




# **Fundamental of Environmental Engineering**

## **Chapter 1: Introduction**



### **Environmental Engineering:**

**“A field in which one applies the basic fundamentals of mathematics, physics, chemistry, and biology to the protection of human health and the environment (Mihelcic et al., 1999)”**



**“Environmental engineering is manifest by sound engineering thought and practice in the solution of problems of environmental sanitation, notably in the provision of safe, palatable, and ample public water supplies; the proper disposal of or recycle of wastewater and solid wastes; the adequate drainage of urban and rural areas for proper sanitation; and the control of water, soil, and atmospheric pollution, and the social and environmental impact of these solutions. Furthermore it is concerned with engineering problems in the field of public health, such as control of arthropod-borne disease, the elimination of industrial health hazards, and the provision of adequate sanitation in urban, rural, and recreational areas, and the effect of technological advances on environment (The American Society of Civil Engineers, ASCE, 1977). ”**



## **How environmental engineers and environmental scientists work together?**

**“Scientist discover things and engineers make them work”**

**From educational point of view environmental engineering is founded on environmental science. Environmental science, in particular, quantitative environmental science provides the fundamental theories used by environmental engineers to design solutions for environmental problems.**

**Environmental engineers and environmental scientist have something to contribute. Each has to be familiar with the requirements of the other to be able to come up with an acceptable solution. In many instances the tasks and tools of environmental scientists and environmental engineers are the same.**

## Environmental Systems Overview

The relationships and interactions of plants and animals with the water, air, and soil that makes up their environments.

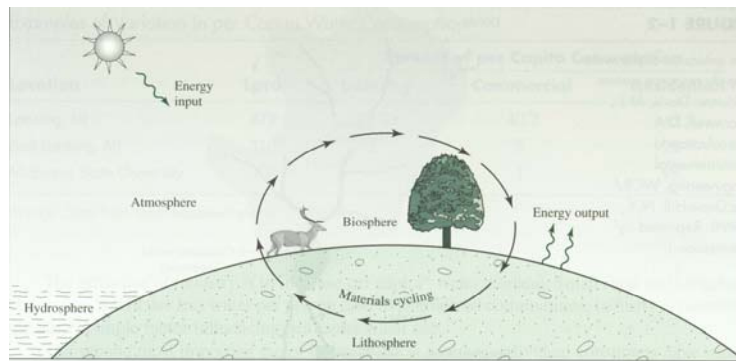


Figure 1-1 The earth as an ecosystem (Davis and Masten, 2004)

## Single-medium problems vs. Multimedia medium problems

**Single-medium problems:** pollution problems that affect on one medium that is either air, water, or soil.

**Multimedia-medium problems:** pollution problems that affect on more than one medium by crossing the boundaries from one to another.



## **Environmental Management Overview**

### **Water Resource Management**

- **Water supply system: surface-water and groundwater.**
- **Wastewater disposal system: domestic and industrial**

### **Air Resource Management**

- **Outdoor air**
- **Indoor air\***

### **Solid & Hazardous Management**

### **Multimedia Management System**

### **Sustainability**



## **Environmental Regulations**

- **Water Quality Act**
- **Clean Air Act**
- **Solid Waste Disposal Act**

## **Environmental Ethics**

**“To add of not add”**

**“You can’t do everything at once”**