

Environmental education as a solution tool for the prevention of water pollution

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Abstract

Water is the origin of life. 3/4 of the Earth's surface is covered by water and all living things must have water to survive. Life without water can not be considered. Despite this, of all living things only humans exploit, waste and pollute this vital natural resource. Raising awareness of the people on this issue is of great importance. At this point, environmental education is a key concept. This theoretical study aims to reveal the importance of environmental education as a solution tool for the prevention of water pollution. The study will be undertaken depending on the literature review.

Keywords: Water, Water pollution, Environmental education

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Introduction

Many anthropogenic pollutants contaminate water bodies. These pollutants can come from a specific source such as a pipe that discharges used water or other material from a factory into a water body. Such discharges can harm the aquatic ecosystem. Pollutants can also come from large areas such as agricultural fields that have been covered with fertilizer or pesticides. Fertilizer and pesticide residues can run off or wash into streams and rivers or seep into soil, contaminating underlying groundwater. Pollutants can come from parking lots, gardens, driveways, sidewalks, lawns, and roads. Rain water or melted snow can transfer materials such as oil, litter, fertilizers, and salt down storm sewer inlets found on the streets. In some areas, the storm sewer transports this polluted water to a water treatment facility. In other areas, the storm sewer transports this polluted water to a nearby river, lake, stream, or wetland (EPA, 1997). In short, to prevent this anthropogenic effect, it is primarily necessary to educate people. Environmental education can be used as a powerful tool in this context.

Definition of water pollution

The word pollution in dictionaries define as contamination; desecration; dirtying, soiling; spoiling, destruction. Contamination material can be explained as a component located where is naturally it should not been there or its concentration is higher than

normal concentrations. Moreover, it would have adverse and harmful effects on living organisms. Generally, pollution includes air pollution, water pollution, noise pollution and soil contamination (Safari, Naderi, Ghasemi, 2014: 1179). Among the types of pollution, water pollution is of great importance for the health of all living organisms. Water is essential for all living organisms. It is vital to life on Earth. Water and life are inseparable so life is unthinkable without it. Unfortunately, this very important source for all living organisms is used unconsciously and contaminated by humans. However, humans are also a part of nature and they actually destroy their own future with their unconscious behaviors. Pollution they cause threaten their future generations.

It is known that pollution is a human problem because it is a relatively recent development in the planet's history: before the 19th century Industrial Revolution, people lived more in harmony with their immediate environment. As industrialization has spread around the globe, so the problem of pollution has spread with it. When Earth's population was much smaller, no one believed pollution would ever present a serious problem. It was once popularly believed that the oceans were far too big to pollute. Today, with around 7 billion people on the planet, it has become apparent that there are limits. Pollution is one of the signs that humans have exceeded those limits (Woodford, 2015). Humans take for

granted that they have easy access to clean water for drinking, washing dishes and cleaning their clothes, but water isn't always clean. A body of water, such as a lake, stream, river, pond, ocean and even the water underground in the soil, can become polluted when it's contaminated by sewage leaks, agricultural runoff or chemical spills. When water is polluted, it becomes unsafe for human consumption because the water contains dangerous or toxic substances and disease-causing bacteria and organisms (Friedl, 2003).

Normally, water contains dissolved air and a few mineral salts, which are useful rather than injurious to living organisms. However, sometimes substances harmful to living beings are present in water, in which case the water is said to be polluted (Mondal, 2015). Water pollution is any human-caused contamination of water that reduces its usefulness to humans and other organisms in nature. Pollutants such as herbicides, pesticides, fertilizers, and hazardous chemicals can make their way into water supply. Polluted water is a threat to human, animal, and plant health unless it goes through a costly purification procedure. Pollutants can contaminate our drinking water sources, reduce oxygen levels which can kill fish and other wildlife, accumulate in the tissue of fish we catch and eat from the lakes, and reduce the beauty of the water (EPA, 1997). Water is polluted if (Mondal, 2015):

- It tastes bad,

- It smells bad,
- Oil or grease is floating over it,
- There has been a decrease in the population of fish in the water body from which it has been taken,
- There has been unchecked growth of weeds in the water body from which it has been taken.

An adequate supply of safe drinking water is one of the major prerequisites for a healthy life, but waterborne disease is still a major cause of death in many parts of the world, particularly in children, and it is also a significant economic constraint in many subsistence economies. The basis on which drinking water safety is judged is national standards or international guidelines. The most important of these are the WHO Guidelines for Drinking Water Quality. The quality of drinking water and possible associated health risks vary throughout the world with some regions showing, for example, high levels of arsenic, fluoride or contamination of drinking water by pathogens, whereas elsewhere these are very low and no problem. Marked variations also occur on a more local level within countries due, for example, to agricultural and industrial activities (Fawell and Nieuwenhuijsen, 2003: 199).

The causes of water pollution and its effects on human health

Water is essential for survival. It has been stated that our existence is “intimately connected with the quality of water available to us. 25% of the

human body is made up of solid matter while the remaining 75% is water. If our bodies are not continuously supplied with water, our bodies become dehydrated and the vital organs will deteriorate until they are no longer viable for human life. Access to safe water is a fundamental human need and, therefore, a basic human right. Polluted water jeopardizes both the physical and social health of all people. It is an affront to human dignity. According to medical experts, an individual needs to consume at least 2 liters of water daily for basic survival. The health and livelihood of people depends on the availability of a safe drinking water supply. Unfortunately, drinking water may be susceptible to toxins. As the human population and development in modern technology increases, the risk for water pollution also increases (Ahmed, 2010). The causes of water pollution are listed below (Rand Water Foundation, 2015):

- **Urbanisation:** As more and more people move into cities and towns, these factors cause pollution: the physical disturbance of land due to construction of houses, industries, roads, etc.; chemical pollution from industries, mines, etc.; inadequate sewage collection and treatment; increase in fertilisers to grow more food and litter, which causes disease and has a negative visual impact.
- **Deforestation:** Clearing land for agriculture and urban growth often leads to water pollution. When soil is stripped of its protective vegetation

it becomes prone to soil erosion. This leads to an increase in the murkiness of the water which can cause the following: It can block the gills of fish; Bottom dwelling plants cannot photosynthesize as the sun's rays cannot reach them; There is an increase in disease as bacteria and viruses use the soil particles as a method of transportation.

- **Damming of Rivers:** Damming of rivers can have an impact on water in the following ways: Water flowing out of dams has reduced suspended material as a large amount settles to the bottom of dams and it is depleted of nutrients and is often more saline with detrimental effects on downstream agriculture and fisheries; Enhanced eutrophication may result due to the water spending a longer time in the dam; There is also increased evaporation in dams, especially those with a large surface area.
- **Destruction of Wetlands:** Wetlands are nature's way of cleaning water as well as damming water (they hold back water in summer and release it in winter). Destruction of wetlands destroys the habitat of many birds and fish; removes the natural filters capable of storing and degrading many pollutants, such as phosphorus and heavy metals; destroys natural dams and causes flooding further downstream.
- **Industries:** Industries produce waste that can affect the: pH of water (whether it is acid, neutral or

alkaline); colour of water; amount of nutrients (increase in nutrients can cause eutrophication); temperature (increase or decrease in temperature can have an impact on temperature sensitive organisms living in the water); amount minerals and salts (too much can cause health problems); murkiness of water (can block fish gills; bottom dwelling plants cannot photosynthesize as the sun's rays cannot reach them); increase in disease as bacteria and viruses use the soil particles as a method of transportation.

- **Mining:** Mines produce waste that can increase the amount of minerals and salts in the water (too much can cause health problems); can affect the pH of water (whether it is acid, neutral or alkaline); can increase the murkiness of the water.
- **Agriculture:** Agriculture increases soil erosion due to the physical disturbance of soil and vegetation due to ploughing, overgrazing, logging and road building. This effects the murkiness and the amount of salts and minerals in water; increases nutrients due to fertilisers and excreta, which contribute worrying amounts of nitrates and phosphates to water supplies (this can cause eutrophication) and increases pesticide use.

As can be seen in the list above, one of the greatest dangers to human and environmental health is water pollution. After all, people can't survive without drinking water, and if their freshwater

resources are polluted, they can become ill from drinking them. Different types of pollutants affect human health in different ways. Organisms that cause disease are called pathogens. Pathogens include bacteria, viruses, and parasitic organisms that infect humans and cause illness. Some pathogens occur naturally, and others pollute water when human or animal waste washes into the water. Some of the most common illnesses caused by pathogens in water include typhoid, cholera, dysentery, polio, hepatitis. These illnesses are particularly dangerous for young children; in fact, they account for almost 60 percent of early childhood deaths worldwide. In some regions of the world (parts of India, China, and Africa, for example), water-related illnesses are still a leading cause of death (Spooner, 2015).

As it can be seen from its causes and effects, human factor is the major factor in water pollution. Therefore, raising awareness of the people is of paramount importance for prevention of this problem. Universities, all level of schools, non-governmental organizations, local governments, health care professionals should work together for awareness-raising activities. Environmental education can be able to guide them in this regard.

The concept of environmental education
Population growth and economic development are contributing to many serious environmental calamities. These include heavy pressure on land, land

degradation, forests, habitat destruction and loss of biodiversity. Changing consumption pattern has led to rising demand for energy. The final outcomes of this are air pollution, global warming, climate change, water scarcity and water pollution (Anand, 2013: 9). Among these environmental problems, pollution has become an unending problem in the modern society and it is now becoming a threat to the livelihood of the people. The air we breathe, the water we drink and the soil on which most of our food is grown, constitute the main elements of our environment (Obafemi, Eludeyin, Akinbosola, 2012: 233). In attempt to address these problems, environmental education is a key factor. The main objective of environmental education is to equip learners with knowledge, values and skills that promote the protection and conservation of the environment (Peter, 2013: 57).

Environmental education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among man, his culture and his biophysical surroundings (Palmer, 1998: 27). Environmental Education (EE) is a process aimed at developing a world population that is aware of and concerned about the total environment and its associated problems, and which has the knowledge, attitudes, motivation, commitment, and skills to work individually and collectively toward

solutions of current problems and the prevention of new ones (Skanavis, 2004: 63)

Much of the work on environmental education within the last quarter century has been guided by the Belgrade Charter (UNESCO/UNEP, 1984) and the Tbilisi Declaration (UNESCO, 1978). These two documents furnish an internationally accepted foundation for environmental education. According to Belgrade Charter, the goal of environmental education is to develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones. Following Belgrade, the world's first Intergovernmental Conference on Environmental Education was held in Tbilisi, Georgia. Building on the Belgrade Charter, representatives at the Tbilisi Conference adopted the Tbilisi Declaration, which challenged environmental education to create awareness and values amongst humankind in order to improve the qualities of life and the environment. A major outcome of Tbilisi was detailed descriptions of the objectives of environmental education. Most environmental educators have since universally adopted these objectives (Thomson and Hoffman, 2003: 6-7):

- **Awareness**– to help social groups and individuals acquire an awareness

and sensitivity to the total environment and its allied problems.

- **Knowledge**– to help social groups and individuals gain a variety of experience in, and acquire a basic understanding of, the environment and its associated problems.
- **Attitudes**– to help social groups and individuals acquire a set of values and feelings of concern for the environment and the motivation for actively participating in environmental improvement and protection.
- **Skills**– to help social groups and individuals acquire the skills for identifying and solving environmental problems.
- **Participation**– to provide social groups and individuals with an opportunity to be actively involved at all levels in working toward resolution of environmental problems (Thomson and Hoffman, 2003: 6-7).

Environmental education can help to (Atkins, 2015):

- Protect human health,
- Promote sustainable development (environmental protection and pollution prevention in conjunction with economic development),
- Create interest in a wide variety of jobs in various environmental fields,
- Enhance learning in all areas of education,
- Reinforce the desire to protect natural resources for future generations.

Environmental education is a concept encompassing a vision of education that seeks to empower people of all ages to assume responsibility for creating a sustainable future (Australian Government, 2005). However it is impossible to imagine a sustainable future without clean water.

Environmental Education as a Solution Tool for the Prevention of Water Pollution

An important purpose of environmental education is to teach understanding about pollution in order to best protect the environment. Thus, groups involved with environmental education often teach individuals and groups pertinent information about subjects, such as biology, geology, meteorology, and hydrology, in order to better analyze the various sides of an issue through critical thinking. For example, members of the North American Association for Environmental Education (NAAEE) use a wide variety of materials and methods in order to investigate the environment within the context of economics, politics, popular culture, and social equity as well as natural systems and processes in order to better educate the public (Atkins, 2015). At this point, local governments have major duties and responsibilities because they are the organizations primarily responsible for the protection of the environment. Together with local governments, all level of educational institutions, NGOs, public and private institutions should come together for

the environment and work together to raise environmental awareness of people.

Environmental education is a very important and effective tool to promote public awareness. Activities related to environmental education should be done as follows:

- Farmers should be informed by experts about the negative consequences of excessive use of fertilizers and proper fertilization,
- Students should be informed about recycling process and waste materials,
- Parents should be informed about the harms of excessive consumption,
- Instructional films, slideshows, presentations, posters those stress the importance of environmental protection should be used,
- People should be advised to use public transport more,
- Mass media should be used in promoting environmental awareness,
- People should be informed about waste oils,
- People should be informed about the importance of all natural resources for life,
- Well attended forums, activities, presentations about protection of water and all the other vitally important natural resources should be organized regularly.

A meaningful environmental education needs to include education about, in/through, and for the environment. The focus is to help the learners develop knowledge, skills and

positive attitudes towards the environment (Kimaryo, 2011: 185). In this sense, extensive conscious and awareness should be targeted for every people ranging from children to adults with environmental education. When the informative programs which will be rapidly applied with the aid of communication devices are firstly provided for children, it can be possible to get favorable outcomes after a few generations. And with the adults' education, when the natural awareness is extended, the perspectives for the problems will be under control and appropriate policies can be generated. Our future assurance and the persistence of human being can only be provided with such precautions and conscious (Alpagut, 1997: 118-119). Not only for water pollution, radical solutions can be produced for all level and types of environmental problems with environmental education because environmental education aims to transfer people's attitudes towards environment in a positive direction. Thus, it will increase people's environmental awareness and environmentally friendly people will be able to bring radical solutions to environmental problems.

Conclusion

Water is a very important source for all living organisms. All the living organisms need water so it is life itself. It keeps them alive but polluted water is a very harmful substance. When humans drink polluted water it has

serious effects on their health. The polluted water produced by humans does not get properly treated. Some measures have to be taken before such a major problem occurs. According to Knapp (2005) it has many negative effects like diseases, death of aquatic animals, destruction of ecosystems, economic costs of cleaning processes, disruption of food chains. Here, education on the dangers of water pollution is extremely important, as it helps people to apply the right attitudes when dealing with the environment. Education activities that get people informed and empowered to help protect water should be encouraged and invested in. Environmental education enhances critical-thinking, problem-solving, and effective decision-making skills. It also teaches individuals to weigh various sides of an environmental issue to make informed and responsible decisions (Knapp, 2005). Awareness-raising activities is of great importance for people before they contaminate water sources. These activities can be accomplished through environmental education.

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