

CE 435 (January 2018 Semester)

**Environmental Pollution and Management:
Water Pollution**

CN-1: Introduction

Dr. M. Ashraf Ali
Professor of Civil Engineering, BUET

Water Pollution: Introduction

References:

1. Environmental Engineering

Howard S. Peavy, Donald R. Rowe & George Tchobanoglous
McGraw-Hill

2. Introduction to Environmental Engineering and Science

Gilbert M. Masters
Pearson Education Inc.

Water Pollution: Definition

“ Water pollution may be defined as any physical, chemical or biological change in water quality that adversely affects living organisms or makes water unsuitable for desired uses.”

May be caused by:

- Natural processes e.g., decaying plants, animals, weathered products, etc.**
- Anthropogenic processes e.g., industrial, agricultural, urban, domestic sources.**

Why is water so important?

- ❑ 71% of the earth's surface is water – mostly saline.
- ❑ Water is the basis of life and has two characteristics that make it so important:
 - **No plant or animal can survive without it.** All organisms are made up mostly of water; a tree is about 60% water by weight, and most animals are about 50 – 65% water
 - **There are no substitutes for most of its uses.** Each of us need only about 10 - 12 glasses of water per day to survive, but huge amounts of water are needed to supply us with food, shelter and other needs; e.g., about 5,000 liters of water are needed to produce 1 kg rice.

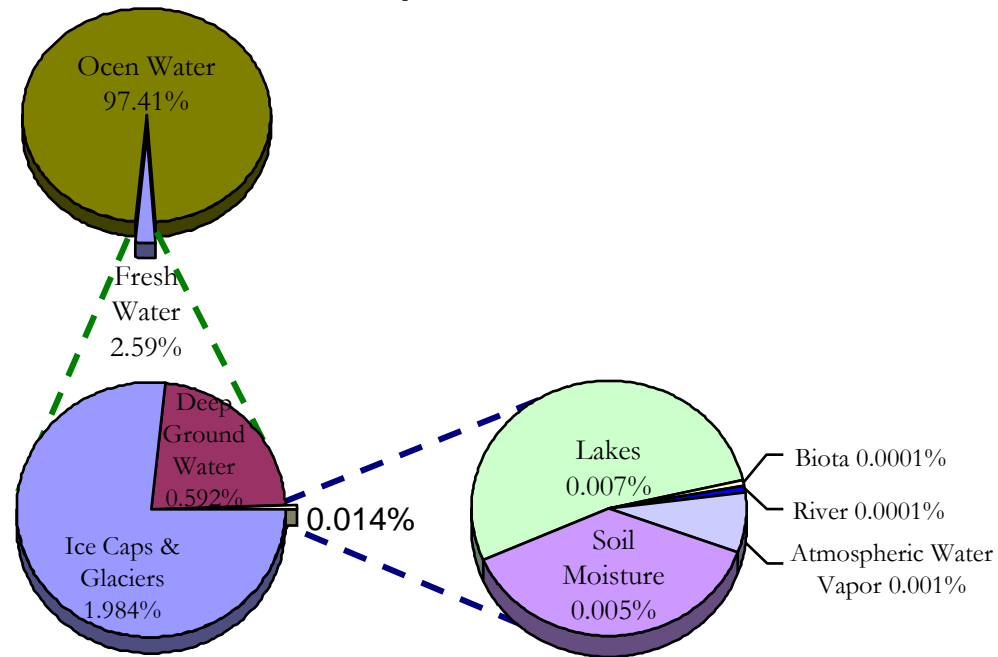
But how much water do we have for such uses?

Fresh Water Available for Use

- **About 97.41% water is in the oceans and is too saline for drinking, irrigation, or industry.**
- **Remaining 2.59% that is fresh water most of which is locked up in ice caps or glaciers or is in groundwater too deep to be used**
- **Only about 0.014% of the earth's total volume of water is easily available to us as**
 - soil moisture
 - usable groundwater
 - water vapor and
 - lakes and rivers

Fresh Water Available for Use

- If the world's total water were only 100 liters, our usable fresh water would be only about 0.003 liter i.e., about one-half tea spoon



Water Pollution: Global Scenario

- Worldwide, polluted water is estimated to affect the health of about 1,200 million people and to contribute to the death of about 15 million children under five every year (ICWE 1992)
- Polluted water and poor sanitation cause more than 500,000 infant deaths a year in the developing countries , as well as a huge burden of illness and disability (WHO 1992).

Water Pollution in Bangladesh

- The rivers Buriganga, Balu and Sitalakhya are typical examples of serious surface water pollution.
- **The worst pollution is found in Buriganga river in Dhaka mostly due to tannery wastes and domestic sewage.**
- Rivers near other industrial towns like Khulna and Chittagong have also become polluted.
- **Untreated wastes from industries including textile dyeing and printing are causing serious pollution of surface waters.**
- Excessive sediment load of rivers also constitutes a water quality problem.
- **Due to withdrawal of water from the Ganges, seawater intrudes a long way inside the coastline which causes river water pollution by salinity.**

Groundwater Water Pollution

- **Extensive use of agrochemicals:** leads to groundwater pollution.
- **Leaking sewers/septic tanks/pit latrines:** also cause groundwater pollution.
- **Arsenic/ Fluoride/Manganese contamination of groundwater:** While sources of these contaminants are natural, anthropogenic influences (e.g., over-extraction of groundwater) are thought to influence contamination of scenario.
- **Bangladesh is now considered the world's largest case of groundwater pollution from Arsenic.**

How the Rivers and Water Bodies are Getting Polluted?

- **Municipal / domestic sewage** (treatment before disposal mandatory)
- **Industrial wastewater** (treatment before disposal mandatory)
- **Storm runoff** (can be discharged untreated)
- **Agricultural runoff** (requires catchment management)
- **Drainage / leaching from land disposal of liquid and solid waste** (treatment before disposal mandatory)

Domestic sewage, industrial wastewater, and storm water are being mixed and conveyed through storm drains into the water bodies without any treatment.



21.01.2008

Greenish colored industrial wastewater being discharged into the Hatirjheel (near Rampura bridge) through the storm sewer (coming from Badda area)

Untreated sewage and industrial wastewater find their way into rivers/khals mostly through storm drainage system





27.11.2007

Storm sewer outfall (Outlet of Panthopath Box Culvert) behind Sonargaon Hotel



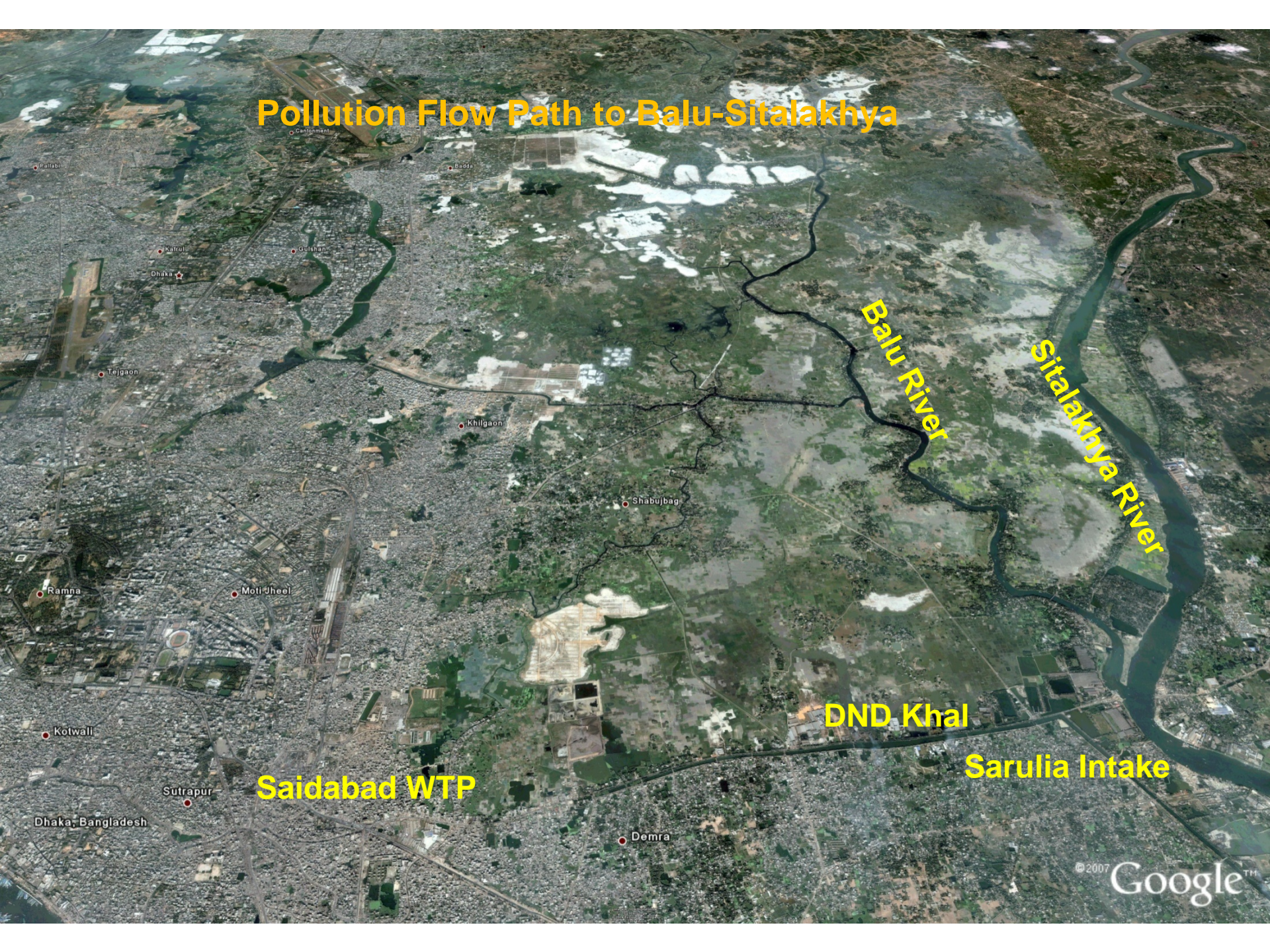
21.01.2008

Box-culvert storm sewer at Niketon; flow from the Banani Lake is coming from the right and mixing with the storm sewer discharge

Even major rivers like Buriganga and Sitalakhya are suffering from gross pollution



Pollution Flow Path to Balu-Sitalakhya



Saidabad WTP

DND Khal

Sarulia Intake

Balu River

Sitalakhya River

Saving Water Bodies from Pollution







We now feel more confident in reversing the process of environmental degradation

