Preventing Environmental Problems in the Arid and Semi-Arid Zones Environmental Education is What We Need

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Jel classification : Q 200, O 130

Abstract

The world population is facing enormous environmental problems due to the rapid population growth. Ninety percent of the projected increase will take place in developing countries including the Arid and Semi-Arid Zones. Modest government policies, absent of development plans, pollution of ground waters, soil, and air, desertification of millions of hectares, and urbanization, are but a few of the many concerns facing these countries.

Environmental education can play a dual role in environmental management and in insuring sustainable development. It is seen as one of the most effective ways to stop further deterioration of our planet and conservation of natural resources.

Public awareness about the consequences of environmental problems is needed more than ever before. It can lead to sustainable development if it is considered wisely. Environmental education is a crucial variable for achieving economic growth, sustainable development and human progress.

This paper provides an overview of the environmental problems facing developing countries, especially those in the Arid and Semi-Arid zones and the vital role that environmental education can play.

Résumé

La population mondiale se trouve confrontée à des problèmes environnementaux très graves causés par sa croissance rapide. Quatre-vingt-dix pour cent de l'accroissement prévu aura lieu dans des pays en développement, y compris les Zones arides et Semi-arides. Les politiques peu clairvoyantes des gouvernements, l'absence de plans de développement, la pollution des eaux de nappe, du sol et de l'atmosphère, la désertification de plusieurs millions d'hectares et l'urbanisation parmi les préoccupations nombreuses qui pèsent sur ces pays.

L'éducation environnementale peut jouer un double rôle dans la gestion de l'environnement et dans la promotion du développement durable. C'est là l'une des voies les plus utiles pour arrêter la détérioration croissante de notre planète et favoriser la préservation des ressources naturelles.

La sensibilisation de l'opinion publique sur les conséquences des problèmes environnementaux est devenue un véritable impératif en vue de garantir un développement durable et à condition qu'elle soit convenablement orientée. L'éducation environnementale est une variable cruciale pour atteindre la croissance économique, le développement durable et le progrès humain.

Dans ce travail, on passe en revue les problèmes environnementaux auxquels se heurtent les pays en développement, notamment ceux des Zones Arides et Semi-arides et on examine le rôle prépondérant que peut avoir l'éducation environnementale.

1. Introduction

Nobody denies the fact that our world has become a "Global Village". Changes taking place in one country can affect other nations thousands of miles away. Problems of one country can and for sure will affect neighboring ones. It is well known that environmental problems do not respect national boundaries. A good example is the global warming affecting most world countries by carbon dioxide build-up, released by the developed world. We still remember the Chernobyl catastrophe during the 80's where many European countries suffered radiation. Acid rains in Canada are a big problem that is created in the United States.

The development of science, research, and education can be used and benefit all world population positively if it is used effectively and efficiently. There is no doubt that it can also affect the lives of billions of people if it is used unwisely. Close interaction, therefore, is essential between researchers, decision makers and ordinary people to insure that the life of future generations is not jeopardized. Priorities must be set so that the limited resources are focused on solving the most important problems facing humanity. It is very important to promote the enhancement of local abilities for conservation and efficient utilization of natural resources through the development of appropriate technologies; policies, rules and procedures must be environmentally sound, socially acceptable, and economically viable.

2. The global dimension of environmental problems

Our natural environment as defined by Karunadasa (1998) is "...that special asset of naturally occurring stock of resources, such as air, water, land, forests, and fisheries, which is available to human beings for use" (p.55). Certainly, the word "use" as described by Karunadasa means "the appropriate use", which has little or no negative effect on the quality of our environment. Such negative or damaging effects occur when more waste is generated than the environment's assimilative capacity. It is basically associated with the unmanageable pressure caused by population growth.

The population explosion described by many researchers was among the most important reasons beyond the deterioration of our natural environment. In his book, "The Popu-

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lation Bomb", Paul Ehrlich (1968) was among the first to sound the alarm that an urgent action is needed before catastrophes are eminent. Sadik (1991) described the magnitude of the problem that adds urgency to what the whole world is facing. He indicated that the world is increasing by three people every second-over a quarter of a million everyday; a billion people-a whole extra China will be added over the decade.

This added one billion people will share the limited natural resource with the existing population. Meeting their demands for food and water will require more economic activities that will increase the pressure on natural environment already suffering serious problems, destroying livelihoods and reducing biodiversity. The progress that has been made in scientific research in the last few years means that although food sufficiency remains the number one problem facing manhood, the battle against hunger is not completely lost.

Meeting the increasing demands for food products for billions of people around the world must be given greater focus, because it is the biggest challenge facing policy makers. If no action is taken, poverty and instability will cause a long list of problems. Pun and Maass (1998), for example, estimated that between 1990 and 2010, the demands for meat and milk in developing countries would grow by 66 percent and 233 percent respectively.

Serious problems will occur within the next few years. Biodiversity for Development Magazine (1999) indicated that in the early 90's, more than 800 million people were inadequately fed. According to the same magazine, the food gap was estimated at 94 million tons of cereals and if the same trends continue, the food gap will jump to over 238 million tons by the year 2020.

According to Al-Quds Al-Arabi Newspaper (2003), a child dies from hunger every 7 seconds and another looses his sight because of lack of proteins, 840 million suffer from malnutrition in 2002, a jump from 815 million in 2001, and 1.2 billion live under the poverty line. To close the gap, developing countries must increase food production at rates never before achieved.

Our natural environment was deteriorating so fast due to the population growth. It is well known that environmental problems are not restricted to one country or to

a certain region. It is a global problem that respects neither national nor geographic boundaries. Unfortunately, many of these problems have catastrophic effects which are irreversible and can not be prevented; natural resource degradation, erosion of topsoil, loss of biodiversity, depletion of the ozone layer, desertification and deforestation of millions of hectares, the destructive effect of acid rains, the pollution of air, water, and soil, and the increasing rate of fossil fuel consumption are but a few of the many environmental disasters.

Soil erosion is one of the most serious problems facing the rapidly increasing population, due to the fact that soil is the main factor in achieving food security. Pimentel (1993), for example, stated that most world countries have serious soil erosion problems to the extent that 30-50% of the earth's land surface is affected. It is a universal problem and a serious threat to man's well-being.

The economic loss caused by soil erosion is so difficult to determine. However, Dregne (1978) estimated that the loss of 2.5 cm of topsoil is enough to reduce the United States wheat yields by 4,032,000 tons a year. Miles (1991 found that worldwide loss of topsoil between 1970-1990 was over 480 billion tons, deserts grew by 300 million acres, and forests were reduced by 500 million acres. Brown, Falvin and Postel (1992) indicated that world farmers lost over 480 billion tons of topsoil- an area equal to agricultural lands of France and India. Kircher, Wallace, and Gore (1992) pointed out that a soil once eroded couldn't be replaced, while Wolman (1985), believed that enormous inputs are needed to replace soil productivity.

Inappropriate irrigation methods and the wrong farming practices used by illiterate farmers have become a serious threat to the well being of millions of residents. Pollution caused by fossil fuel consumption, massive use of chemicals and over-fertilization in agriculture, contaminating air, soil and groundwater have become a serious problem. It constitutes one of the key environmental problems touching the lives of millions of people all over the world. Orshu (1998) pointed out that a UN report indicated that over 150 million tons of polluted gas and particles spread to the atmosphere annually. Lacoste (1992) reported that the Japanese scientist found that between 1981-1991, the ozone hole was 13 times wider. Sanderson (1992) pointed out that over half of the worldwide warming is due to carbon-dioxide buildup, which is expected to cause skin cancer to over 35% of the world's population.

Water resources in many world countries are scarce. The human populations are growing while water availability is not. Water resources are contaminated and the sewage is left untreated. According to "Biodiversity for Development Magazine" (1999), an estimated 3 billion people in 50 countries, mostly developing countries, will have no access to safe drinking water supplies by the year 2025. The population growth will push many countries into conditions of chronic water scarcity.

Urbanization is another serious concern affecting most world countries. More than 25 million hectares of tropical forests are lost each year (Biodiversity and Development, 1999). The United Nations Development Program (1996) reported that urban areas occupy about 2% of the world's land surface, but use over 75% of the world's resources, discharging huge amounts of wastes into local and global environment. The Arid and Semi-Arid Zones are no exception. More people live in towns and cities than in rural areas. According to Rabinovitch and Schmetzer (1997), more than 2.2 billion people live in urban areas of Asia, Africa, and Latin America.

3. Future trends

There is no doubt that the world is facing a wide variety of environmental trends, and overpopulation is among the most serious ones facing humanity. Developing Countries, including those in the Arid and Semi-Arid Zones, are on the top of the list. They confront enormous environmental problems and are susceptible to the problems of environmental degradation. Government's modest policies and strategies to meet the needs of a rapidly growing population have put more unmanageable pressure on the environment and the natural resources.

Improper water management rapidly increased the waste of water resources where water situation is precarious. Clarke (1993) described the seriousness of the water crisis when pointing out that in 1985 nine Arab countries could meet the basic level of water demand, while twelve couldn't. The regions' deficit would amount to more than 421 billion cubic meters of water a year- much more than the regions' supply. He believed that, by the year 2025, water supply would lag far behind their demand. The problems in these countries are the consequences of overexploitation of water resources where some irrigated areas are seriously affected by salinization.

Maaroufi (1996) described the magnitude of the water problem when he indicated that Jordan is among ten countries in the Middle East and North Africa (Libya, Oman, Qatar, Jordan, Bahrain, United Arab Emirates, Israel, Saudi Arabia, Kuwait, Lebanon, the West Bank and Gaza Strip) that consume more than 100% of the renewable fresh water supplies, and nine countries have known problems of poor water quality (Algeria, Egypt, Iran, Iraq, Jordan, Lebanon, Morocco, Syria, Tunisia, the West Bank and Gaza Strip). The annual per capita water availability has fallen by 60%, from 3300 cubic meters in 1960 to 1250 cubic meters in 1996. The Jordan Environmental Association (2002) supported Maaroufi when he pointed out that the water consumption has fallen from 800 cm to 200 in 1999 - one of the lowest levels in the world.

The rate of desertification in the Arid and Semi-Arid Zones is accelerating throughout the whole region. The degree varies within the drier region, however, some 3 billion hectares, or approximately one-fourth of the earth's land surface, is damaged by factors that contribute to desertification. Tunisia and Libya, for example, are loosing 100,000 hectares of croplands each year (Alexandratos 1987). In Jordan, over 92% of the country's lands are desert and only 5.09% of the remaining territory of the country's area can be cultivated and used (NCARTT, 2001). A similar picture can be seen in Egypt, Iraq, Saudi Arabia, Libya, Algeria, Syria and many other countries.

Urbanization is one of the most significant processes affecting the livelihood of developing countries and shaping their daily life and future. Rabinovitch and Schmetzer (1979) believed that more people will live in cities than in rural areas and at least fifty cities will host more than four million inhabitants each. The rapid increase in the population of a country like Jordan, for example, has increased by more than 254% between 1971 and 2001 to reach 5.2 million (Al-Sabeel, 2002). The three largest cities in Jordan (Amman, Zarqa, and Irbid), for example, host more than three-fourth of the country's population. Cairo, Damascus, Riyadh, Baghdad, and many other capitals in this part of the world have over-population problems. The result is a radical transformation in the structure of cities, accompanied by social, economic, and environmental changes.

According to Ubeidat (1991), any city in the world with a population of one million consumes an average of 600,000 tons of water daily, 2000 tons of food, and about 9500 tons of fuel. At the same time, the same city produces about 2000 tons of garbage, 500,000 tons of drainage water, and 950 tons of polluted air. A good example of pollution problems, in the Arid and Semi-Arid Zones, is mentioned by Orshu (1998). He indicated that the number of cars entering the city of Zarqa-Jordan through one of the main streets in a 24-hours period exceeded 18385, while the number of cars leaving through the same street was 16360.

What is clear is that despite the increased number of environmental agencies and institutions all over the world, and despite the increased attention to environmental research, environmental disasters continue to pose a real threat to millions of people in these areas. It is clear that environmental education has not received the deserved status in school curriculum and people's perception of such problems is still far away from recognitions. The challenge raised will no doubt continue for the decades to come and the magnitude of the task facing these countries in establishing and operating the necessary education and training services for sustainable development is immense.

4. Conclusion

In a world where progress is soaring at an increasing rate, society must adapt its technology to solve its problems. There is an urgent need to address third world problems to improve the economy, increase production efficiency, improve their standard of living and enable them to become prosperous nations. Because of the important role of agriculture in the economy, narrow base of education, rapid rate of technological changes in agriculture, and widespread literacy, there is a strong case for the establishment of effective environmental education. Studies of sustainable development have proved that environmental education is one of the crucial variables for achieving economic growth and human progress. There is an urgent need for a new revolution in the attitudes and thinking of people.

It is important to improve the capabilities of education and training institutions to produce trained personnel required for making agriculture a sustainable commodity. Training in environmental issues is extremely important, yet such education has never been given the necessary importance, and has been totally neglected. Only with envi-

ronmental education and training, people can change their perceptions about the environment.

Environmental education must not cover the economic aspects only, but give equal attention to social and ecological dimensions as well. The development of environmental education as a discipline must draw knowledge from many other scientific and technical fields such as ecology, biology, information management as well as curriculum development of schools, community colleges and universities. It is very important that environmental education becomes an important source of support to the maintenance of our environment and the sound management of conservation of natural resources.

More emphasis must be put on changing people's attitudes and thinking to the causes and effects of environmental problems. The new techniques of teaching new environmental education courses must not be routine, but a powerful tool in determining the importance of protecting our water resources, air and soil from deterioration. Environmental education operates largely by stimulating, supporting and coordinating all activities with the work of many institutions and individuals at the local, regional and international levels with the help and support of NGO's. The unique combination of strong research and effective extension will gain experiences in balancing the needs of the communities with those of conservation, which will lead toward a sustainable development.

The close ties between environmental education and sustainable development were acknowledged by the international community as the guiding principle for a better future life on the earth. Such principle means that social progress and economic development must be brought into line with the need to safeguard the vital natural resources (Hebel, 1998). It becomes a reality only if all people around the world think globally and act locally. It requires dependence on local rather than outside resources to improve the economic and social conditions through individual and collective efforts without jeopardizing the global environment.

Environmental concerns must be integrated into school curriculum in a way that environmental education becomes an instrument of growth rather than a restraint on development. To date, many development programs have diminished rather than enhanced the welfare of their people. The problems in these countries are the result of overexploitation of natural resources.

Certainly, such problems will continue for many years to come unless education and training institutions improve the livelihood of people through changing their attitudes and perceptions about the environment. The magnitude of such tasks facing third world countries is immense. Education and training are required for making science and technology the perfect tool in overcoming environmental problems and a vital step in creating and establishing sustainable development.

As Mitschke, Gersemann and Reichling (1998) put it, "sustainable development, seen as striking a balance between the environment, society and the economy, as well as between interests of today and tomorrow, cannot be attained by way of technocratic planning, but only by processes of negotiation between all actors who have to work together", (p.49)". Sustainable development must be a question of sustainable interaction between environmental education and people. A change in attitudes is crucial to avoid present catastrophe and to make sustainable development possible.

There is no doubt that one of the main strategies to achieve sustainable development is the wise management of the available natural resources. It implies the teaching of efficient practices and technologies as well as the adoption of improved techniques whenever needed. Education and training can help not only farmers, but also rural and urban people to better use the resources, recycle products, protect ground water from pollution and certainly change people's attitudes to the better.

Understanding social problems can play an important role in speeding or slowing technology transfer process. Recognizing socio-cultural and economic aspects of a society can insure and increase the knowledge basis, broaden participation, and enhance a wise management of natural resources. The structure of a society can determine the speed rate of technology dissemination. The more a nation is open to the world, the faster the technology transfer will go. For those nations that close their borders to development, technology transfer is unable to penetrate and to promote changes.

No doubt that technology transfer can improve the economy, hence reducing unemployment, crime rate, and increasing the quality of life. Certainly, when people find the latest technologies at their front door, they become more aware, better educated and more career-oriented. As a result, the family size decreases, thus reducing over population and reducing the pressure on natural resources.

Governments must put more emphasis on adopting the latest techniques in agriculture, manufacturing and education. Certain measures such as rationalizing energy prices, reducing fossil fuel consumption, raising prices, encouraging the use of unleaded gasoline that has less pollutants, and making the private sector involved in managing power stations are just a few of the measures that can be implemented.

Governments must increase their support to environmental education and extension. Short and long-term training is a must, and establishing regional centers for training is also important. There is an urgent need for redesigning policies and techniques, and also for the development and implementation of sustainable strategies for knowledge and information dissemination, on-farm trials, and other demonstration activities at all levels. New water and energy conservation measures, like increasing the prices of irrigation water and fossil fuel must be introduced.

An urgent need exists for governments to establish and identify agencies that should have overall responsibilities in enforcing rules, guaranteeing full cooperation of factories,

farmers, and ordinary individuals, and trying if necessary, to implement sustainable development. Improving institutional linkages, especially between research facilities and involved agencies is a must. Classification of all research findings (local, regional and international) that can be adopted must be disseminated in the form of technology packages to be used. Overall supervision of all plans and reviewing monthly reports must be done systematically. Enhancing local abilities for conservation can ensure sustainability by enabling national staff and researchers to implement applied research and strengthening extension must be encouraged.

The seriousness of environmental problems requires integrated efforts by all parties. Government institutions as well as NGO's will have the main role to play. It is not an easy task, but a very complicated one. Environmental problems can be prevented only if all people cooperate and consider it as their local problem. Researchers and environmentalists agree that the only way to stop the deterioration of our planet and to prevent future damage depends largely on changing people's attitudes toward their environment and on the sound use of natural resources through effective and well developed environmental education curriculum.

Références

Alexandratos, N. (1987). World agriculture toward 2000. Food and Agricultural Organization. Rome, Italy. Belhaven Press. A Division of Pinter Publishers. London.

Al-Quds AL-Arabi (2003). No. 15 (4481), P.14. (In Arabic)

Al-Sabeel Weekly Newspaper (2002), No. 445 year 9, July 23-29 (In Arabic).

Biodiversity for Development (1999). The New Strategy of the International Plant Genetic Resources Institute. IPGRI, Rome, Italy.

Brown, L.R., Flavin, C., & Postel S. (1992). A planet in jeopardy. The Futurist, 26(3), 10-14.

Clarke, R. (1993). Water, the international crisis. Earthscan Publications Ltd, London Published in association with the Swedish Red Cross.

Dregne, H.E. (1978). The effect of desertification on crop production in Semi-Arid regions. In G.H. Cannel (Ed.). Proceedings of an International Symposium on Rainfed Agriculture in Semi-Arid Regions. University of California, Riverside.

Ehrlich, P. (1968). The population bomb. New York, NY: Ballantine Books, Inc.

Hebel, A. (1998). Sustainable land use-six years on from the Rio Conference on Environment and Development. Agriculture and Rural Development Journal. 1 (98), p.45-48

Jordan Environmental Association (2002). Annual report, 2002.Amman, Jordan

Karunadasa, K. (1998). A case for promoting urban agriculture and environmental protection in Sri Lanka. International Agriculture and Extension Education Journal. Volume 1, spring 1998. A publication of the Association for International Agricultural and Extension Education.p.55-58

Kircher, H. B., Wallace, D. L. & Gore, D. J. (1992). Our natural resources and their conservation, (7 th. Ed.). Danville, IL.Interstate Publishers, Inc

Lacoste B. (1992). Saving our ozone shield. Our Planet, 4(4), 4-7.

Maaroufi, A. (1996). Environmental problems and perspectives in Middle East and North African regions. MEDIT Journal, 4, 25-28.

Miles, J. (1991). Twenty going on one hundred: What now for environmental education. Clearing, No.69, 6-9, 37.

Mitschke, E., Gersemann, J. and Reichling, J (1998). The future means accepting responsibility for our environment. Agriculture and Rural Development Journal, 1 /98,p. 48-50.

National Center for Agricultural Research and Technology Transfer / NCARTT (2001). Annual Report 2000-2001, Amman, Jordan.

Orshu, I. (1998). Zarqa, a hot environmental area. Al Nadi Alquqazi # 11 (In Arabic).

Pimentel, D. (1993). World soil erosion and conservation, Cambridge University Press.

Pun, H. L. and Maass, B. L. (1998). The role of international livestock research in addressing human needs and the environment. Agriculture and Rural Development Journal 4(98), p.58-61.

Rabinovitch, J. and Schmetzer, H. (1997). Urban agriculture: Food, jobs and sustainable cities. Agriculture and Rural Development Journal, 2/97, 44-45.

Sadik, N. (1991). World population continues to rise. The Futurist 25(2).

Sanderson, G. F. (1992). Climate change, the threat to human health. The Futurist, 26 (2), 34-38.

The United Nations Development Program (1996). UNDPA96,

Ubeidat, T. (1991). Engineering designs of streets and its effect on air pollution. Resalet

Al bee'ah. No. 1 month 12, p.32.

Wolman, M. (1985). Soil erosion and crop productivity: A worldwide perspective. In R.

Follett &B. Stewart (Eds.), Soil erosion and crop productivity. Madison, WI: Soil Science Society of America, Inc.