يعمر: ﴿هُوَ أَنشَأَ لَكُمْ مِنَ الْأَرْضِ وَاسْتَعْمَرَكُمْ فِيهَا﴾ الآية (٦١) هود؛ أي طلب منكم عمارتها. وهذا يعني إحياء الأرض الميتة، واستمرار صيانتها عن طريق غرس الأشجار، والعناية بالتربة. وجاء في رسالة أمير المؤمنين علي بن أبي طالب إلى الأشتر النخعي عندما ولاه مصر: «وليكن نظرك في عمارة الأرض أبلغ من نظرك في استجلاب الخراج... ومن طلب الخراج بغير عمارة أخرج البلاد وأهلك العباد.»

٢ - عدم الإسراف في استهلاك موارد البيئة والتأكيد على حمايتها

دعا الإسلام إلى الاقتصاد في الاستهلاك. ومثال ذلك مرور رسول الله ﷺ بسعد بن أبي وقاص وهو يتوضأ؛ فقال له: «لا تسرف في الماء». فقال سعد: «وهل في الماء إسراف؟» قال: «نعم، وإن كنت على نهر جارٍ» ٤٨/١ زاد المعاد. وذكر الماء في أكثر من ثمانين آية في القرآن الكريم، لأنه أصل الحياة، وعدم تلويثه سواء أكان في الأنهار أم السدود أم البرك أم الأواني أمر مهم. ويعد مجرد الزفير فيه شكل من أشكال التلوث. وقد نهى النبي ﷺ عن الزفير أو النفخ في الإناء الذي يوجد فيه ماء؛ فكيف إذا لوث بمواد أخرى؟

٣ - عدم العبث في عناصر البيئة

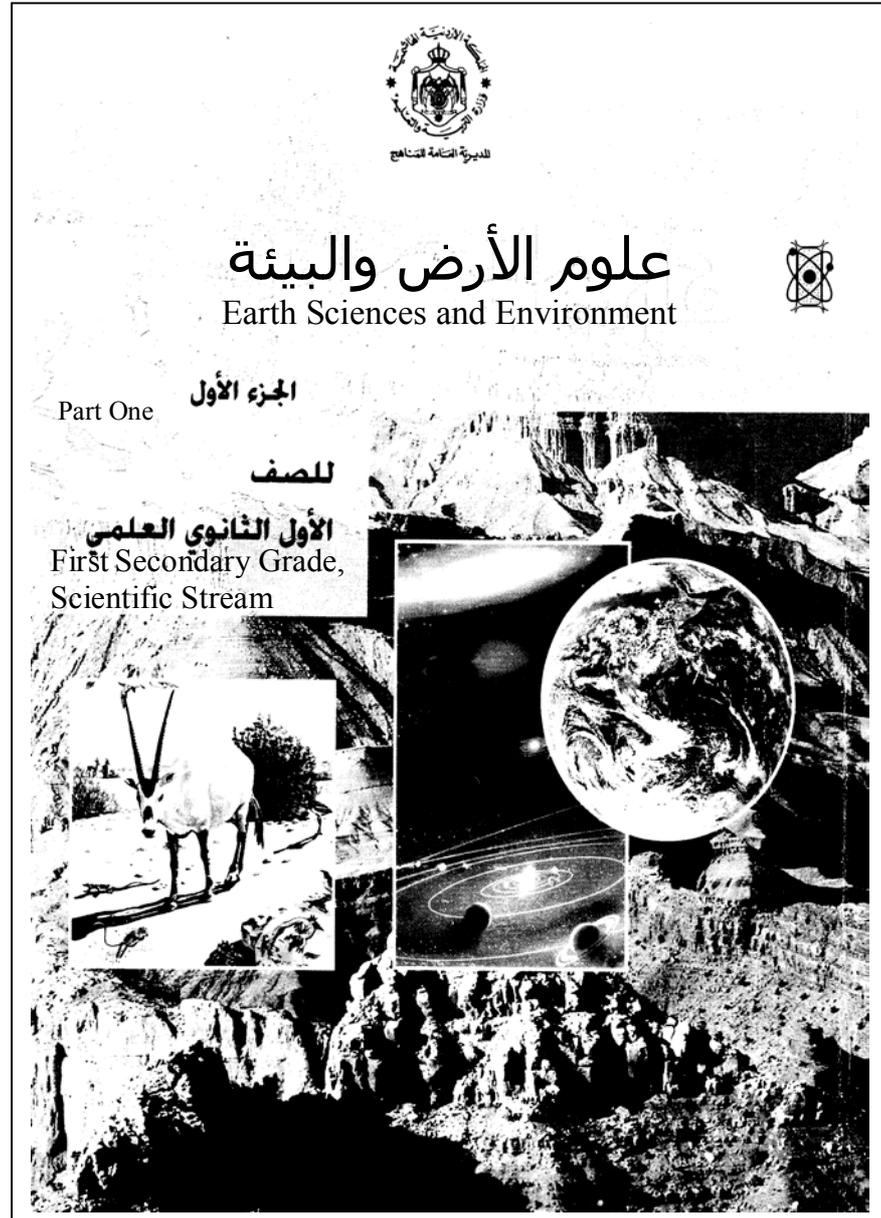
حرّم الإسلام العبث في موارد الثروة وعناصر البيئة، وحرّم التعامل معها بصورة عشوائية طائشة، كقتل الحيوانات عبثاً، وقطع الأشجار وصيد الطيور ﴿وَلَا تُفْسِدُوا فِي الْأَرْضِ بَعْدَ إِصْلَاحِهَا ذَلِكُمْ خَيْرٌ لَّكُمْ إِن كُنتُمْ مُؤْمِنِينَ﴾ الآية (٨٥) الأعراف.

Source: Earth Sciences and Environment Textbook, 2nd Secondary Grade, Scientific Stream, p. 53.

This page shows some of Islamic environmental teachings. The texts between quotations stand for verses from the Holy Quran and sayings of Prophet Mohammed (peace be upon him). The last verse in the page says: "...do no mischief on the earth after it has been set in order: that will be best for you, if ye have Faith" HQ, Al-'Araf, verse 85.

Second: The Textbook of *Earth Sciences and Environment* for First Secondary Grade/ Scientific Stream.

The following is the cover page of the textbook followed by some selected pages.



قال تعالى : ﴿ وَءَاتَيْنَاكُمْ مِنْ كُلِّ مَا سَأَلْتُمُوهُ وَإِنْ تَعُدُّوا نِعْمَتَ اللَّهِ لَا تَحْصُوهَا إِنَّ الْإِنْسَانَ لَذَلُولٌ كَفَّارٌ ﴾

سورة إبراهيم (الآية ٣٤) .

اختار الله الأرض لتكون بيئة الحياة في المجموعة الشمسية على الأقل ، ففيها اليابسة بأشكالها وأنواعها ، والبحار والأنهار والبحيرات ، والنباتات من دنيقة إلى راقية ، وكذا الحيوان ، والجو بما فيه من غازات ، والطاقة الشمسية إذ تصل إلى الأرض بقدر يسمح للحياة باستمرارها . وعلى ذلك فالأرض هي بيئة الحياة التي نعرفها . ولكن الأرض فيها مناطق ومقاطع مختلفة في بنيتها وفي الظروف المحيطة بها من طاقة شمس ، ومن هواء وتربة وماء . ونتيجة هذه الاختلافات تختلف النباتات والحيوانات الموجودة فيها مما يجعل البيئة الأرضية تنقسم إلى بيئات أصغر ، وهذه إلى أصغر . ولكن البيئات الصغيرة ليست مستقلة بل متفاعلة مع عواملها ومع مكوناتها ومتأثرة بجوارها ، وكل هذه العوامل تتفاعل مع بعضها لتنتج اتزاناً بيئياً مرناً .

ويتوقع منك بعد دراستك هذا الفصل أن تكون قادراً على أن :

- ١ - توضح مفهوم البيئة .
- ٢ - تعرف : علم التبيؤ ، والعلوم البيئية وأقسامها .
- ٣ - تتعرف على أغلفة المحيط الحيوي .
- ٤ - تتعرف على خصائص الغلاف المائي .
- ٥ - تتعرف على خصائص الغلاف الصخري .
- ٦ - توضح أهمية الغلافين المائي والجوي للحياة .
- ٧ - تسهم في الحفاظ على البيئة وعلى أترابها كإنسان مسؤول .

ما البيئة ؟ وما علومها ؟

ازداد اهتمام الناس بالبيئة ازدياداً ملحوظاً ، وبخاصة في السنوات الأخيرة . وكلمة بيئة وما يتفرع عنها تتردد في الإذاعة والتلفاز بكثرة . وموضوعات البيئة تعالج بالدراسة والتحليل والقاء الأضواء عليها في الصحف والمجلات والنشرات والكتب ، وبما يُعقد من ندوات ومؤتمرات . ولا شك أن البيئة ومشكلاتها تأخذ حيزاً ومنتسباً في جميع نشاطات الإنسان على سطح هذا الكوكب الذي يشكل

Source: Earth Sciences and Environment Textbook, 1st Secondary Grade, Scientific Stream, 1999 Edition, p. 6.

This is the first page of chapter one in the textbook that is titled *the Environment and the Ecosystems*, which started with a verse from the Holy Quran” “*And He giveth you of all that ye ask for. But if ye count the favors of Allah, never will ye be able to number them. Verily, man is given up to injustice and ingratitude*” (HQ, Ibrahim, verse 34). The box includes the educational objectives of the chapter.

في مجموعه بيئـة فريدة تحتضن الحياة في هذا الكون . وما دام الأمر كذلك ألا يحق لنا التساؤل : ما البيئة ؟ وما علومها ؟ وما النظام البيئي وما خصائصه ؟

تعيش الكائنات الحية ضمن مجموعة من الظروف والعوامل تؤثر فيها وتتأثر بها ، وهذه العوامل منها ما هو طبيعي خلقه الله فأبدع في خلقه ، ومنها ما هو صناعي شيده الإنسان خلال حضاراته المختلفة .

ويُطلق العلماء لفظ «البيئة (Environment)» على مجموع الظروف والمكوّنات والعوامل التي تتفاعل معها الكائنات الحية في حيزٍ معيّن ، وتؤثر في العمليات الحيوية التي تقوم بها .

وأما «علم التبيؤ (Ecology)» ؛ فإنه يعتبر فرعاً من فروع علم الحياة يُعنى بدراسة النباتات والحيوانات والإنسان ، وما يجري من علاقات وتفاعل بين هذه الكائنات الحية وبين بيئاتها .

ومن فروع هذا العلم نذكر منها :

١ - علم التبيؤ النباتي Plant Ecology .

٢ - علم التبيؤ الحيواني Animal Ecology .

٣ - علم تبيؤ الكائنات الدقيقة Microbial Ecology .

٤ - علم التبيؤ الإنساني Human Ecology .

إن تفاعل الإنسان المستمر ونشاطاته في المجالات المختلفة : الزراعية والصناعية والتجارية والسياحية أدى إلى ضرورة وجود نظرة متكاملة وشاملة تعالج موضوع الإنسان والبيئة . فظهرت : العلوم البيئية Environmental Sciences .

العلوم البيئية : هي التي تُعنى بالدراسات التي تمثل نتاج تكامل العلوم الإنسانية والطبيعية والاقتصادية المرتبطة ببيئة الإنسان . وتوضح أهميتها من حيث أنها تعتبر الإنسان ونشاطاته المختلفة وتأثره بالبيئة وتأثيره فيها ، محور دراساتها ومجال اهتماماتها .

علم التبيؤ : استخدمت الكلمة Ecology لأول مرة من قِبَل العالم الألماني آرنست هاكل عام ١٨٦٩ . وهي مشتقة من الكلمة اليونانية Oikos وتعني البيت ، والكلمة Logos وتعني الفهم أو العلم ، وتعني حالياً : دراسة مجمل العلاقات بين الكائنات الحية من جهة وبيئتها من جهة أخرى .

سؤال

إذا علمت أن مقطع كلمة Nomics يعني "حسابات" فما معنى Economics ؟

نشاط ١ - ١

بحث مكتبي

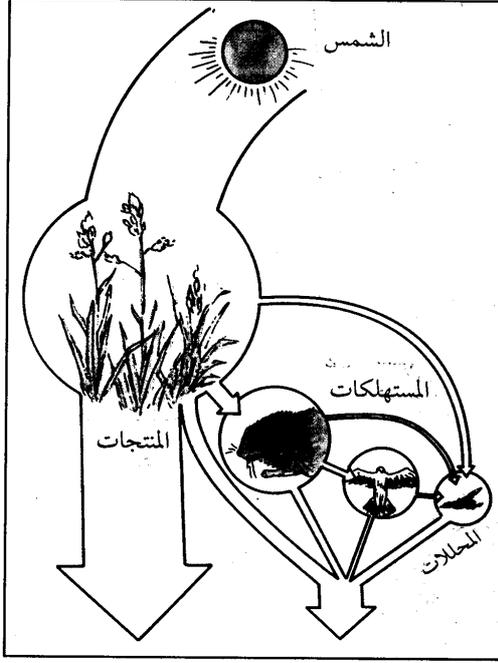
١ - يرتب المعلم زيارة طلاب فصله إلى بعض الجهات التي تهتم بالبيئة في الأردن ، للتعرف على أهم نشاطاتها البيئية ويطلب منهم بعد ذلك كتابة تقارير بيئية .

٢ - بالاستعانة بمكتبة مدرستك - أو المكتبة العامة - سجّل قائمة بأسماء الكتب والمجلات والنشرات البيئية . اذكر أهم موضوعاتها .

Source: Earth Sciences and Environment Textbook, 1st Secondary Grade, Scientific Stream, p. 7.

This page explains the definitions of the terms: *Earth Sciences* and *Environment*, in addition to the branches of environmental sciences. Earth Sciences is a multidisciplinary science. It involves plant and animal biology, taxonomy, physiology, genetics, behavior, geology, anthropology, physics, and chemistry. In understanding the interactions between the organism and the environment or between organisms, it is often difficult to separate behavior from population dynamics, behavior from physiology, adaptation from evolution and genetics, animal Earth Sciences from plant Earth Sciences.

انظر إلى الشكل (١-٢). ماذا يُمثل؟ ما أهمية الشمس للنباتات؟ وما أهمية الغازات والماء والتربة للكائنات الحية؟ هل رأيت حوض سمك؟ ما مكوناته الحية؟ وما مكوناته غير الحية؟ ما العلاقات التي تربط المكونات الحية فيه بالمكونات غير الحية؟



الشكل (١ - ٢) : نظام بيئي

بالمكونات غير الحية؟ يمثل الشكل (١ - ٢) نظاماً بيئياً يضم كائنات حية متنوعة؛ النباتات فيه تقوم بصنع غذائها في عملية البناء الضوئي.

ماذا تحتاج النباتات الخضراء حتى تقوم بهذه العملية؟ وما أهمية الطاقة الشمسية لذلك؟ إن النظام الذي يوضحه الشكل، والنظام الذي يمثله حوض السمك يسمى كل منهما نظاماً بيئياً (Ecosystem).

والنظام البيئي (مصطلح حديث وهو عبارة عن وحدة طبيعية تتألف من مكونات حية وأخرى غير حية تتفاعل بعضها مع بعضها الآخر، وتتبادل فيه المكونات الحية وغير الحية العلاقات تائراً وتأثيراً وفق نظام متوازن توازناً دينامياً مرناً، لتستمر في أداء دورها في استمرارية الحياة).

إن الأنظمة البيئية تحتوي على عناصر ومواد، أي أن المادة هي المكون الأساسي للأنظمة البيئية وتدخل في تركيب مكوناتها الحية وغير الحية، وبالتالي يمكننا القول إن النظام البيئي يخضع للقوانين الأساسية في علوم الفيزياء والكيمياء وبخاصة قوانين حفظ المادة والطاقة.

يُعد النظام البيئي أحد مستويات الحياة كما يوضحه التسلسل الآتي:

خلية ← نسيج ← عضو ← جهاز ← فرد أو كائن
نظام بيئي ← مجتمع ← نوع ← جماعة

لاحظ في هذا المخطط أن النظام البيئي ينتج عن تفاعل المجتمع مع العوامل غير الحية في الوسط الذي يحيط به. لاحظ أيضاً المنطقة (ذات اللون الأزرق) تتبع مجال علم البيئة، في حين تمثل الأخرى مجال فروع علم الحياة.

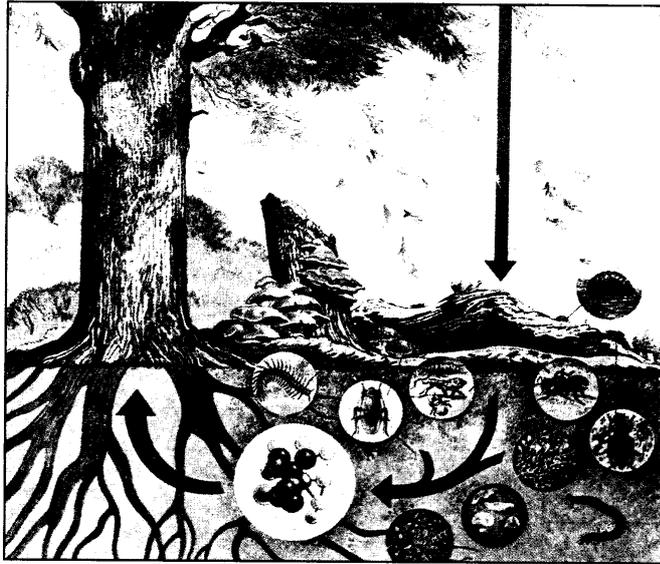
سؤال

استعن في الشكل السابق (١-٢) وأجب عما يلي:
ما أهمية الشمس للنباتات؟ وما أهمية المواد المعدنية للنباتات؟ اذكر المكونات الحية، والمكونات غير الحية.

This page explains the concept of *Ecosystem*. Resources that contain a combination of interacting living and nonliving components are called ecosystems. It is impossible to separate an ecosystem into its living and nonliving components, because the whole constitutes a dynamic system in which there is a flow of energy from sunlight, gases from the atmosphere, and minerals and water from the soil.

١- المكونات الحية

- أ - المنتجات **Producers** : ومثال عليها النباتات الخضراء على اليابسة وفي الماء والطحالب والهائمات النباتية Phytoplanktons في البحار والمحيطات والتجمعات المائية الأخرى . وتعمل المنتجات على استغلال الطاقة الشمسية في عملية البناء الضوئي لصنع الغذاء . ولذا يطلق عليها اسم ذاتية التغذية Autotrophic .
- ب - المستهلكات **Consumers** : وتشمل الحيوانات والإنسان ، وسميت كذلك لأنها لا تستطيع أن تصنع غذاءها بنفسها من المواد غير العضوية كما تفعل النباتات الخضراء ، ويمكن تقسيمها إلى :



- ١ . آكلة الأعشاب أو المستهلكات الأولى
Primary Consumers .
- ٢ . آكلة اللحوم أو المستهلكات الثانية
Secondary Consumers .
- ٣ . الطفيليات Parasites : وهي التي تتطفل على كائنات أخرى بأن تأخذ منها الغذاء وتسبب لها أضراراً مختلفة. هل تذكر أمثلة عليها ؟

الشكل (٢ - ٢) : المحللات .

- ٤ . الحيوانات الكانسة Scavengers : وهي التي تأكل رمم الحيوانات والنباتات ومن أمثلتها بعض الحشرات والديدان المختلفة والكلاب والضباع، وبعض الطيور الجارحة .

ج - المحللات **Decomposers** : وهي - في الغالب - كائنات حية دقيقة كالبيكتيريا ، والفطريات . انظر الشكل (٢-٢) . تقوم المحللات بتحليل المواد العضوية الموجودة في الفضلات وفي بقايا الكائنات الميتة ، وذلك حتى تتمكن من الحصول على الطاقة اللازمة لها . وهي بهذا تعمل على تدوير هذه المواد وتحويلها إلى مواد أبسط ضمن النظام البيئي ، أي تحوّل المواد العضوية إلى مواد غير عضوية يستخدمها النبات الأخضر لبناء المواد الغذائية من جديد . وهي بذلك تحافظ على نسبة العناصر المعدنية في البيئة . كما أنها تزيل الجثث والرمم من سطح الأرض ، ولولا ذلك لتراكمت هذه الجثث والرمم ، ولوصل ارتفاعها إلى عشرات الأمتار على الأقل . فكيف يمكن للحياة أن تستمر في وضع كهذا ؟

Source: Earth Sciences and Environment Textbook, 1st Secondary Grade, Scientific Stream, 1999 Edition, p. 12.

Ecosystems function by maintaining a flow of energy and a cycling of materials through a series of steps of eating and being eaten, of utilization and conversion, called the food chain. Ecosystems tend toward maturity, or stability, and in doing so they pass from a less complex to a more complex state. The producer level composed of those organisms that make their own food. The final link in all food chains is made up of decomposers, those heterotrophs that break down dead organisms and organic wastes.

٢ - العلاقات الغذائية في النظام البيئي

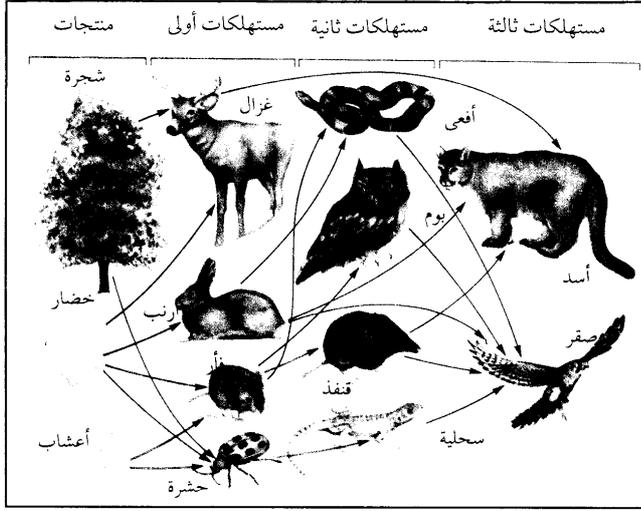
انظر إلى الشكل (٢ - ٣) وتتبع ما يلي

أ - ماذا يأكل الفأر؟ وماذا يأكل الأرنب؟ وماذا يأكل الغزال؟ ماذا نسمي هذه الكائنات الحية؟

ب - ماذا تأكل الأفاعي وطيور البوم والسحالي؟ ماذا نسمي هذه الكائنات الحية؟

ج - ماذا يأكل كل من الأسد والصقر؟ ماذا نسمي هذه الكائنات الحية؟

د - عند موت أي من هذه ماذا يحدث للحيطة؟



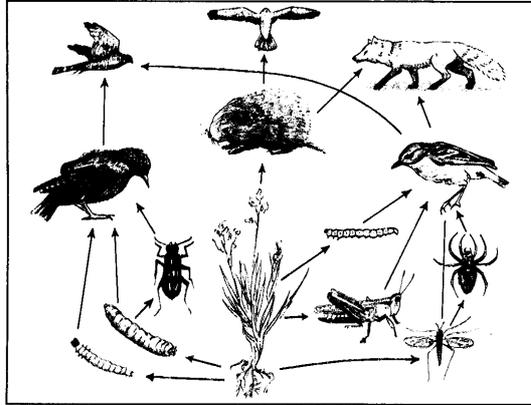
الشكل (٢ - ٣) : شبكة غذائية .

إن العلاقات التي تربط هذه الكائنات الحية بعضها ببعض داخل نظام بيئي، تدعى بالسلاسل الغذائية (Food Chains). والملاحظ أن كل سلسلة غذائية تتألف من : نباتات خضراء (منتجات) وحيوانات مستهلكة . وتلاحظ أيضاً أن لكل سلسلة غذائية تركيباً وتنظيماً معيناً ، فلا يستطيع طائر البوم، مثلاً، أن يقصّر من طول السلسلة ويتغذى على الأعشاب ، ولا يستطيع الصقر كذلك أن يقصّر من السلسلة ويتغذى على أوراق الأشجار .

دراسة شبكة غذائية

انظر الشكل ، إنه يمثل شبكة غذائية .

- تتبع السلاسل الغذائية فيه .
- اذكر أسماء : المنتجات ، والمستهلكات الأولى ، والمستهلكات الثانية والمستهلكات الثالثة فيه .



رسم يوضح شبكة غذائية

Source: Earth Sciences and Environment Textbook, 1st Secondary Grade, Scientific Stream, 1999 Edition, p. 13.

The movement of organic matter and energy from the producer level through various consumer levels makes up a food chain. For example, a typical food chain in grassland might be grass (producer) mouse (primary consumer) snake (secondary consumer) hawk (tertiary consumer). Actually, in many cases the food chains of the ecosystem overlap and interconnect, forming what ecologists call a food web.

Appendix XII

EE in Jordanian School Curriculum: Module within a Subject Approach

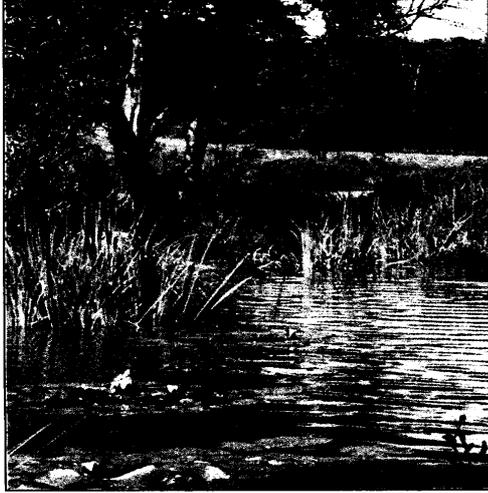
Example 1: A unit from Biology Textbook for ninth grade. The title of the unit is *the Environment and the Ecosystems*. The following is some selected pages.

البيئة والتكيف

ثانياً النظام البيئي Ecosystem

يقتصر وجود أشكال الحياة المختلفة في الأرض على الغلاف الحيوي biosphere، ويشمل التربة إلى عمق أمتار عدة، والبحار والمحيطات والمياه العذبة والغلاف الجوي. فلو تصوّرنا أن الكرة الأرضية أصبحت بحجم تفاحة فإن الغلاف الحيوي لن يزيد سمكه عن قشرتها الرقيقة، وبالرغم من ذلك فإن هذا الغلاف الحيوي يشكل بيئة معقدة ومتنوعة إلى درجة تصعب معها دراسته وحدة واحدة. ولتسهيل دراسته يُقسّم إلى وحدات صغيرة تسمى النظم البيئية، فما المقصود بالنظام البيئي؟

لعلك زرت غابات دبين في الأردن، فما نوع الكائنات الحية الأكثر انتشاراً فيها؟ هل تختلف هذه المنطقة عن المنطقة الصحراوية المبيّنة في الشكل (٤-١)؟ هل تختلف الكائنات الحية والعوامل الطبيعية في بحيرة عنها في الغابة أو الصحراء؟



نظام بيئي مائي



صحراء



غابة

الشكل (٤ - ١) : أنظمة بيئية مختلفة.

Source: Biology Textbook, ninth grade, p. 135.

This page explains the definition of the term ecosystem and the pictures show different types of ecosystems. All ecosystems are contained within the largest of them, the ecosphere, which encompasses the entire physical Earth (geosphere) and all of its biological components (biosphere).

البيئة والتكيف

يظهرُ لك أنَّ الغابةَ والبحيرةَ والصحراءَ هي وحداتٌ طبيعيةٌ، تختلفُ عن بعضها بعضاً من حيثُ العواملُ الطبيعيةُ والكائناتُ الحيَّةُ التي تعيشُ فيها.

وتُعرفُ كلُّ من الغابةِ، والبحيرةِ، والصحراءِ بالنظامِ البيئيِّ، وهو مجموعةُ الظروفِ الطبيعيةِ في منطقةٍ معيَّنةٍ بها في ذلك الكائناتُ الحيَّةُ جميعها التي تعيشُ فيها. وقد يكونُ النظامُ البيئيُّ كبيراً جداً كالمحيط، أو صغيراً كجذعٍ متعقنٍ لشجرةٍ في أرضِ الغابةِ. اذكرُ أمثلةً أخرى على الأنظمةِ البيئيةِ.

وتُقسَمُ مكوّناتُ النظامِ البيئيِّ إلى مجموعتينِ:

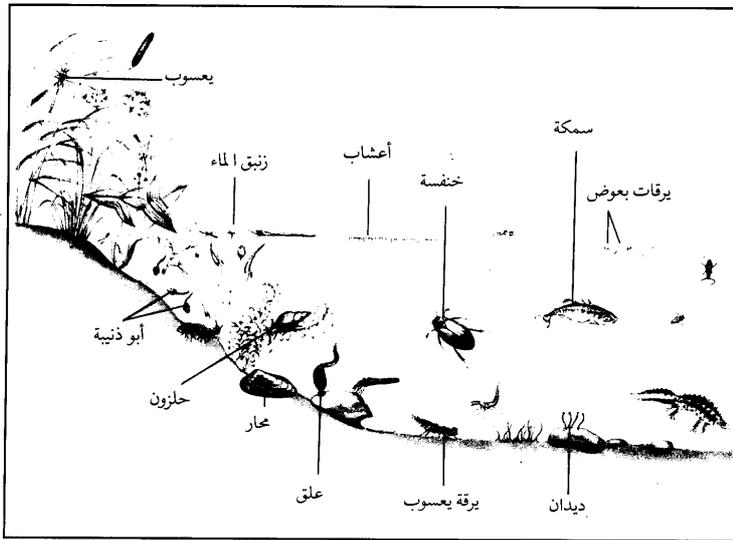
١ - مكوّناتُ غيرِ حيَّةٍ (العواملُ الطبيعية)

وهي مجموعةُ العواملِ غيرِ الحيَّةِ التي تؤثرُ في حياةِ الكائناتِ الحيَّةِ، وتحدّدُ نوعيتها وأماكنَ وجودها، كما تحدّدُ نوعيةَ العلاقاتِ بين هذه الكائناتِ الحيَّةِ. وتقسَمُ العواملُ الطبيعيةُ إلى ثلاثةِ أنواعٍ:

- أ - العواملُ الجويَّةُ: ومنها الضوءُ والحرارةُ والرطوبةُ والرياحُ والضغطُ والغازاتُ.
- ب - عواملُ التربة: وتشملُ سُمكَ التربةِ وتركيبها وموقعها ونسبةَ الرطوبةِ فيها، والموادِّ العضويَّةِ وغيرِ العضويَّةِ، ودرجةَ حرارتها، وتمهيتها.
- ج - العواملُ المائيَّةُ: وتشملُ مدى وفرةِ الماءِ، ونسبةَ ملوحتهِ، ومقدارَ رُقمه الهيدروجينيِّ، ودرجةَ حرارتهِ.

٢ - مكوّناتُ حيَّةٍ (العواملُ الحيويَّة)

وهي أنواعُ الكائناتِ الحيَّةِ جميعها في النظامِ البيئيِّ. ويشملُ ذلك أنواعاً مختلفةً من الحيواناتِ والنباتاتِ



والفطريات والكائناتِ الـدقيقةِ والإنسان. ويُطلَقُ على مجموعةِ الكائناتِ الحيَّةِ التي تعيشُ في نظامِ بيئيِّ معيَّنٍ مثلَ البحيرةِ وترتبطُ فيما بينها بعلاقاتٍ غذائيةٍ متبادلةٍ اسمُ المجتمعِ الحيويِّ community، لاحظ (الشكل (٤ - ٢).

الشكل (٤ - ٢): بحيرة كنظام بيئي.

Source: Biology Textbook, ninth grade, p. 136.

The principles underlying the study of ecosystems are based on the view that all the elements of a life-supporting environment of any size, whether natural or man-made, are parts of an integral network in which each element interacts directly or indirectly with all others and affects the function of the whole. The picture shows an example of ecosystems (lake).

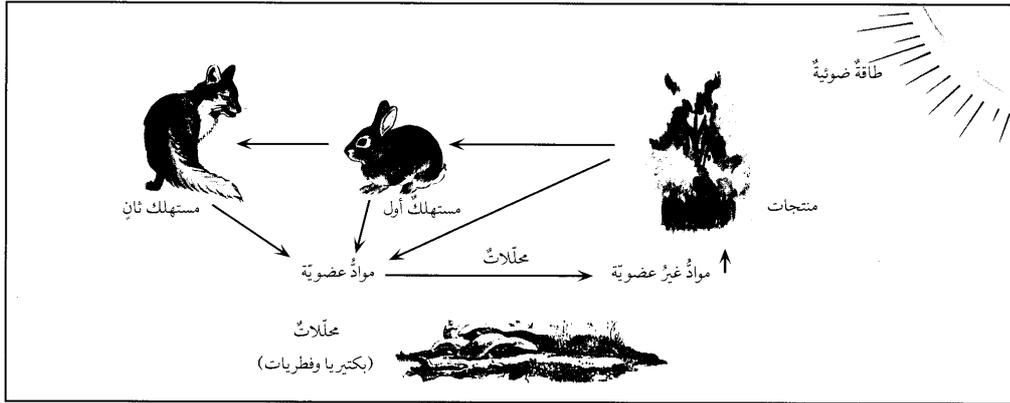
٤ - بيّن فرقا واحداً بين كل مما يأتي :

- أ - التعايش والتقايض .
- ب - التطفل والتقايض .
- ج - التجمّع والتنافس .
- د - الافتراس والتطفل .

خامساً السلاسل الغذائية والشبكات الغذائية

عرفت أنّ الكائنات الحية تقسم إلى ذاتية التغذية مثل النباتات والطحالب، وغير ذاتية التغذية مثل الحيوانات وباقي الكائنات الحية التي تعتمد في تغذيتها بصورة مباشرة أو غير مباشرة على غيرها. وتسمى النباتات والطحالب منتجات producers، في حين تسمى الحيوانات وباقي الكائنات الحية التي تستهلك الغذاء ولا تنتجها مستهلكات consumers.

انظر إلى الشكل (٤ - ٩)، تلاحظ فيه أنّ الطاقة الضوئية (الشمسية) تتحول إلى طاقة كيميائية تخزن في مركبات عضوية في النباتات. هذه الطاقة تنتقل من النباتات (المنتجات) إلى الحيوانات (المستهلكات) عندما تتغذى الأخيرة بالنباتات.



الشكل (٤ - ٩) : مسار الغذاء والطاقة في نظام بيئي.

وتحافظ هذه العلاقة الغذائية المنظمة على الاتزان الطبيعي بين الكائنات الحية المنتجة والمستهلكة والمحللة decomposers، وتكون العلاقات الغذائية بين هذه الكائنات الحية على شكل سلاسل غذائية و شبكات غذائية. ويظهر من خلال مسار الغذاء والطاقة في الشكل السابق أنّ الكائنات الحية ترتبط بعلاقات غذائية تنتقل فيها الطاقة المختزنة من كائن حي إلى آخر؛ ويحدث ذلك في أي نظام بيئي مائي أو باس.

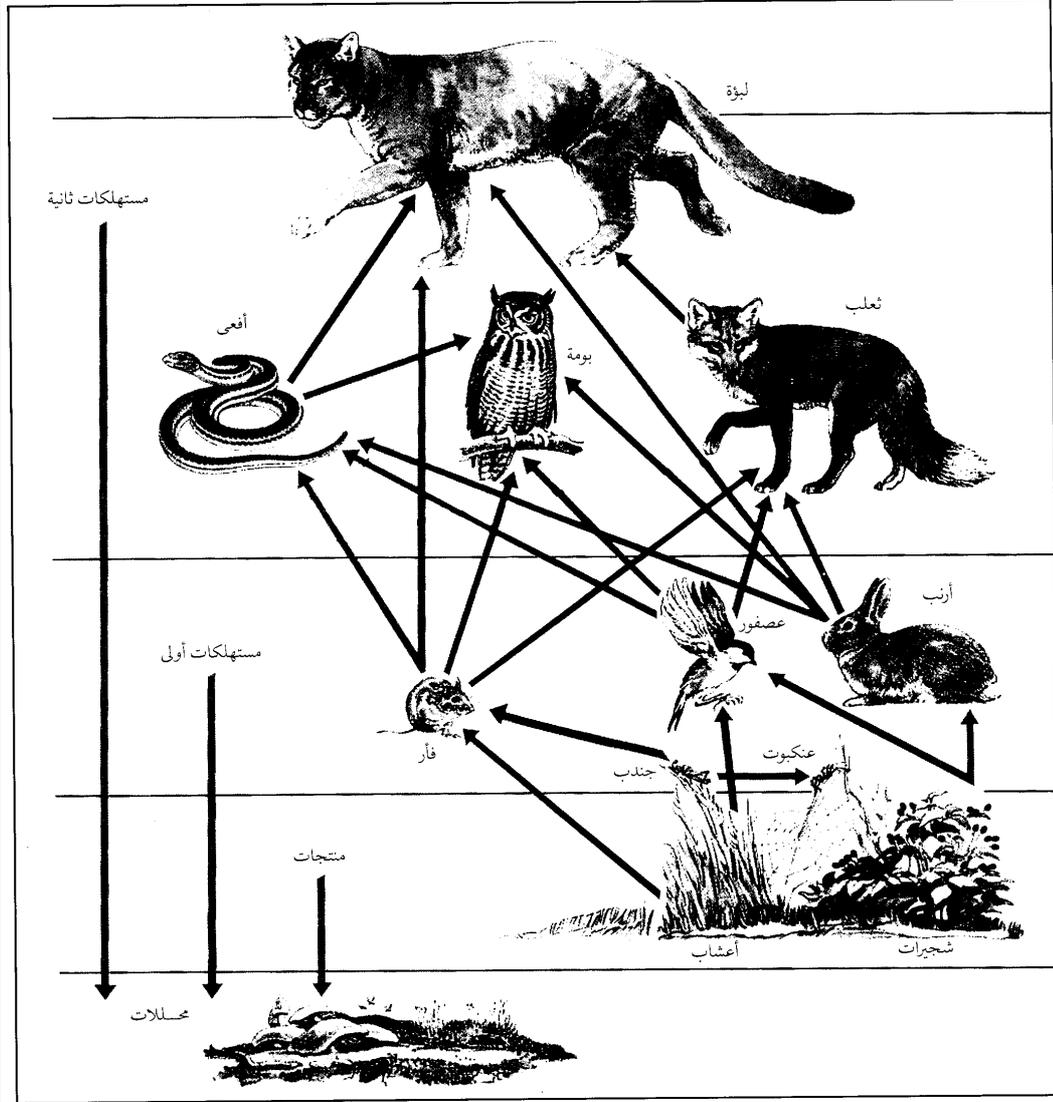
Source: Biology Textbook, ninth grade, p.143.

Food chains and food webs.

Because all species are specialized in their diets, each trophic pyramid is made up of a series of interconnected feeding relationships called food chains. Most food chains consist of three or four trophic levels. A typical sequence may be plant, herbivore, carnivore, top carnivore; another sequence is plant, herbivore, parasite of the herbivore, and parasite of the parasite.

البيئة والتكيف

فهذا التداخل بين السلاسل الغذائية يؤدي إلى شبكات غذائية، كما في الشكل (٤ - ١٠).



الشكل (٤ - ١٠) : شبكة غذائية في نظام بيئي.

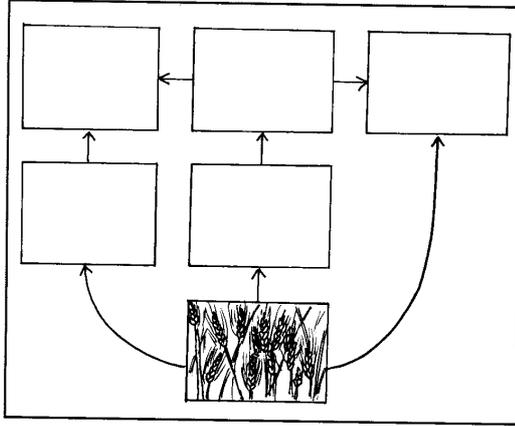
Source: Biology Textbook, ninth grade, p.145.

Food chains combine into highly complex food webs. Even a simplified food web can show a complicated network of trophic relationships.

البيئة والتكيف

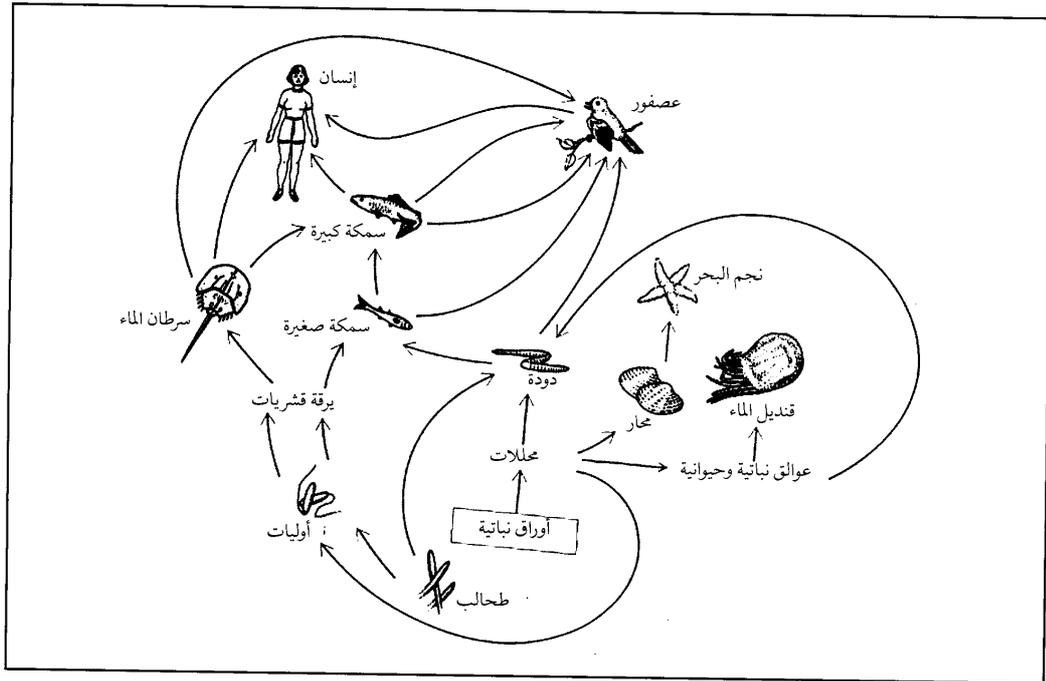
وللتدرُّبِ على تخطيط شبكاتٍ غذائيةٍ، قُمُ بالنشاطِ الآتي:

النشاط (٤ - ٣)



- الشبكات الغذائية
- انقل الرسم الآتي، الذي يمثل رسماً تخطيطياً لشبكة غذائية، إلى دفترِكَ. ضع اسم كلِّ كائنٍ من الكائناتِ الحيَّةِ الآتيةِ في الفراغِ المناسبِ بحيثُ تشكُّلُ شبكةً غذائيةً. إنسان، جندب، ثعلب، دجاجة، فأر.

انظرُ إلى الشكل (٤ - ١١) وتعرَّفِ الشبكةَ الغذائيةَ في البيئةِ المائيةِ.



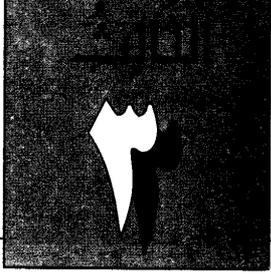
الشكل (٤ - ١١) : شبكة غذائية في بيئة مائية.

Source: Biology Textbook, ninth grade, p.146.

Generalized aquatic food web.

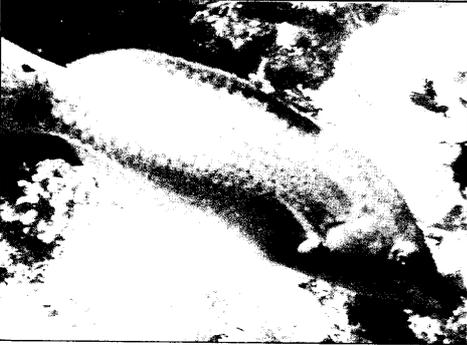
Example 2: A unit from Social Sciences Textbook for fifth grade. The title of the unit is *Environmental Concepts*. The following is some selected pages.

مفاهيم بيئية



الدرس الأول

البيئة



- بيئة بحريّة وتشمل عدداً من العناصر؛ كالماء والأفلاج والأسماك والأحياء البحريّة ...
- هل عناصر البيئة البحريّة هي عناصر بيئة اليابسة نفسها؟

الشكل (3-13) : صورة بيئة بحريّة .



- عناصر هذه البيئة : الإنسان، الثبات ، الحيوان ، ...
ما البيئة ؟ اقرأ الملخص الآتي :

الشكل (3-12) : صورة أعتام في مزعى .

البيئة : مجموعة الظروف والعوامل الخارجيّة التي تعيش فيها الكائنات الحيّة ، وتؤثر في العمليات المختلفة التي تقوم بها هذه الكائنات .

Source: Social Sciences Textbook, fifth grade, p.81.

This page explains the concept of the environment and its elements.



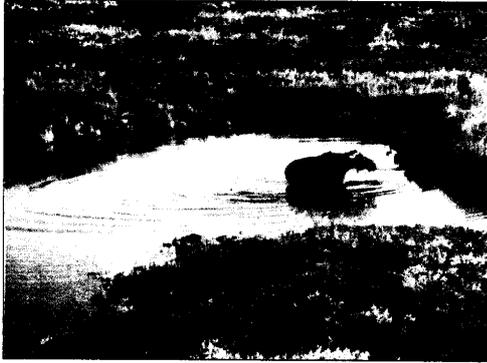
البيئة الاجتماعية : هي إطار من العلاقات يُحدّد استمرار الجماعة (الإنسان) ، ويُعدّ هذا الإطار أساساً لتنظيمها ، سواء بين أفرادها أم بين جماعات متباينة .



تحدّد البيئة الطبيعية بعدد هائل من المظاهر التي لا دخل للإنسان في وجودها أو استحداثها ، ومنها : الغابات والصّحراء والجبال والبراكين والبحار والمحيطات ... وتشمل أيضاً : المناخ والنبات والحيوان وغير ذلك . هل تختلف النباتات الطبيعية من منطقة إلى أخرى ؟ ما أثر ذلك في الإنسان ؟

الشكل (٣-١٥) : مجموعة من الناس .

الشكل (٣-١٤) : منظر طبيعي من البيئة .



الشكل (٣-١٦) : صورة الماء في الطبيعة .

- ممّ تتكوّن السحابة ؟ ماذا يتساقط من السحب عادة ؟
- أين تذهب مياه الأمطار ؟ وهل تبدأ دورتها من جديد ؟
- هل هناك دورات أخرى لمواد أخرى في هذه الطبيعة ؟
- لكل من الهواء والإنسان والحيوان والنبات دورة في هذه الحياة .

تختلف البيئة الطبيعية من منطقة إلى أخرى تبعاً للعناصر التي تتكوّن منها وخصائص هذه العناصر ؛ فالبيئة الجبلية تختلف عن البيئة السهلية ، والبيئة الحارة تختلف عن البيئة الباردة أو المعتدلة ، ويُؤدّي اختلاف البيئات الطبيعية إلى اختلاف تأثيرها في الإنسان وأعماله التي يقوم بها في كل منها ؛ فالأشكيمو

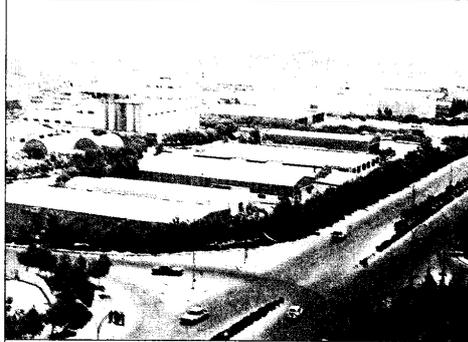
Source: Social Sciences Textbook, fifth grade, p.82.

Types of the environments.

The first picture on the top right represents a natural environment, the second picture on the top left stands for the social environment, and the picture on the bottom shows the aquatic environment.

دور الإنسان في المحافظة على التوازن البيئي

انظروا إلى الأشكال الآتية ، ثم أجب عن الأسئلة التي تتضمنها :



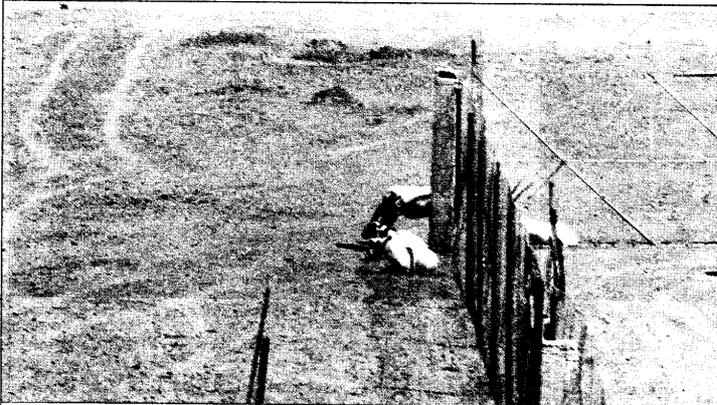
تقع المدن الصناعية عادةً خارج المدن والأحياء السكنية .
- هل هناك فوائد لذلك ؟

الشكل (٣-١٨) .



أطفال يغرثون الأشجار في يوم الشجرة ووصولاً إلى أزدن أخضر .
- لماذا نسعى إلى أزدن أخضر عام ٢٠٠٠ م ؟

الشكل (٣-١٧) .



محمية الشومري التي أنشأتها الجمعية الملكية لحماية الطبيعة في منطقة الأزرق .
- ما الفائدة من إنشاء مثل هذه المحميات في المملكة ؟

الشكل (٣-١٩) .

- ما دور الإنسان في المحافظة على التوازن البيئي ؟

Source: Social Sciences Textbook, fifth grade, p.85.

The role of Man in the environmental equilbration.

The first picture on the top right shows children watering plants, the picture on the top left represents an industrial city, and the picture on the bottom is a site in Shaumari wildlife Reserve in Azraq.

حتى تَسْتَطِيعَ الإِجَابَةَ عَنِ السُّؤَالِ السَّابِقِ دَعْنَا نَعْرِفُ التَّوَازْنَ البيئي :

يُمْكِنُ تَعْرِيفُ التَّوَازَنِ البيئي بِأَنَّهُ بَقَاءُ عَنَاصِرِ الطَّبِيعَةِ فِي حَالَةٍ اتِّسَاقٍ وَانْسِجَامٍ لِتَوَدِّي وَظَائِفِهَا عَلَى أَكْمَلِ وَجْهِ . وَنَسْتَطِيعُ المَحَافَظَةَ عَلَى التَّوَازَنِ البيئي فِي الأَرْدُنِّ عَنِ طَرِيقِ عَدَدٍ مِنَ الأَعْمَالِ وَالأُنْشِيطَةِ مِنْهَا :

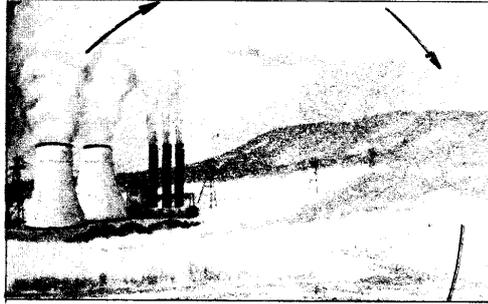
١ - غَرْسُ الأشْجَارِ لَمَّا لِلشَّجَرَةِ مِنْ فَوَائِدَ عَدِيدَةٍ عَلَى البيئَةِ ؛ كَتَنْقِيَةِ الهَوَاءِ بِامْتِصَاصِ غَازِ ثَانِي أُكْسِيدِ الكَرْبُونِ الَّذِي تَنْفُثُهُ المَصَانِعُ وَعَوَادِمُ السِّيَّارَاتِ ، وَإِعْطَاءِ الأَكْسِجِنِ بَدَلًا مِنْهُ ، فِيمَا يُعْرَفُ بِعَمَلِيَّةِ البِنَاءِ الصُّوئيِّ فِي النَبَاتَاتِ .

٢ - إِنْشَاءُ المَصَانِعِ بَعِيدًا عَنِ الأَحْيَاءِ السَّكِنِيَّةِ ؛ لِوَقَايَةِ النَّاسِ مِمَّا تَنْفُثُهُ هَذِهِ المَصَانِعُ مِنْ غَازَاتٍ سَامَّةٍ ، وَمَا قَدْ تَطَرَّحَهُ مِنْ فَضْلَاتٍ فِي البيئَةِ المَحِيظَةِ .

٣ - العَمَلُ عَلَى إِنْشَاءِ المَحَمِيَّاتِ لِلْمَحَافَظَةِ عَلَى الثَّرْوَةِ الحَيَوَانِيَّةِ أَوْ النَبَاتِيَّةِ المَهْدَدَةِ بِالانْتِقَاصِ ؛ كَمَحَمِيَّةِ الشُّومَرِيِّ لِلْمَحَافَظَةِ عَلَى الأَحْيَاءِ البرِّيَّةِ فِي مَنطِقَةِ الأَزْرَقِ ، وَمَحَمِيَّةِ الأَحْيَاءِ البَحْرِيَّةِ فِي العَقْبَةِ لِلْمَحَافَظَةِ عَلَى ثَرَوَاتِ البَحْرِ الأَحْمَرِ المَخْتَلِفَةِ .

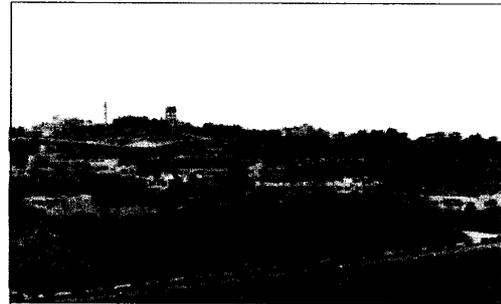
٤ - العَمَلُ عَلَى نَظَافَةِ البيئَةِ وَإِزَالَةِ كُلِّ مَا مِنْ شَأْنِهِ الإِخْلَالُ بِالتَّوَازَنِ البيئي ؛ كَالْفَضْلَاتِ وَالقُمَامَةِ الَّتِي تَعْمَلُ عَلَى تَكَاثُرِ الحَشَرَاتِ النَاقِلَةِ لِلأمْرَاضِ المَخْتَلِفَةِ .

وَنَسْمَعُ بَيْنَ الحَيْنِ وَالأَخْرِ عَنِ عَدَدٍ مِنَ الحِمَلَاتِ الَّتِي تَقُومُ بِهَا مَرَاكِزُ الشَّبَابِ وَطَلَبَةُ المَدَارِسِ وَوُؤَادُ العَمَلِ التَّطَوُّعِيِّ ، وَهَمَّ يَعْمَلُونَ عَلَى نَظَافَةِ البيئَةِ وَإِزَالَةِ الفَضْلَاتِ فِي الشُّوَارِعِ الرَّئِيسَةِ أَوْ عَلَى سَاحِلِ العَقْبَةِ الجَمِيلِ أَوْ المَنْتَزَهَاتِ وَالحَدَائِقِ العَامَّةِ . انظُرْ إِلَى الأشْكَالِ الآتِيَةِ :



مَصْنَعٌ يَنْفُثُ غَازَاتِهِ وَسُمُومَهُ فِي سَمَاءِ المَنْطِقَةِ ، وَيُلْقِي بِفَضْلَاتِهِ فِي المَنْطِقَةِ نَفْسِهَا .
- مَا أَثَرُ ذَلِكَ فِي النِّظَامِ البيئيِّ لِلْمَنْطِقَةِ ؟

الشُّكْلُ (٣-٢١) .



إِخْدَى بِلْدَانَنَا الأَرْدُنِيَّةِ المُنْبَسِطَةَ عَلَى الشُّهُولِ الزَّرَاعِيَّةِ الحَصْبَةِ الَّتِي تَمُدُّنَا بِمَنْبَجَاتِ زَرَاعِيَّةٍ نَحْنُ بِحَاجَةٍ إِلَيْهَا .
- مَا أَضْرَارُ التَّوَسُّعِ العِمْرَانِيِّ عَلَى جَسَابِ الأَرْضِ الزَّرَاعِيَّةِ ؟

الشُّكْلُ (٣-٢٠) .

Source: Social Sciences Textbook, fifth grade, p. 86.

Suggested methods to protect the Jordanian environment and the environmental equilibration. The picture on the right shows the expansion of Amman city on the expense of the agricultural land. The picture on the left shows a factory is submitting hazardous gases into the atmosphere.



شَابٌ يَمَلَأُ كَأْسًا مِنْ مِيَاهِ الْأَنْبِيَبِ الْمَوْصَلَةِ إِلَى بَيْتِهِ .
- لماذا تُعَدُّ الْمِيَاهُ الَّتِي تُرَوِّدُنَا بِهَا سُلْطَةُ الْمِيَاهِ عَيْبَرِ شَبَكَةِ
مِنَ الْأَنْبِيَبِ مِيَاهًا صَالِحَةً لِلشَّرْبِ ؟

الشَّكْلُ (٣-٢٣) .

مُمْكِنٌ تَعْرِيفُ التَّلَوُّثِ بِأَنَّهُ "وَجُودٌ أَوْ إِلقَاءُ
أَيِّ مَادَّةٍ لَا تَنْسَجِمُ مَعَ عَنَاصِرِ الْحَيَاطِ الْحَيَوِيِّ ، مِمَّا
قَدْ يُؤَدِّي إِلَى إِحْدَاثِ تَغْيِيرَاتٍ فِي النِّظَامِ الْبَيْئِيِّ
يَنْتُجُ مِنْهُ ضَرَرٌ أَوْ مَرَضٌ أَوْ خَلَلٌ مَا فِي هَذَا النِّظَامِ"
. وَمِنَ الْأَمْثِلَةِ عَلَى ذَلِكَ : التَّلَوُّثُ الْهَوَائِيُّ لِلبَيْئَةِ
الْقَرِيبَةِ مِنَ الْمَصْنَعِ الَّتِي تَنْفُثُ أَبْخَرَتَهَا وَعَازَاتِهَا
الْعَادِمَةَ فِي سَمَاءِ الْمَنْطِقَةِ الْمَوْجُودَةِ فِيهَا .

وَتَلَوُّثُ الْحَضْرَاوَاتِ إِذَا سَقِيَتْ بِمِيَاهِ الْمَجَارِي
الْمَلَوَّثَةِ أَوْ بِالْمِيَاهِ الَّتِي تَلْفُظُهَا الْمَصْنَعُ وَمَا تَحْتَوِيهِ مِنْ
مَوَادِّ كِيمِيَائِيَّةٍ سَامَّةٍ لِلْإِنْسَانِ

- هل جَمِيعُ حَالَاتِ التَّلَوُّثِ الَّتِي تُصِيبُ
الْإِنْسَانَ تَكُونُ نَاتِجَةً مِنْ تَنَاوُلِهِ طَعَامًا أَوْ شَرَابًا
مُلَوَّنًا أَوْ تَنْفِيسِهِ هَوَاءً مُلَوَّنًا ؟

كِي تَسْتَطِيعَ الْإِجَابَةَ عَنْ هَذَا السُّؤَالِ ، انظُرْ إِلَى الصُّورَتَيْنِ الْآتِيَتَيْنِ :



وَجُودُ مَحَلَّاتِ التَّجَارَةِ وَالْحِدَادَةِ وَالآلَاتِ الْمُخْتَلِفَةِ فِي
بَعْضِ الْأَحْيَاءِ السَّكْنِيَّةِ .
- مَا أَثَرُ ذَلِكَ فِي حَوَاسِ الْإِنْسَانِ ؟

الشَّكْلُ (٣-٢٥) .



أَحَدُ شَوَارِعِ الْعَاصِمَةِ "عَمَّانَ" وَهُوَ يَزْدَجِمُ بِالسَّيَّارَاتِ .
- مَا حَوَاسِ الْإِنْسَانِ الْأَكْثَرُ تَأَثَّرًا بِأَصْوَابِ زَوَامِيرِ
السَّيَّارَاتِ ؟

الشَّكْلُ (٣-٢٤) : صُورَةُ شَارِعٍ بِهِ عَدَدٌ كَبِيرٌ جَدًّا مِنْ
السَّيَّارَاتِ (مَزْدَجِمٌ بِالسَّيَّارَاتِ) .

Sources of Pollution. The means of transportation in Jordan help greatly to concentrate emissions of exhausted gases close to ground level, especially in cities which suffers from heavy Jams. The picture on the top right shows a man drink pure water. The picture on the bottom left shows a part of handicrafts that spread within urban areas. The picture on the bottom right represents a heavy traffic in one of Amman roads.

نماذج من الخلل البيئي في الأردن

الكتاب الرابع

انظر إلى الشكل (٣-٢٦) الذي يمثل نماذج من الخلل البيئي في الأردن :



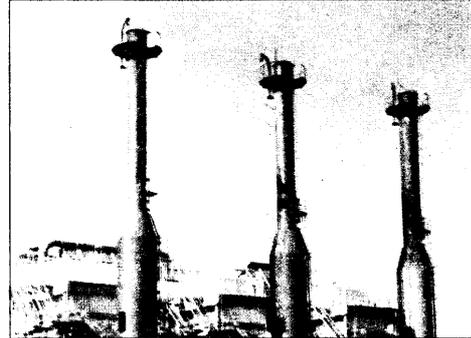
تُلقي المصانع نفاياتها من المواد الكيميائية السامة في سبيل الرزق ، وتجرها المياه إلى سد الملك طلال ، ثم إلى غور الأردن مما يحدث خللاً بيئياً يمس الأحياء المختلفة .
- ما أثر ذلك في البيئة ؟



إن الإفراط في عمليات صيد الطيور والأحياء البرية يؤدي إلى خلل بيئي في المنطقة .



قُطع الأشجار الحرجية الكثيفة لإقامة الشوارع الفسيحة أو المشاريع المختلفة .
- ما أثر قطع الأشجار في البيئة ؟



تقام بعض المصانع بالقرب من المناطق السكنية .
- ما أثر ذلك في البيئة المحيطة ؟

الشكل (٣-٢٦) .

Source: Social Sciences Textbook, fifth grade, p.91.

Examples of the attacks against the environment in Jordan. The Ministry of Agriculture shows a special concern in protecting and growing forests through the implementation of special law and regulations that provides the protection against fires and destruction. The picture on the top right shows unwarranted hunting, the picture on the top left shows the factory wastes in Zarqa, the picture on the bottom right shows that the industrial compounds near the urban areas, and picture on the bottom left shows the removal of trees.

Appendix XIII

EE in Jordanian School Curriculum: Cross-Curricular Approach

Example 1: EE experiences within the content of Chemistry Textbooks. The following is some selected pages.

الطبية؛ فهو سائل يتبخّر بسهولة (درجة غليانه ٦١° س)، وإن وُضِعَ بضع مللترات منه على كمامة واستنشاقها يكفي لإحداث تخدير سريع (في دقائق). إلا أن التخوف من الأضرار الصحية التي تُعزى له قلّل من استخدامه. ومن أحدث مركبات الكلور المستخدمة في التخدير المركب المعروف بالهالوتان ($CF_3CHBrCl$). وقدرة الكلوروفوم على إذابة المواد العضوية، وعدم ذوبانه في الماء، وصعوبة اشتعاله، أدت إلى استخدامه مذبذباً لاستخلاص المواد العضوية من مصادرها الطبيعية، إلا أن مخاطره الصحية تدعو إلى الحذر عند استعماله.

ب - رابع كلوريد الكربون (CCl_4)

يشبه الكلوروفورم في قدرته على إذابة المواد العضوية، وعدم ذائبته في الماء، وعدم إشتعاله إذا تعرض للنار؛ مما أدى إلى استخدامه مذبذباً عضوياً وخاصة للمواد الدهنية. وقد شاع استخدامه في التنظيف الجاف، إلا أن استخداماته هذه بدأت تتضاءل بسبب تأثيراته في الصحة؛ إذ يُخشى أن يكون له أثر في إصابة الإنسان بالسرطان.

ج - الفريون



ويمثل مجموعة من المركبات يشار إليها بـكلوروفلوروكربون (CFC) اختصاراً لـ Chloro Fluoro Carbon منها CCl_2F_2 ؛ وهو غاز ثابت (خامل نسبياً) لا يشتعل، وغير سام، ولا رائحة له، ويمكن إسالته؛ إذ إن درجة غليانه -٣٠° س. وهذه الصفات تؤهله لاستخدامات عدة من أبرزها: التبريد في الثلاجات، وإطفاء الحرائق، وفي أواني الضبابات (Aerosols). ويستخدم من هذه المواد ملايين الأطنان تنتشر في الهواء وتبقى فيه دون تحلل

شكل (٣-١٤): طفاية حريق وعلب ضبابات

إلى أن تصل إلى طبقات الجو العليا فتؤثر في طبقة الأوزون وتسبب ثقباً فيها يسمح بمرور الأشعة فوق البنفسجية الصادرة عن الشمس، مما يضر بالكائنات الحية. ولهذا وضعت قيود على إنتاج هذه المواد واستخدامها، ويُعمل الآن - على إنتاج بدائل لها لا تضر بطبقة الأوزون.

Source: Chemistry Textbook, 1st Secondary Grade, Scientific Stream, p.90.

The effects of Fluorocarbons (CFCs) on Ozone layer. The ecological investigators had determined that Fluorocarbons (CFCs), widely employed as propellants in aerosol spray cans, could reduce the amount of stratospheric ozone significantly.

د - المبيدات الحشرية

إستغلّ الإنسان الأثر السام لبعض مركبات الكور العضوية للقضاء على الحشرات الضارة. ومن أبرز هذه المركبات ما يعرف بـ د. د. ت (DDT)؛ إذ كان له أثر كبير في الحد من أمراض تنقلها الحشرات؛ كالمالاريا (ينقله البعوض)، والتيفوس (ينقله القمل) إلا أن استخدامه الكثيف، ومقاومته للتحلل، وعدم ذوبانه في الماء أدّى إلى تراكمه في أعضاء الحيوانات مما سبب أضراراً كبيرة لها؛ انظر إلى الشكل (٣ - ١٥).



(طيور تضررت من DDT)



طائرة ترش حقلاً بالمبيدات

شكل (٣ - ١٥): فوائد المبيدات الحشرية ومضارها

وقد أصبح استخدامه محظوراً في كثير من البلدان. وبشكل عام لوحظت مثل هذه الآثار - النافعة أو الضارة - لمعظم المبيدات الحشرية العضوية التي تحتوي على الكلور. ومما يسهّل مهمتها الضارة أنها قابلة للذوبان في الأجزاء الدهنية في الأجسام الحية، وإمكانية وصولها إلى الخلايا التي تغلف بالأغشية الدهنية؛ وثباتها الذي يسمح لها بالصمود فترة طويلة حتى تصل إلى داخل الخلايا. ولم يعد ضرر هذه المركبات مقتصرًا عليها بحد ذاتها. بل تعدّاه إلى أثر مخلفاتها، وما تؤوّل إليه مع الزمن، فضلاً عن تأثير العوامل الطبيعية؛ فأكثر المواد سميّة هي المركبات المعروفة بالدايوكسينات (Dioxins)، خاصة التي تحتوي على الكلور في جزيئاتها. ويعتقد أن بعضها ينتج من المبيدات الكلورية (التي تحتوي على الكلور).

هـ - المواد البلاستيكية (المبلمرات)

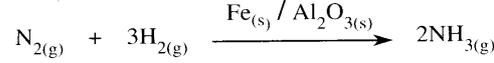
ومن أشهرها المبلمر بولي كلوريد الفاينيل (PVC)، ومادته الأساسية هي كلوريد الفاينيل (C_2H_3Cl). وعند دراستك للمركبات العضوية ستتعرف هذا النوع من المركبات. واستخدامات المبلمر متعددة وشائعة، ومن أبرزها صنع الأنابيب البلاستيكية التي تتصف بالمتانة، كتلك المستخدمة في نقل المياه والسوائل وتغليف الأسلاك الكهربائية وغيرها؛ انظر الشكل (٣ - ١٦).

Source: Chemistry Textbook, 1st Secondary Grade, Scientific Stream, p. 91.

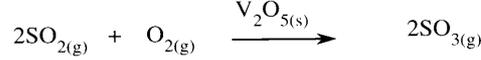
Insecticides.

Insecticide is any toxic substance that is used to kill insects. Such substances are used primarily to control pests that infest cultivated plants or to eliminate disease-carrying insects in specific areas. The main soil contaminants are the chlorinated hydrocarbons such as DDT, aldrin, dieldrin, and heptachlor. Birds of prey such as eagles, hawks, and falcons are usually most severely affected, and serious declines in their populations have been traced to the effects of DDT and its relatives.

٢ - العوامل المساعدة في التحفيز غير المتجانس : يستخدم هذا النوع من العوامل المساعدة في كثير من العمليات الصناعية المهمة . فمثلاً، تُحضَّر الأمونيا من النتروجين والهيدروجين بوجود فلز الحديد وأكسيد الألومنيوم .



ويستخدم أكسيد الفناديوم (V) ، V_2O_5 ، الصلب كعامل مساعد في الطرق الحديثة لتحضير حمض الكبريتيك إذ يساعد على أكسدة SO_2 إلى SO_3 :



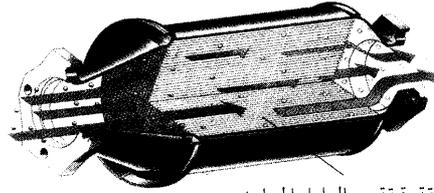
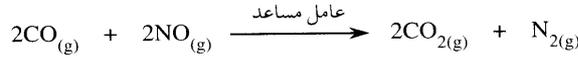
الآن دقق في الحالة الفيزيائية للمواد المتفاعلة والحالة الفيزيائية للعامل المساعد في التفاعلين السابقين . ماذا تستنتج؟

من السهل ملاحظة الاختلاف بين هذا النوع من التحفيز والنوع الذي عرفته سابقاً، إذ تجد هنا أن المواد المتفاعلة في الحالة الغازية بينما العامل المساعد في الحالة الصلبة . فمثلاً، في حالة الأمونيا يدخل النتروجين والهيدروجين إلى بوتقة التفاعل في الحالة الغازية ويكون العامل المساعد موجوداً في داخل البوتقة في حالته الصلبة . وتسمى العملية التي يكون فيها العامل المساعد في حالة فيزيائية مختلفة عن حالة المواد المتفاعلة التحفيز غير المتجانس (Heterogeneous Catalysis) .

ويستخدم هذا النوع من العوامل المساعدة مثل (Ni) في تفاعل إضافة الهيدروجين إلى الروابط الثنائية في الزيوت النباتية غير المشبعة (غير الصالحة للاستهلاك البشري) وبذلك تتحول إلى زبدة نباتية صالحة للأكل .

المحوّل الحفّاز لتنقية الغازات الصادرة من عوادم السيارات

تستخدم عمليات التحفيز غير المتجانس في كثير من الدول المتقدمة لتنظيف الهواء من الغازات السامة مثل CO و NO التي تنفثها عوادم السيارات . ويتم ذلك بتركيب برميل فولاذي على عادم السيارة يسمى المحوّل الحفّاز (Catalytic Converter) . ويحتوي البرميل الفولاذي على قالب من السيراميك مثقب كخلية النحل وجميع الثقوب مغلّفة بطبقة رقيقة من أحد الفلزات الثمينة (Rh ، Pd ، Pt) والتي تقوم بدور العامل المساعد في تحويل غازي CO و NO إلى CO_2 و N_2 .



طبقة رقيقة من العامل المساعد

Source: Chemistry Textbook, 2nd Secondary, Scientific Stream, p. 143.

Homo and Heterogeneous catalyses.

The Catalytic Converter in Vehicle's Exhaust Emission unit.

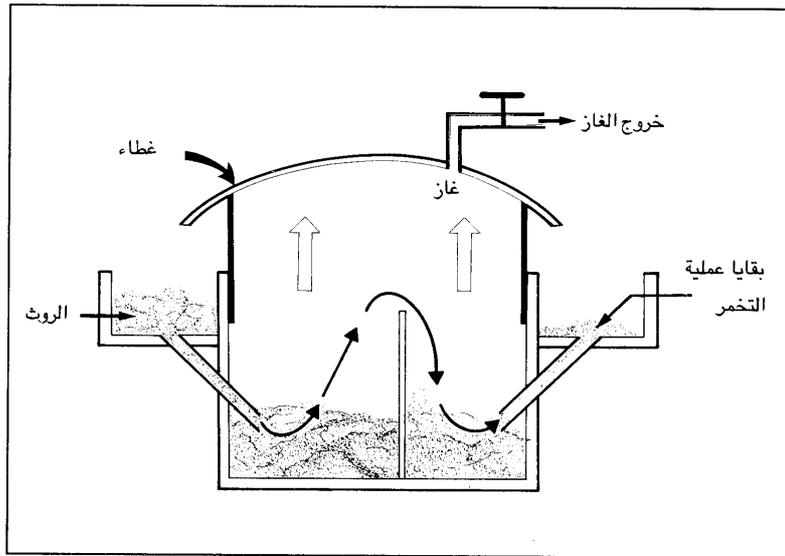
الكيمياء والمجتمع

الغاز الحيوي Biogas

يزداد الطلب على المصادر التقليدية للطاقة (نفط، فحم، غاز طبيعي) لأن أكثر من ٩٥٪ من الطاقة التي نستهلكها مأخوذة من هذه المصادر، لذلك تزداد المحاولات للبحث عن مصادر جديدة، وفي البلاد الفقيرة التي لا تستطيع شراء النفط تبدو الحاجة ملحة للبحث عن بدائل له، وفي الصين والهند الغنيتين بثروتهما الحيوانية، يستخدم الناس روث الحيوانات في إنتاج غاز يُسمى الغاز الحيوي، لإنتاج الطاقة، وهذا الغاز مزيج من عدة غازات أهمها غاز الميثان الذي تبلغ نسبته فيه ٥٠٪.

يستخدم الغاز الحيوي لإنتاج الطاقة في المصانع وتوليد الكهرباء، ويستخدم في البيوت لأغراض الطبخ وتسخين الماء والإنارة.

تقدر كمية الغاز الحيوي الناتجة من روث بقرة واحدة يومياً، بحوالي ١٢٠٠ لتر. وتكمن أهمية هذا الغاز في أن كل عائلة تستطيع بناء مولد للغاز يكفيها من الطاقة التي تحتاجها، وفي كل من الهند والصين يوجد الملايين من مولدات الغاز، ويتكوّن الغاز في هذا المولد نتيجة الهضم اللاهوائي للروث بفعل البكتيريا في غياب الأكسجين. وفيما يلي رسم توضيحي لهذا المولد.



مولد الغاز الحيوي من روث الحيوانات

-٩٦-

Source: Chemistry Textbook, Tenth Grade, p. 96.

Biogas.

Biogas is a mixture of several organic gases, especially methane. It is produced mainly from animals' droppings.

٣. تلوثُ الماء

لاحظتَ فيما سبقَ ، أنَّ عمليَّةَ تنقيةِ الماءِ ليصبحَ صالحاً للشربِ ، تمرُّ بمراحلَ عدةٍ . وفي كلِّ مرحلةٍ يتمُّ التخلُّصُ منُ واحدٍ أو أكثرَ منِ الشوائبِ ، فلماذا نقومُ بإزالةِ هذهِ الشوائبِ ؟ وهل من الضروريِّ إزالةُ كلِّ ما في الماءِ منُ مكوناتٍ أُخرى ؟ متى تُعدُّ هذهِ المكوناتُ ضروريَّةً ؟ ومتى تُعدُّ زائدةً عن الحدِّ المعقولِ ؟ ماذا نسميَ الماءَ الذي زادتُ فيه نسبةُ إحدى المكوناتِ عن الحدِّ المسموحِ به ؟ للإجابةِ عنُ هذهِ الأسئلةِ ، انظرُ إلى الجدولِ التالي الذي يبيِّنُ التراكيزَ الكبرى لبعضِ الأيوناتِ التي لا يُسمحُ بتجاوزها ، لكي يكونَ الماءُ صالحاً للاستعمالِ البشريِّ .

الجدولُ (١) : درجةُ التراكيزِ المسموحِ بها لبعضِ الأيوناتِ في الماءِ

اسم الأيون	الرمز	معياري التلوُّثِ للاستخدامِ البشريِّ (بوحدةِ الجزءِ من المليون)
الزرنِخُ	As ³⁺	٠,٠٥
الرصاصُ	Pb ²⁺	٠,٠٥
الزئبقُ	Hg ²⁺	٠,٠٠١
النتراتُ	NO ₃ ⁻	٤٥

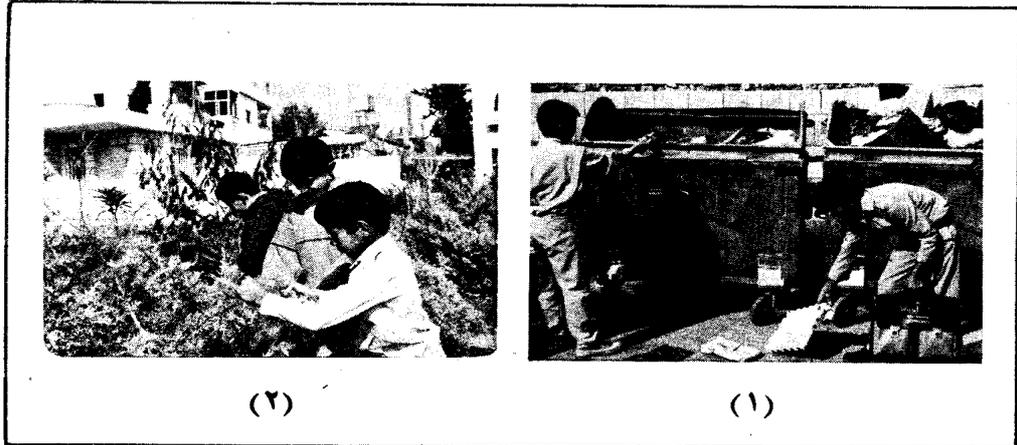
لاحظْ أنَّه تُستعملُ وحدةٌ جديدةٌ للتعبيرِ عن تركيزِ هذهِ الأيوناتِ ، هي وحدةُ «جزءٍ من المليون» ونعني بها كتلةُ المذابِ بالغرامِ في مليونِ غرامِ من المحلولِ ، وذلكُ لأنَّ التراكيزَ المسموحِ بها لهذهِ الأيوناتِ في ماءِ الشربِ ضئيلةٌ جداً ، ويرجعُ ذلكُ إلى أنَّها إنَّ زادتْ عن حدِّ معينٍ تكونُ ضارةً بالإنسانِ والحيوانِ . فالكلورُ -مثلاً- يتراوحُ تركيزُهُ المسموحُ به في الماءِ بينَ ٢٠٠ و ٥٠٠ جزءاً بالمليون ، وإذا زادَ تركيزُهُ عن ٥٠٠ جزءاً بالمليون يُعدُّ الماءُ ملوثاً . وقد ساهمتِ التطوراتُ العلميَّةُ والتكنولوجيَّةُ في تلوُّثِ كثيرٍ من مصادِرِ المياهِ فالرصاصُ مثلاً -يدخلُ في كثيرٍ من الصناعاتِ ، إذ يضافُ إلى بنزينِ السياراتِ لتنظيمِ عمليَّةِ اشتعالهِ داخلَ آلةِ السيارَةِ . كما يُستخدمُ في بطارياتِ السياراتِ السائِلةِ ، وفي الدهاناتِ . لذا فإنَّه من المتوقعِ أن يصلَ أيونُ الرصاصِ إلى الماءِ . عن طريقِ طرحهِ فيه مباشرةً من المصانعِ التي تستخدمُهُ ، أو عن طريقِ غيرِ مباشرةٍ ، حيثُ يقومُ ماءُ المطرِ بإذابةِ المخلفاتِ التي تطرحُها المصانعُ منه ، وحملها معه إلى تجمعاتِ المياهِ . ويُعدُّ الماءُ ملوثاً بالرصاصِ إذا زادَ تركيزُ أيونِ الرصاصِ فيه عن ٠,٠٥ جزءاً بالمليون ، أمَّا الحياةُ المائيةُ فتتضررُ إذا زادَ تركيزُ أيونِ الرصاصِ في مياهِ البحرِ عن ٠,٠١٥ جزءاً بالمليون .

Polluted Water and Water Quality Standards.

Water quality standards set limits on the concentrations of impurities allowed in water. Standards also affect the selection of raw water sources and the choice of treatment processes.

Example 2: EE experiences within the content of Islamic Literacy Textbooks. The following is some selected pages.

تَبِيلٌ : إزَالَةُ جَمِيعِ أَنْوَاعِ الْأَدَى مِثْلِ الْأَشْوَاكِ وَالْحِجَارَةِ وَالزُّجَاجَاتِ الْفَارِغَةِ مِنَ الطَّرِيقِ .
زَيْدٌ : عَدَمُ إِزْعَاجِ النَّاسِ بِالصَّرَاخِ ، وَالسَّبَابِ ، وَأَصْوَاتِ السَّيَّارَاتِ .



المُعَلِّمُ : مَاذَا تَرَوْنَ ، يَا أَبْنَائِي ، فِي الصُّورَةِ الْأُولَى ؟ مَا رَأَيْكُمْ فِي عَمَلِ هَذَا الطَّالِبِ ؟ هَلْ هُنَاكَ أَدَى آخَرِيُمْكِنَ أَنْ تُزِيلَهُ مِنَ الطَّرِيقِ ، مَنْ يُعْطِينَا أَمْثَلَةً عَلَيْهِ ؟
المُعَلِّمُ : مَاذَا تَرَوْنَ يَا أَبْنَائِي فِي الصُّورَةِ الثَّانِيَةِ ؟ مَا رَأَيْكُمْ فِي هَذَا التَّصَرُّفِ ؟ مَا نَتِيجَةُ هَذَا الْأَدَى عَلَى جَمَالِ بَلَدِنَا ؟ مَنْ يُعْطِينَا أَمْثَلَةً أُخْرَى عَلَى هَذِهِ التَّصَرُّفَاتِ الْمُؤْذِيَةِ ؟
المُعَلِّمُ : بَارَكَ اللَّهُ فِيكُمْ ، إِنَّ هَذِهِ الْأَمْثَلَةَ تَدُلُّ عَلَى الْفَهْمِ السَّلِيمِ لِكَفِّ الْأَدَى ، وَالآنَ ، مَنْ يَذْكُرُ بَقِيَّةَ الْأَدَابِ الْوَارِدَةِ فِي الْحَدِيثِ الشَّرِيفِ ؟
أَحْمَدُ : رَدُّ السَّلَامِ عَلَى مَنْ يَطْرَحُهُ مِنَ الْمَارَةِ .
خَالِدٌ : الْأَمْرُ بِالْمَعْرُوفِ وَالنَّهْيُ عَنِ الْمُنْكَرِ .

Source: Islamic Literacy Textbook, Fifth Grade, p.97.

This page contains a dialogue between a teacher and students regarding the conservation of the environment and the protection of natural resources as an Islamic requirement. The picture on the right represents a positive Islamic environmental behavior, while picture on the left represents a negative Islamic environmental behavior.

اهتمام الإسلام بالبيئة

جاء الإسلام لينظم شؤون الناس جميعها، فاهتم بتنظيم علاقة الإنسان بخالقه سبحانه وتعالى، كما نظم علاقته بالكون من حوله، ودعا إلى الاستغلال الأمثل للموارد البيئية التي خلقها الله تعالى للإنسان، والمحافظة عليها والابتعاد عن إفسادها.

المحافظة على مكونات البيئة

أولاً:

خلق الله تعالى هذا الكون للإنسان، وسخر له السماوات والأرض والرياح، والحيوانات والنباتات، والأنهار والبحار وما فيها من ثروات، وغير ذلك من النعم التي لا تعد ولا تحصى، قال تعالى: ﴿أَلَمْ تَرَوْا أَنَّ اللَّهَ سَخَّرَ لَكُمْ مَاءَ فِي السَّمَوَاتِ وَمَا فِي الْأَرْضِ وَأَسْبَغَ عَلَيْكُمْ نِعْمَهُ ظَهْرَهُ وَبَاطِنَهُ...﴾ (١)، وهذا التسخير يشمل مكونات البيئة التي أمرنا بالإفادة منها بما يتفق ومنهج الله تعالى، ونهينا عن إفسادها حتى نحقق رسالة الاستخلاف التي كلفنا الله تعالى إياها، قال تعالى ﴿وَلَا تُفْسِدُوا فِي الْأَرْضِ بَعْدَ إِصْلَاحِهَا﴾ (٢).

نشاط

قال تعالى: ﴿وَلَقَدْ مَكَّنَّاكُمْ فِي الْأَرْضِ وَجَعَلْنَا لَكُمْ فِيهَا مَعِيشَ قَلِيلًا مَا تَشْكُرُونَ﴾ (٣)، استنتج من الآية الكريمة الغاية من تسخير الله تعالى الأرض للإنسان، واكتب ذلك في دفترك.

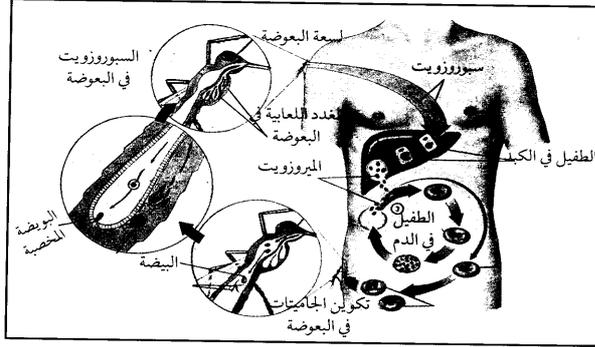
(١) سورة لقمان ، الآية (٢٠) .

(٢) سورة الأعراف ، الآية (٥٦) .

(٣) سورة الأعراف ، الآية (١٠) .

The title of this lesson is *the Islamic Concern towards the environment*. It gives some of the Islamic teachings that sought to the conservation of the environment. The texts between quotation marks are Quranic verses. The first verse says: “Do ye not see that Allah has subjected to your (use) all things in the heavens and on earth, and has made His bounties flow to you in exceeding measure, (both) seen and unseen? Yet there are among men those who dispute about Allah, without knowledge and without guidance, and without a Book. To enlighten them!” (HQ, Luqman: 20).

Example 3: EE experiences within the content of Biology Textbooks. The following is some selected pages.



الشكل (٥ - ١٣) : دورة حياة بلازموديوم الماريا .

مواد سامة تسبب ارتفاع درجة حرارة المريض . ما نوع الانقسامات التي تكون (الميروزويت)؟ لاحظ الطور الجاميتي . أين تتكون الجاميتات؟ هل تتضمن دورة حياة الطفيل دوراً جنسياً؟ كيف يمكنك كسر دورة المرض؟

؟

سؤال

ما طرائق الحركة والانتقال في كل من السوطيات ، والهدبيات ، والبوغيات؟

الأوليات والمرضى

تسبب بعض الأوليات أمراضاً عدّة تؤثر في حياتنا ، وتسبب خسائر بشرية ومادية . ولأن الأمراض التي تسببها الأوليات تنتقل عن طريق عائل وسيط ؛ كالذباب والبعوض ؛ فإن مكافحة هذه الآفات بالمبيدات قد تؤدي إلى تلوث البيئة .

وفيما يأتي بعض الأمثلة على الأمراض التي تسببها الأوليات :

- ١ - مرض الزحار الأميبي : يسبب هذا المرض آلاماً شديدة عند التبرز ، ويضعف الجسم ويصيبه بالهزال وفقر الدم . ويحتاج المريض إلى الراحة والعلاج .
- ٢ - مرض النوم الإفريقي : ويسببه طفيل التريانوسوما الذي تنقله ذبابة تسي تسي . ويصيب الشخص بالنعاس والكسل ، مما يؤدي إلى فقدان القدرة على العمل والإنتاج ، فضلاً عن المضاعفات الصحية .
- ٣ - الملاريا : مرض وبائي يُسببه طفيل بلازموديوم ملاريا وتنقله بعوضة الأنوفيليس التي تعيش في المياه الراكدة . ويسبب هذا المرض الهزال وفقر الدم والخسارة المادية للمريض ، من جهة نفقات المعالجة والوقاية والمكافحة . ولا بد من الإشارة إلى التكاليف الكبيرة التي يحتاج إليها برنامج القضاء على العائل الوسيط في كثير من الأمراض التي تسببها بعض الأوليات ، عن طريق رش المبيدات ، وما يحتاج إليه من تجهيزات وكوادر بشرية .

قضية للبحث

ابحث في الفوائد الاقتصادية للأوليات ؛ إن وجدت .

Source: Biology Textbook, 1st Secondary Grade, Scientific Stream, 1999 Edition, p. 144.

This page is a part of a section that discusses the types of *Protozoa* (*Sarcodina*, *Mastigophora*, *Ciliata*, and *Sporozoa*). It shows the effects of the *Protozoa* on human health and discusses the use of insecticides. Some insecticides have been important in improving the health of both humans and domestic animals, such as Malaria. But the use of insecticides has also resulted in several serious problems, chief among them environmental contamination and the development of resistance in pest species. (The picture represents the lifecycle of *Plasmodium*, which occurs in the liver and red blood cells of humans. *Plasmodium* causes Malaria to Man).

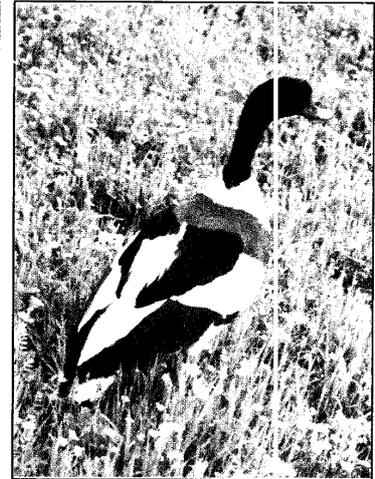
يعد الأردن بحكم موقعه الجغرافي وتنوع بيئاته الطبيعية محطة للطيور المهاجرة من أوروبا وآسيا إلى إفريقيا. ويلاحظ أن الطيور المهاجرة تمر في الأردن على مدار الفصول الأربعة. ووفقاً لتسجيل متحف التاريخ الطبيعي الأردني في جامعة اليرموك فقد تمّ تسجيل أكثر من (٢٢٠) نوعاً من الطيور المقيمة والمهاجرة. ومن أمثلة الطيور المهاجرة: اللقلق الأبيض، اللقلق الأسود، الحمام الرقطي، مالك الحزين الرمادي، الرها، أبو الحنسة، الباز، الشاهين، الصقر الحوام، الصقر الحر، وغيرها. أما الطيور المقيمة فهي: السوادية، الزريقي، الزانح، البومة النسرية، النسر الأسمر، القبرة المتوجة، القبرة الهددية، الحمام الحمري، الحجل، عصفور البحر الميت، الثرثرة العربية، وغيرها. وتوضح الرسوم الآتية بعض الطيور المهاجرة والمقيمة في الأردن.



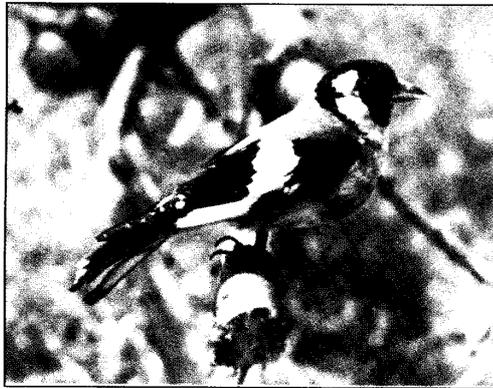
الزريقي / أبو زريق : طائر مقيم من العائلة الغرابية، يتعلم النطق بسهولة ويتغذى على الفاكهة وثمار البلوط.



الشاهين : لاحظ شكل المنقار.



الشهرمان : طائر من عائلة البط، يهاجر إلى الأردن بأعداد قليلة.



الحسون : طائر مقيم مغرد، يتغذى على البذور النباتية. يُصطاد بالشباك بأعداد كبيرة مما قد يهدده بالانقراض.



الهدهد : طائر من العائلة الهددية، يتغذى على الحشرات المختبئة داخل الأرض.

Source: Biology Textbook, 1st Secondary Grade, Scientific Stream, 1999 Edition, p. 233.

The number of resident birds recorded in Jordan includes 220 birds. Depletion of water resources has resulted in enormous decline in the number and variety of water birds visiting Jordan, such as ducks, herons, flamingo, and storks. Hunting with falcons is not legal in Jordan. It is also not legal to bring them into the country. Anyone found hunting or transporting falcons could face fines and the confiscation of their birds. It is prohibited to hunt without having a Hunting License issued by RSCN. (The pictures show examples of the birds in Jordan, such as Hoopoe and goldfinch).

Example 4: EE experiences within the content of Science Textbook for eighth grade. The following is some selected pages .

رقم التأكسد : يعني شحنة عنصر ما في مركب على اعتبار أنها شحنة كاملة .

تستخدم الأرقام الرومانية I ، II ، III ، IV ، V ، VI وغيرها التي تعني ١،٢،٣،٤،٥،٦ على الترتيب في حالة العناصر التي لها أكثر من ذرية ، ويدل الرقم الروماني على عدد تأكسد عنصر معين في المركب ، ويمكن حسابه في حمض الكبريتيك (H_2SO_4) على النحو الآتي :

باعتبار أن الشحنة الكلية على المركب تعادل صفر . وان عدد تأكسد الأكسجين ، الهيدروجين هي (-II) ؛ (+I) .

$$8- = (-II) 4$$

$$2+ = (+I) 2$$

$$6+ = 1 \times (+VI)$$

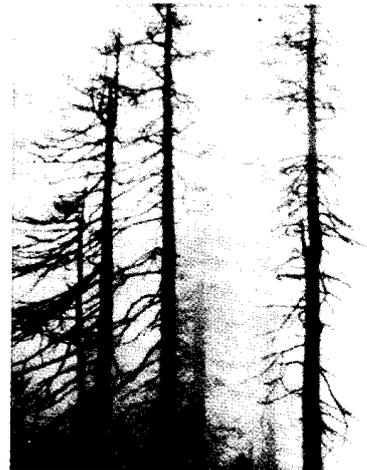
يساهم الأكسجين بمقدار

يساهم الهيدروجين بمقدار

وحتى تصبح الشحنة الكلية صفراً

لا بد ان يحمل الكبريت شحنة قدرها

وهذه الحموض تشكل ما يسمى بالمطر الحمضي ، وله آثار ضارة ؛ إذ يؤدي الأشجار والنباتات ، ويقلل خصوبة التربة ، لاحظ الشكل (١١) ، كما يهاجم الجسور والتمائيل والمنشآت ، لاحظ الشكل (١٢) .



الشكل (١١): أثر المطر الحمضي على الأشجار . الشكل (١٢) : أثر المطر الحمضي على التماثيل .

Acid rain. The picture on the right shows the effects of acid rain on plants, the picture on the left shows the effects of acid rain on statues.

١ - ٤ - ٣ أكاسيد النتروجين :



الشكل (١٣) : الضبخن .

تتكوّن أكاسيد النتروجين نتيجة احتراق الوقود ؛ إذ يتحد الأكسجين مع النتروجين في محركات السيارات ، وفي أماكن توليد الطاقة في المصانع عند حدوث الشرارة الكهربائية ، وهذه الغازات قد تكون ممتزجة مع غاز أول أكسيد الكربون أو أيّ مواد هيدروكربونية غير محترقة . تسخن هذه المواد فتصعد إلى أعلى ، وتصادف منطقة باردة فتتحبس في طبقة معينة وتكوّن الضبخن * (Photochemical smog) . وما

يجدر ذكره ، أنّ هذه الغازات والمواد قد

تتفاعل مع بعضها وتكوّن مواد كيميائية ضارة ؛ لذا فإنّ الموقع الجغرافي للمنطقة يساعد على تكوّن هذا النوع من الضبخن . لاحظ الشكل (١٣) .

والضبخن يؤدي صحة الإنسان ، ويعيق نموّ النباتات ، ويحجب ضوء الشمس .

قضية للبحث :

تتسبّب الأكاسيد بشكل عامّ وأكاسيد الكبريت بشكل خاصّ ، في تلويث الهواء الجويّ ، ويمكن إيقاف هذا التلوّث بمنع وصول هذه الغازات للهواء . ابحث في الطرق الممكنة اتباعها في ذلك .

* الضبخن : مزيج من الضباب ودخان المصانع ، وبخاصة الذي يحتوي على نسبة كبيرة من أكاسيد النتروجين .

Example 5: EE experiences within the content of English Language Textbooks (Students' Book). The following is some selected pages.

UNIT THREE

Lesson One

1 Learn the words

Vocabulary: wild-life oryx ibex
barbed wire mesh wire
derived situated
administered elevation
ranging*



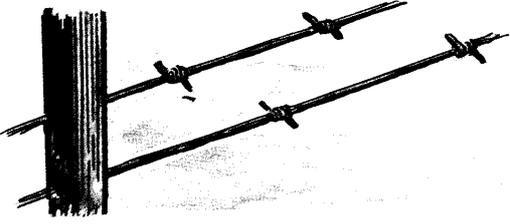
wildlife



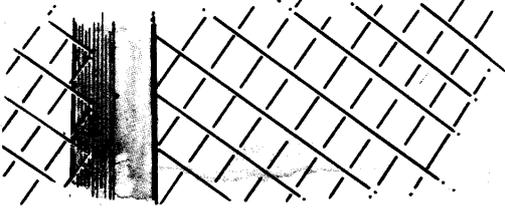
an oryx



an ibex



a barbed wire fence

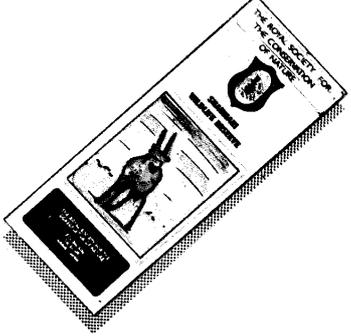


a mesh wire fence

2 Shaumari Wildlife Reserve

Read and answer.

- 1 Where did Shaumari get its name?
- 2 Where is it?
- 3 Who administers it?
- 4 What is the climate like?



Shaumari, whose name is derived from a wadi system in the area, is Jordan's first wildlife reserve. Situated about 120 km from Amman and about 12 km south-west of the Azraq Oasis, it is administered by the Royal Society for the Conservation of Nature (RSCN).

The total area of Shaumari is 22 sq. km, or about 22,000 dunums, completely fenced in by a double fence of barbed and mesh wire designed for protection.

The land is almost flat with an elevation ranging from 510 to 680 m above sea level, and with an average annual rainfall of about 50-100 mm. The summers are hot and winters cool.

8
WB page 10 a  and b

Source: Progress in English through Relevant Activities (PETRA), Students' Book 5, Ninth Grade, p.8.

Shaumari was the first wildlife reserve in Jordan. It was created to provide a safe home for one of the most endangered animals in the world: the Arabian Oryx. The reserve serves as an educational center and has a special visitor center and education program.

UNIT THREE Lesson Two

3 Farid the friendly ibex

Read and answer.

- 1 What does **Farid** mean?
- 2 What would happen if you ~~killed~~ an ibex?
- 3 Why don't the Society want to release Farid?

Next time you visit Shaumari, make sure you call on the Reserve's friendliest resident – Farid the ibex.



Vocabulary: make sure call on
resident rare crag
unique live up to
naturally breed (v) mate
nowadays hunter shoot
in the wild unfortunately
release attention

Farid was found in the south of Jordan by a Bedouin and given to the RSCN. The Society called him Farid because he was the only ibex they had in the Reserve. Naturally, they wanted to breed ibex at Shaumari, so they started to look for a mate for him. This was not an easy task, since there are now very few ibex left in Jordan. Ibex used to be found all over the hills of Wadi Rum, Wadi Araba, and Mujib. But now there are very few left. Most of the ibex in Jordan have been killed by hunters. Nowadays, ibex are rarely seen in the wild. The ibex is a protected animal in Jordan. The fine for killing an ibex is JD 100. But that doesn't seem to stop hunters trying to shoot these beautiful animals.

Unfortunately, the Society couldn't find a mate for Farid. At first the Society wanted to release Farid back into the wild. But the trouble is that Farid has become much too friendly in Shaumari. He likes people too much now. If he saw a hunter with a gun, he would probably want to play with him. And we all know what would happen then!

So Farid stays at Shaumari, where he is very popular, especially with the many children who come to visit the Reserve. They love to play with him and Farid seems to enjoy the attention he gets. He's probably happier in Shaumari than he would be in the wild.

4 Match words and meanings

resident
breed
in the wild
fine
popular

well liked
money paid for doing something wrong
someone who lives in a place
keep animals to produce young
in its natural place

5 Ask and answer

- 1 Who found Farid?
- 2 Why are there so few ibex in the wild nowadays?
- 3 What would Farid do if he saw a hunter?
- 4 What is your favourite animal? Give reasons for your choice.

WB page 11 c and d

9

Source: Progress in English through Relevant Activities (PETRA), Students' Book 5, Ninth Grade, p. 9.

Things to do in Shaumari wildlife reserve: see the Oryx, take an Oryx safari, enjoy the visitor center, use the observation tower, come and watch birds, and have a picnic.

UNIT SEVENTEEN Lesson Four

13 Poem 📖

Here is another poem by the "Nature Poet", William Wordsworth. The writer is thinking about the beauty of nature as he sits in a grove (a small wood) looking at the flowers of early spring and watching birds. He sadly compares this beauty and pleasure with the faults of man. (What man has made of man?)

Lines Written in Early Spring

I heard a thousand blended notes,
While in a grove I sate reclined,
In that sweet mood when pleasant thoughts
Bring sad thoughts to the mind.

To her fair works did Nature link
The human soul that through me ran;
And much it grieved my heart to think
What man has made of man.

Through primrose tufts, in that green bower,
The periwinkle trailed its wreaths;
And 'tis my faith that every flower
Enjoys the air it breathes.

The birds around me hopped and played,
Their thoughts I cannot measure –
But the least motion which they made,
It seemed a thrill of pleasure.

The budding twigs spread out their fan,
To catch the breezy air;
And I must think, do all I can,
That there was pleasure there.

If this belief from heaven be sent,
If such be Nature's holy plan,
Have I not reason to lament
What man has made of man?



William Wordsworth

Note: grove = a small group of trees primrose, periwinkle = plants
bower = a small open area surrounded by trees

When you have read the poem again carefully, answer these questions:

- What does the writer say about the flowers, the twigs and the birds? Does he think they have feelings?
- What makes him feel sad while he is watching the flowers and the birds?

WB pages 66 and 67 g and h

Lines Written in Early Spring. A poem written by William Wordsworth, which sought to the appreciation of nature's beauty.

UNIT TWENTY-TWO

Lesson One

1 What do you know?

- How can we make sea water into drinking water?
- What is evaporation? Where can we notice evaporation taking place? Make a list.
- What fuels can be used for cooking?



Structures: Imperatives (and negatives - Don't ...!)

Present simple

Adverbial clauses with when, as

Vocabulary: power evaporation leaflet* purifier line (v) bottom waterproof* top (n) transparent* level (= flat) (adj) evaporate condense* bill spot (= place) (n) simple stand (n) catalogue price list vapour recommend slogan

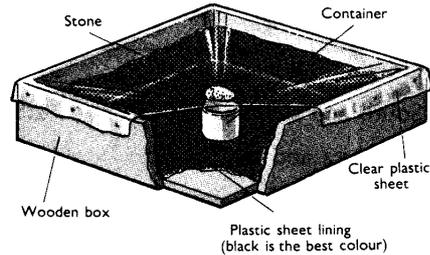
2 Look and find

- Look through the instruction leaflet for the water purifier and find out the colour of the plastic sheet.
- Look through the advertisement and find out how many types of solar cooker there are.

How to make a solar water purifier

Here is an easy way to make pure water from sea water using a wooden box, some plastic sheet and the power of the sun.

- Take an old wooden box and place a sheet of plastic inside so that it lines the bottom and the sides. (Black plastic is best for this purpose.) This will make the box waterproof.
- Add a little sea water to the box.
- Place a tall container (glass or plastic) in the middle of the box. The top of the container must be higher than the level of the sea water so that no sea water enters the container. (Put a stone inside the glass if necessary so that it does not float.)
- Now cover the top of the box with a transparent plastic sheet. Fix it with pins, or nails, to the sides of the box.
- In the middle of the sheet place a stone directly above the container.
- Leave the box on level ground in the sun. As the sun's rays pass through the transparent sheet, the sea water in the box will begin to warm up. The water will start to evaporate leaving salt behind. The evaporated water then condenses on the inside of the sheet and runs down to the lowest point. This is where the stone was placed on the sheet. The water then drips into the container below.
- When the container is full, drink the water - it's pure and clean!



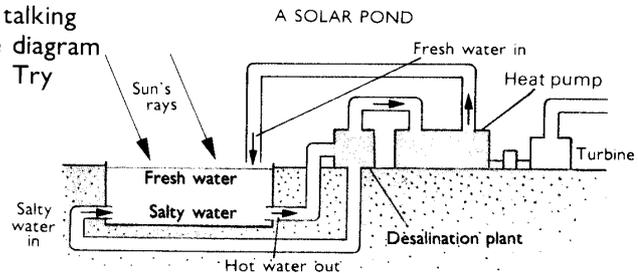
UNIT TWENTY-TWO Lesson Three/Four

Lesson Three

9 People talking

Dr Adnan is an engineer. He is talking about the solar pond. Study the diagram and then listen to what he says. Try to answer the questions below.

- Is the purpose of the solar pond to make:
 - steam?
 - electricity?
 - salt?
- The salt water stays at the bottom of the pond because:
 - it is hotter than fresh water
 - it is heavier than fresh water.
- Where is the steam produced?
 - at the desalination plant
 - at the heat pump
 - at the turbine.
- What happens to the salty water from the desalination plant?



Vocabulary: pond heat pump*
turbine* diagram

10 Look and say

Look at the diagram of the solar pond (or Wall Picture 8). Explain how it works to other students in the class.

Use these words to help you:

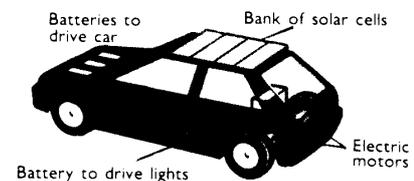
sun's rays/ fresh water/ salty water/ heavier/
bottom/ hotter/ pumped/ desalination plant/
hot water/ heat pump/ steam/ turbine/ electricity/

WB page 84 d and e

Lesson Four

11 Look and write

Here is a drawing of a solar car. It has not been produced yet, but one like it might be developed in the future. It has solar cells on the roof which recharge the car's batteries. There are two sets of batteries. A set at the front drives the electric motors which power the car. The set of batteries at the back is for the lights.



Vocabulary: recharge* battery
set (a set of) (n) power (v)

113

Source: Progress in English through Relevant Activities (PETRA), Students' Book 6, tenth Grade, p. 113.

The use of renewable energy. An exercise about Solar Ponds and desalination plants.

Appendix XIV

Abstract (in German Language)

Resümee der Dissertation

FÖRDERUNG DES STATUS DER UMWELTERZIEHUNG IM ÖFFENTLICHEN SCHULWESEN UND IN DER AUSSERSCHULISCHEN BILDUNGSARBEIT IN JORDANIEN

Umwelterziehung (UE) ist eines der priorisierten Themen im internationalen pädagogischen Diskurs. Absicht der vorliegenden Studie ist es, zur Verbesserung der Lage von UE in Jordanien mit Hilfe einer Erhebung zu deren Status, wie dieser von den Repräsentanten der Einrichtungen und Programme wahrgenommen wird, auf dem Sektor des öffentlichen Schulwesens und der außerschulischen Bildungsarbeit beizutragen.

Die Studie identifiziert eine beträchtliche Anzahl von Programmen, die in umwelterzieherischer Absicht innerhalb und außerhalb der Schulen durchgeführt werden. Sie bilden in der Mehrzahl vereinzelte Bemühungen, sind auf eine einzelne Institution bezogen und nur lose miteinander verbunden. Die Erhebung wirft darüber hinaus ein Licht auf die Grenzen und Möglichkeiten der Implementation von UE in den Schulen Jordaniens.

Die mit der Erhebung erfasste Population erstreckt sich auf zwei Kategorien, erstens Personen, die als Angestellte des jordanischen Erziehungsministeriums in den Schulen des Landes tätig sind, repräsentiert in einem Sample von 347. Die zweite Kategorie umfasst Personen, die in den Umweltbildungsprogrammen von Umweltschutzverbänden tätig sind; das Sample ist auf elf solcher Umweltschutzverbände bezogen.

Zwei unterschiedliche Instrumente wurden der Erhebung zugrunde gelegt; ihr Grundmuster basiert auf den Leitlinien für UE-Programme, die vom Wisconsin Center für UE in den Vereinigten Staaten entwickelt

worden sind. Die erhobenen Daten werden dementsprechend entweder statistisch ausgewertet oder, im Falle qualitativer Daten und Kommentare der Befragten, zusammengefasst. Die Ergebnisse zeigen, dass fast 30% der Befragten im Öffentlichen Schulwesen die Durchführung von UE Programmen in ihrem Wirkungsfeld anführen, dass 20% angeben, derartige Programme zusammen mit anderen Agenturen durchzuführen, und dass 37% des Lehrpersonals in Jordanien Umweltfragen in ihrem Unterricht behandeln.

Männer greifen Umweltfragen öfter in ihrem pädagogischen Wirkungsfeld auf als Frauen. Erfahrene und formal besser qualifizierte Personen behandeln Umweltbelange öfter als weniger erfahrene und formal weniger gut qualifizierte Personen. Lehrende, die an Aus- oder Fortbildungskursen zur UE teilgenommen haben, greifen Umwelterziehung öfter auf als diejenigen, welche an solchen Kursen nicht teilgenommen haben. Auf das Spektrum der unterschiedlichen Tätigkeitsfelder im öffentlichen Schulwesen bezogen, ergibt sich folgende Sequenz der Neigung, UE aufzugreifen: Schulverwaltungsbeamte, Lehrplanentwickler, Supervisoren und am Ende Lehrerinnen und Lehrer. Im Hinblick auf die Unterrichtsfächer ergibt sich folgende Sequenz der Neigung zur UE: Kunst, Naturwissenschaft, Religion, Arabisch, Englisch, Mathematik, Soziale Studien, Sport.

Der langsame Fortschritt der UE im jordanischen Schulwesen ist in den Augen der Fachleute auf folgende Einflüsse zurückzuführen: Mangelnde Unterstützung seitens der Verwaltung, geringe Bedeutung von Kursen über Umweltbelange in der Lehrerausbildung - und Fortbildung, unzureichende Vorbereitungszeit, Mangel an Ressourcen, fehlendes pädagogisches Wissen zum Einbau von UE in den Lehrplan, fehlendes Wissen über die Kontrolle und Bewertung von UE Aktivitäten. Die Mehrzahl der Personen, die UE in ihr Wirkungsfeld einbeziehen, betonen die Nähe der angemessensten Methoden zur Wertevermittlung und finden darüber hinaus einen kindzentrierten Ansatz am geeignetsten für die Belange der UE. Am wichtigsten ist ihnen die Entwicklung einer persönlichen Verantwortung für den Erhalt der Umwelt, die Wahrnehmung von vorhandenen Umweltproblemen und die Umweltethik.

Programme zur UE, die außerhalb des öffentlichen Schulwesens angeboten werden, können dessen Arbeit unterstützen und ausweiten. Es bestehen, wie die Erhebung belegt, zahlreiche UE Programme, die der Förderung des Umweltbewusstseins dienen. Im großen Ganzen handelt es sich bei dem Angebot vor allem um Aktivitäten, Projekte und

Publikationen zur Förderung des Umweltbewusstseins, die an die Öffentlichkeit und an Schüler gerichtet sind, und in zweiter Linie um Ausbildungskurse. Weniger als 20 % der Leiterinnen und Leiter von derartigen Programmen verfügen über irgendeine Form der Ausbildung zur UE oder deren Didaktik. Der Beitrag von Nichtregierungsorganisationen (NRO) zur UE erstreckt sich vor allem auf die folgenden Assoziationen: Jordanische Umweltgesellschaft, Königliche Gesellschaft für Naturschutz, Freunde der Umwelt.

Die Befunde deuten darauf hin, dass sowohl die Beschäftigten des Öffentlichen Schulwesens als auch die Leiter von Programmen zur Bildung von Umweltbewusstsein mehr pädagogische Ressourcen und UE Ausbildungskurse benötigen. Sie sollten auch die Vorteile einer engeren Zusammenarbeit nutzen. Eine nationale Koordinationsstelle könnte diese Kooperation organisieren und Ressourcenverschwendung (durch Duplikation) vermeiden helfen. Die Stelle müsste auf der Allgemeinen Körperschaft für Umweltschutz, dem Erziehungsministerium, den Umweltschutzverbänden und dem Hochschulrat basieren.

Der Verfasser darüber hinaus unter Berücksichtigung der Ergebnisse seiner Studie ein Unterrichtsmodell vor, das auf die Situation des jordanischen Schulwesens bezogen ist. Es etabliert eine Kooperation zwischen dem Schulwesen und kommunalen Einrichtungen. Das Modell beruht auf der Wirkung von Erfahrungen aus erster Hand, von Lernen durch Tun und der Teilhabe an der Bearbeitung lokaler Umweltprobleme. Die Schüler wählen zunächst eine Frage nach ihrem persönlichen Interesse aus, studieren die damit verbundene Sachverhalte und entwickeln Handlungsstrategien zur Problemlösung, die schließlich evaluiert und möglicherweise umgesetzt werden. Es bietet sich an, die Laboratorien in den Schulen als Zentralstellen der Programme und Ausgangsbasen für Aktivitäten außerhalb der Schule zu nutzen.

Weitere Empfehlungen im Hinblick auf die Lage der UE in Jordanien und weitere Desiderate der Forschung werden aufgeführt.