School of Doctoral Studies

Course Name:

Introduction to Environmental Engineering

Essay on Lesson 1
What is environmental Engineering?

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ENVIRONMENTAL ENGINEERING
ESSAY 1: WHAT IS ENVIRONEMENTAL ENGINEERING?

Introduction

We will begin our essay on environmental engineering by describing the concept itself, as well as the field of action of the environmental engineer and his/her projections in the short, medium and long term.

In addition, we will describe the typical functions of the environmental engineering career, as well as the professional profile that it must have.

As we will present in this essay, information and communications technology (ICT) provides very useful tools to properly educate oneself about the dangers of air, water and soil pollution (Davis, M.L.; Masten, S.J., 2013).

As we will see, some of these applications available for mobile phones provide us with relevant information regarding the current environmental conditions of the place where we are.

Below we will establish a timeline of the global awareness process about the importance that should be given to situations such as the existence of greenhouse gases, gases that deteriorate the ozone layer that protects us from certain frequencies of sunlight.

We will even refer to the different world forums that have been held in this 21st century related to the preservation of natural resources, including one of the most important, water; for which we will show that four world forums called World Water Forums have already been held (Davis, M.L.; Masten, S.J., 2013).

In the section related to Discussions we will detail each one of the existing applications to provide information related to the care that we must give to the environment, applications related specifically to the air, and applications related to all pollution phenomena, including noise pollution (Davis, M.L.; Masten, S.J., 2013).

Furthermore, in Recommendations we will refer to the measures that must be adopted to solve environmental problems, among which we will mention the reduction of pollution due to the use of plastics, reduction of the use of fuel for private and public transport, promotion of recycling techniques for plastics, metals and garbage in general, and, finally, the adoption of energy efficiency policies.

Description

Environmental engineering is the aspect of engineering that promotes sustainable development, through the study of environmental problems that affect human beings and the planet, based on the application of their scientific knowledge in areas such as chemistry, physics, ecology, biology, geology, social, economy and technology (Davis, M.L.; Masten, S.J., 2013).

It is also known as the branch of environmental sciences that seeks the prevention, control and remediation of environmental problems. To achieve this goal, environmental engineering uses the design, application and management of technological processes, products and services as tools.

The pursuit of a better quality of life for the human being of today and tomorrow is the goal of environmental engineering, thereby contributing to guarantee the conservation and preservation of natural resources.

It is a new branch of engineering, but with a great projection in the present and in the medium and long terms, because its objectives are increasingly understood to provide solutions to the ecological crisis facing humanity.

Among the functions of the environmental engineer is identifying and diagnosing negative impacts on the environment, in addition to presenting viable integral solutions to remedy potentially dangerous situations for human beings, air, water and soil (Davis, M.L.; Masten, S.J., 2013).

Some of the characteristics of the profile of the environmental engineer are the following (Davis, M.L.; Masten, S.J., 2013):

- Solid command of basic sciences oriented to the environment and its relationship with the means of production;
- Be able to carry out impact studies and environmental remediation of industrial and technological developments;
- Know how to establish the balance between the protection of the environment and the need for development of a region or country; and, without being limiting
- Design environmental remediation projects with the aim of achieving the recovery of soils subjected to intense mining and industrial processes.

Technology is the quintessential tool of the environmental engineer, who, depending on the level of studies completed, years of experience and exposure to the professional environment, will be able to develop in the private and public sectors as a contractor, as part of the middle management of a company and as a national and international consultant.

As can be seen, the future of environmental engineering is guaranteed since there are increasingly laws and regulations in favor of the environment, all of which guarantees its active participation in providing solutions to potential and existing problems that affect the environment. environment.

General Analysis

Next we are going to establish a timeline that establishes the chronology of the development of environmental engineering in the world.

It can be said that the beginning of environmental engineering can be placed on October 5, 1859, the date on which a sewage system was created in London, United Kingdom, with the aim of solving environmental and health problems in the wastewater that They manifested themselves through the transmission of diseases, such as cholera, through the consumption of contaminated water (Weiner, R.F.; Mathews, R. (2003).

On July 18, 1901, laws are created in London, United Kingdom, to restrict actions that harm the environment.

The environmental park system of the United States of America was created on September 14, 1920.

The United Nations Organization for Education, Science and Culture (UNESCO), promoted and put into practice on May 11, 1960 the so-called "International Policy for the care of the environment", with the aim of protecting heritage cultures of the planet.

On December 3, 1968, the General Assembly of the United Nations Organization approved Resolution No. 2398, through which it convened a conference of the Nations to deal with the problems of the human environment (Weiner, R.F.; Mathews, R. (2003).

In the city of Ramsar, Iran, the Convention on Wetlands of International Importance, especially as Waterfowl Habitat, was signed on January 18, 1971. Said convention entered into force on December 21, 1975. With it, it sought to: give rational use to all

wetlands; develop a list of all wetlands of international importance; and establish international cooperation for transboundary wetlands.

On October 17, 1971, Mexico established the Federal Law to Prevent and Control Environmental Pollution, and from this moment institutional efforts began to develop methodologies and mechanisms to evaluate the Environmental Impact in the various productive activities.

From June 5 to 16, 1972, the United Nations Conference on the Human Environment was held in Stockholm, Sweden. This forum published the Declaration of the United Nations Conference on the Human Environment, which provided 26 common principles to preserve and enhance the human environment. Thanks to this conference, universal interest was awakened in the degradation of the global environment and in the need to adopt urgent measures to counteract it (Weiner, R.F.; Mathews, R. (2003).

UNESCO approved on November 14, 1972, in Paris, France, the Convention on the Protection of the World Cultural and Natural Heritage, which establishes the ways in which man interacts with nature and the fundamental need to preserve the balance between humanity and cultural and natural heritage.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora met on March 3, 1973 in order to promote the conservation of threatened wild animal and plant species, controlling their commercialization. Initially only 21 countries signed it, currently 180 nations are signatories to this convention.

The World Commission on Environment and Development was created on March 4, 1983, with the aim of dealing with matters related to the accelerated deterioration of the

human environment and natural resources. His report “Our Common Future” was published in 1987, promoting the use of the concept of “sustainable development”.

On March 22, 1985, the Vienna Convention was signed. The objectives of the Convention were to encourage the Parties to promote cooperation through systematic observations, research and exchange of information on the impact of human activities on the ozone layer and to adopt legislative or administrative measures against activities that may produce harmful effects. damage to the ozone layer (Weiner, R.F.; Mathews, R. (2003).

The Montreal Protocol, negotiated in 1987, but which entered into force on January 1, 1989, is oriented towards the elimination of depleting substances from the ozone layer.

On March 22, 1989, the Basel Convention was signed, which is a global environmental treaty that strictly regulates the transboundary movement of hazardous waste and obliges the parties to the environmentally sound management of these, especially with regard to their final disposal.

Subsequently, on May 9, 1992, the Agreement on Climate Change was signed, with the aim of achieving the stabilization of greenhouse gas concentrations in the atmosphere at a level that prevents dangerous interference in the climate system and in a enough time. to allow ecosystems to adapt naturally to climate change, ensuring that food production is not threatened and allowing economic development to proceed in a sustainable manner.

A very important event in raising awareness about the environment was the Earth Summit, on June 3, 1992. At this meeting, the international community agreed to adopt a development approach in which the environment was protected, while ensure economic

and social development. Acceptance of the concept of sustainable development was established through the approval of two documents: the Rio Declaration on Environment and Development; and Agenda 21.

In relation to water resources, the First World Water Forum, held on March 22, 1997, in Marrakech, Morocco, aimed to develop a long-term vision on water, life and the environment, with projection towards the 21st century (Weiner, R.F.; Mathews, R. (2003).

On February 19, 1997, the transcendental Kyoto Protocol is signed, which contains legally binding objectives for industrialized countries to reduce emissions of the six greenhouse gases of human origin: carbon dioxide, methane, nitrous oxide, perfluorochlorinated, and sulfur hexafluoride.

Actualization

In the 21st century, new efforts are being made globally with the aim of reinforcing existing global regulations and creating others with the aim of making the sustainable development of the planet viable (Chapin III, F.S., 2011).

That is how the Second World Water Forum, meeting on March 17, 2000, warned about the threat of the reduction of fresh water due to pollution, waste, deforestation, land degradation and climate change.

On June 10, 2000, the Earth Charter was signed, which is a declaration of fundamental principles to build a just, sustainable and peaceful global society for the 21st century.

The Third World Water Forum was held in Kyoto, Osaka and Shinga, Japan, on March 16, 2003. The event had 24,000 participants from more than 170 countries. On this occasion, nearly 130 Ministers adopted a declaration emphasizing the role played by water as a promoter of sustainable development and launched the folder of actions on Water. An inventory of over 3,000 local actions regarding this vital resource.

Subsequently, the Johannesburg Conference, held on August 26, 2022, in Johannesburg, South Africa, aimed to renew the commitment made at the 1992 Earth Summit. The discussions focused on the way in which sustainable development could be ensured, so topics such as the eradication of poverty, water, energy, health, biodiversity, employment, education, among others, were addressed (Chapin III, F.S., 2011).

Once again, Mexico hosts an event related to the environment. This time it was the Fourth World Water Forum, held from March 16 to 22, 2006, its main theme being “Local Actions for a Global Challenge”.

"The future we want" was the final document of the Rio +20 Conference, on June 20, 2012, which focused on two main themes: the construction of a green economy to achieve sustainable development and its international coordination, as well as the poverty eradication.

One of the relevant results derived from the United Nations Conference on Sustainable Development or Rio+20 was the decision adopted on January 1, 2016 to undertake the formulation of the Sustainable Development Goals (SDG) in order to continue with the efforts made on a global scale to achieve sustainable development through concrete measures in specific sectors. This was the last important forum that sought a friendlier relationship between human beings and their environment (Chapin III, F.S., 2011).

Discussion

In the era of knowledge and the emergence of information technology and communications, there have been applications that provide insight into the conditions of the environment and solutions to actual or potential problems that can affect the quality of air, water and soil detriment of humans.

In this section of our essay we will refer to the applications most used by professionals and individuals interested in caring for the environment (Bajjali, W., 2018).

Applications Related to Information:

Recycling Guide: One of the most informative environmental applications. It was created by the company Ecoembes. In this application we can find information concerning the handling of plastic containers, metals, paper and cardboard responsibly. This application includes a classification of the different types of recycling bins, indicating the type of material that each should receive.

Abouit: Using this application brands and products and ranks them according to the impact they cause on the environment are evaluated. This valuable application analyzes with scientific precision products used in various sectors such as food, cosmetics, personal care, household cleaning, technology and appliances in order to determine their environmental sustainability.

Applications Related with Air:

AirEmission: This application records the emissions of harmful gases to the atmosphere and keeps track of all greenhouse gases in each area.

Air Plume Report: This application provides us with information concerning the level of pollution in each area and provides forecasts schedules trend of air quality. Complete information with advice to users of the platform about the best time to develop certain activities with the least possible risk.

AIRNow: With this application the user can obtain rigorous information about the state of the environment in a specific place. With a color-coded system, green, red and yellow will guide us about the quality of the air. Created by the Environmental Protection Agency of the United States of America (EPA), it is a very useful tool for people interested in caring for the environment (Bajjali, W., 2018).

Application Related to Pollution:

NoiseWatch: This application, developed in Europe, aims to measure the level of noise or noise pollution in a given environment. The data recorded by this software platform are sent to a database of the European organization that created to provide a global registry.

Mirubee: Measures energy consumption in homes. With this application you can determine the level of consumption in real time, of each household electrical equipment. This in addition to tips on how to make more efficient use of the energy we consume.

As we can see, the technology provides us with important tools to manage us properly adopt environmental control and lifestyles more friendly to our environment.

General Recommendations

Everything seems to indicate that the loss of biodiversity and the overexploitation of natural resources are two of the greatest challenges that countries, especially the great economic powers, will have to face in order to face the aftermath of climate change. Otherwise, there is a risk of not being able to achieve the sustainable development goals (Heinrichs, H., 2016).

At the end of 2020, the European Commission promoted the enactment of the Climate Law. This law seeks to achieve climate neutrality in the European Union in the year 2050.

If fulfilled, the Climate Law will promote actions to counteract the effects of climate change throughout the world. The report known as Climate Balance 2020, published by the World Meteorological Organization (WMO), presents extremely worrying data regarding the care of the environment (Bajjali, W., 2018).

According to data from the WMO, the year 2020 has been one of the hottest years in recent decades, with the temperature reaching an average value of 1.5 degrees Celsius above the average of recent years.

This information should move nations to adopt concrete actions that produce a reduction in greenhouse gases and deterioration of the planet's ozone layer. Among the provisions to be adopted are the following:

Reduction of plastic pollution: Plastic utensils, such as bags, plates, glasses, cutlery and bottles, among others, after being used end their useful life in sanitary landfills, in rivers, seas and oceans. The decomposition of plastic due to environmental

effects produces polluting gases such as methane and ethylene, which are the cause of global warming. To reduce the use of plastics, we must replace them with materials that are less harmful to the environment, such as using cardboard cups and plates. Use metal cutlery, washable and reusable. Make purchases at the supermarket with degradable cloth bags, instead of plastic bags (Heinrichs, H., 2016).

Reduce the use of fuels in transportation: It is well known that a high percentage of fossil fuel consumption is produced in the internal combustion of private and public transportation vehicles. The burning of these fuels produces polluting gases that contribute to reinforcing the greenhouse effect on the planet. To reduce fuel consumption, the use of hybrid or electric vehicles, collective transport with electric vehicles and, in cases where weather conditions, distances and safety allow it, should be recommended, promoting the use of bicycles to travel in the streets. cities.

Promote recycling: The recycling of inputs such as plastics, glass, metals, etc., reduces the production of goods made with these inputs, thereby reducing energy consumption in their production, less pollution of the environment and less demand for raw materials, thereby reducing the overexploitation of the planet's resources.

Energy efficiency: Energy efficiency must be understood as the rational use of energy in all its manifestations. Some examples of rational use of energy are the replacement of incandescent and fluorescent lamps with those of LED technology. In air conditioning, prevent condensing units from being exposed to direct sunlight. In household appliances such as washing machines, try to wash as many clothes as its capacity recommends. As you can see, it is not about not using energy, electric in this

case, but about using it rationally, without waste. As for the use of hot water, prevent it from running into the bathtub or sink drain if we are not using it, that is, close the valve when we are not needing hot water (Heinrichs, H., 2016).

Conclusions

Based on what we have learned in this essay, regarding environmental engineering, we may conclude the following:

1. Described the concept itself of environmental engineering, as well as the field of action of the environmental engineer and his/her projections in the short, medium and long term.
2. Listed the typical functions of the environmental engineering career, as well as the professional profile that it must have.
3. Showed that information and communications technology (ICT) provides very useful tools to properly educate oneself about the dangers of air, water and soil pollution.
4. Showed that some of these applications available for mobile phones provide us with relevant information regarding the current environmental conditions of the place where we are.
5. Established a timeline of the global awareness process about the importance that should be given to situations such as the existence of greenhouse gases, gases that deteriorate the ozone layer that protects us from certain frequencies of sunlight.
6. Referred to the different world forums that have been held in this 21st century related to the preservation of natural resources, including one of the most important, water; for which we will show that four world forums called World Water Forums have already been held.

7. Also detailed each one of the existing applications to provide information related to the care that we must give to the environment, applications related specifically to the air, and applications related to all pollution phenomena, including noise pollution.
8. Finally, referred to the measures that must be adopted to solve environmental problems, among which we will mention the reduction of pollution due to the use of plastics, reduction of the use of fuel for private and public transport, promotion of recycling techniques for plastics, metals and garbage in general, and, finally, the adoption of energy efficiency policies.

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