

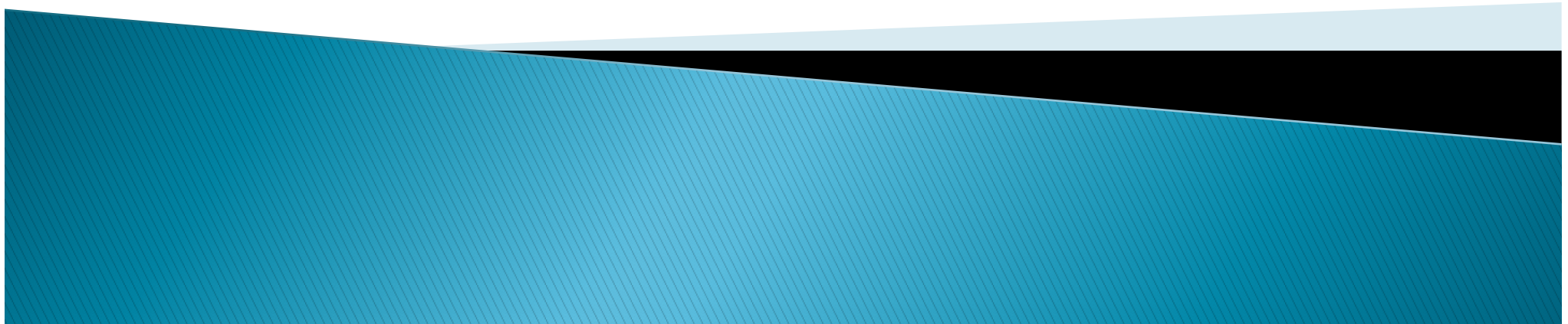
# Lectures in Environmental Geochemistry

By

Asst.prof .

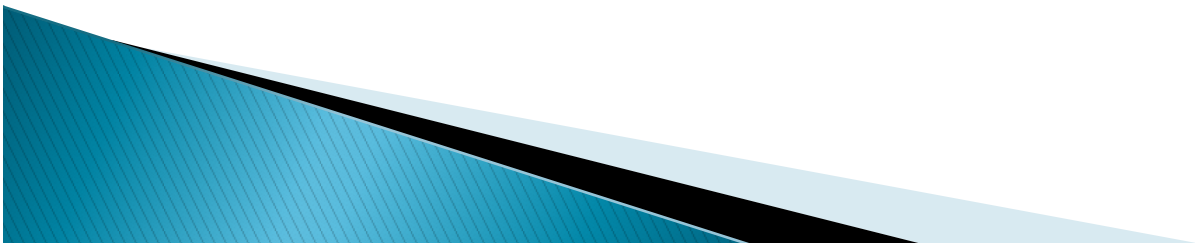
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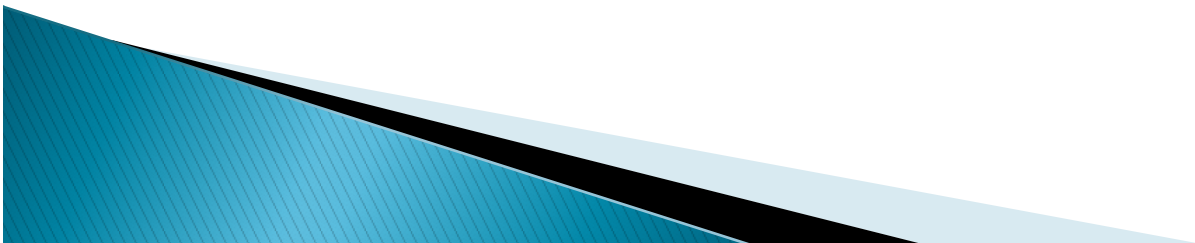
# Lecture one

- ▶ Heavy Metals in the Environment

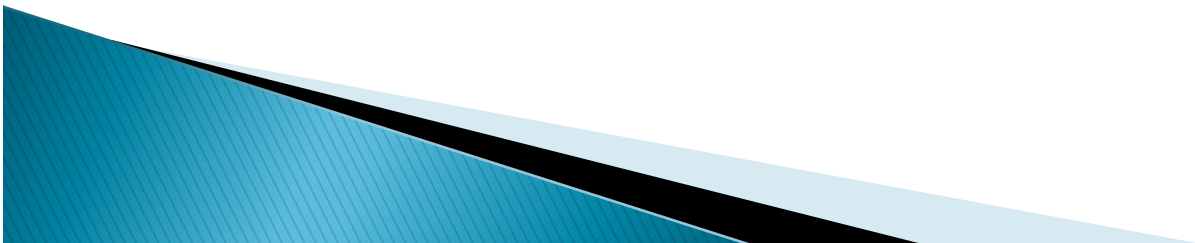


# Introduction:

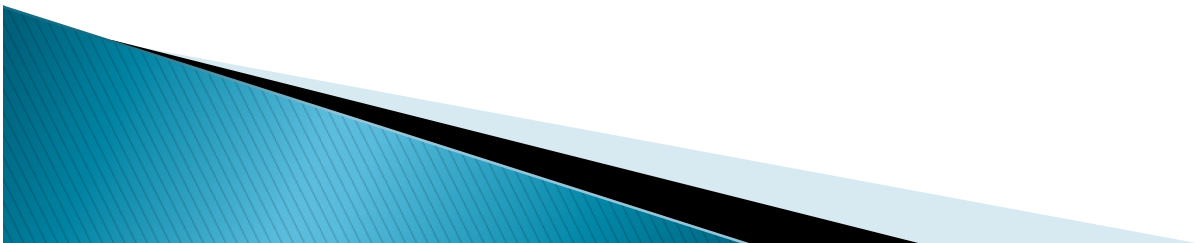
- ▶ **Metals:** Pb , Zn , Cd , Cr , Cu , Ni .
- ▶ These six metals , commonly classified as heavy metals , are a subset of a larger group of trace elements that occur in low concentration in the Earth crust. These heavy metals were mined extensively for use in the twentieth century Industrial society . Nriagu (1988a) estimated that between 0.5 (Cd) and 310 ( Cu ) million metric tons of these metals were mined and ultimately deposited in the biosphere .



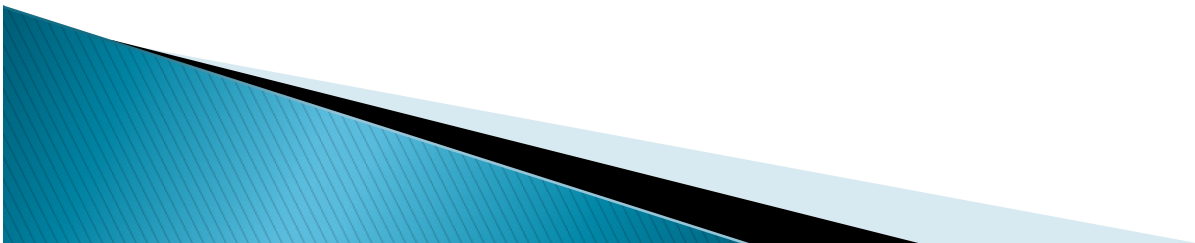
- ▶ In many instances, the inputs of these contributions from natural sources (weathering, volcanic eruptions, forest fires). By several times (Adriano, 1986). In this chapter, heavy metals (elements having densities greater than 5) and trace elements (elements present in the lithosphere in concentration less than 0.1%) are considered synonymous.



- ▶ It has been observed in the past that the rate of emission of these trace metals into the atmosphere is low due to their low volatility. However, with the advent of large-scale metal mining and smelting as well as fossil-fuel combustion in the twentieth century, the emission rate of these metals has increased dramatically.



- ▶ As most of these emissions are released into the atmosphere where the mammals live and breathe we see a great increase in the occurrence of the health problems such as lead (Pb) poisoning, cadmium (Cd) Itai-itai disease, chromium (Cr), and nickel (Ni) carcinogenesis.

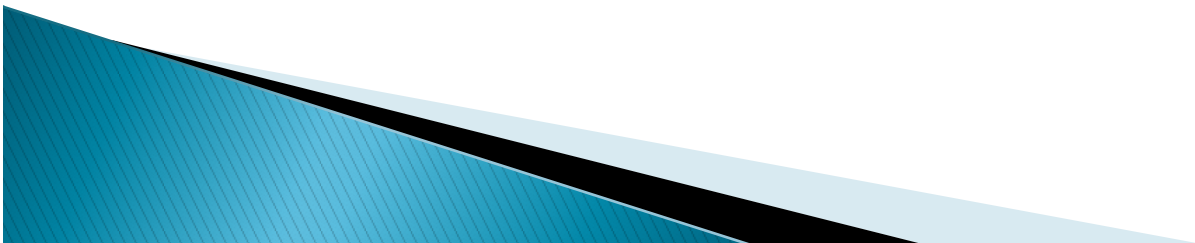


# Source Of Metals

- ▶ There are a variety and anthropogenic source of these metals (Pb , Zn , Cd, Cr ,Cu, Ni) in the environment.

- ▶ **Natural:**

the principle natural source of heavy metals in the environment is from crustal material that is either weathered on ( dissolved ) and eroded from (particulate) the earth's atmosphere by volcanic activity .



- ▶ These two sources account for 80% of all the natural source; forest fires and biogenic sources account for 10% each (Nriagu 1990b).
- ▶ Particles released by erosion appear in the atmosphere as windblown dust. In addition, some particles are released by vegetation.
- ▶ The natural emission of the six heavy metals are 12,000 (Pb), 45,000 (Zn); 1,400 (Cd); 43,000 (Cr); 28,000 (Cu); and 29,000 (Ni) metric tons per year, respectively.

