CE 311A: Environmental Quality and Pollution

Instructor (theory): Abhas Singh

Schedule: MF 8:00 – 8:50; W 16:00-16:50

Venue: L2

Text Books:

Environmental Engineering Science. First Edition (2001).
By: William W. Nazaroff and Lisa Alvarez-Cohen. John Wiley and Sons Inc.

Chemistry for Environmental Engineering. Fourth Edition (1994).
By: Clair N. Sawyer, Perry L. McCarty and Parkins, G. F.

I recommend that you purchase the text book (Indian edition available), though several copies of these books are available in the central library.

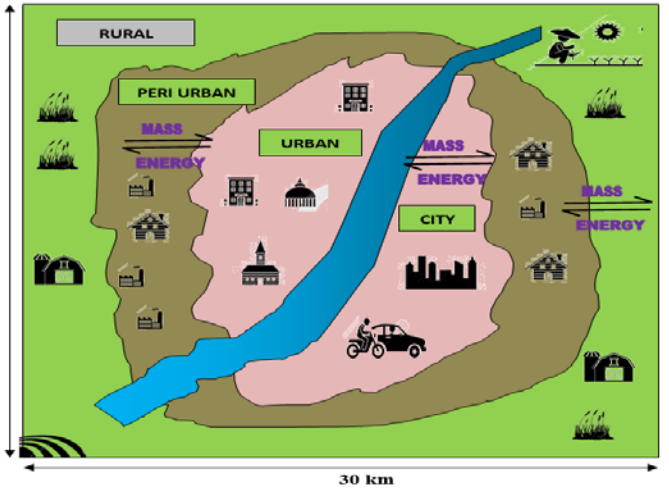
Other relevant material will be circulated through e-mail or posted on Brihaspati from time to time.

Concept of Sustainable Habitat

- To ensure availability of breathable clean air, potable water, affordable, safe housing and energy-efficient, low-emission transport systems

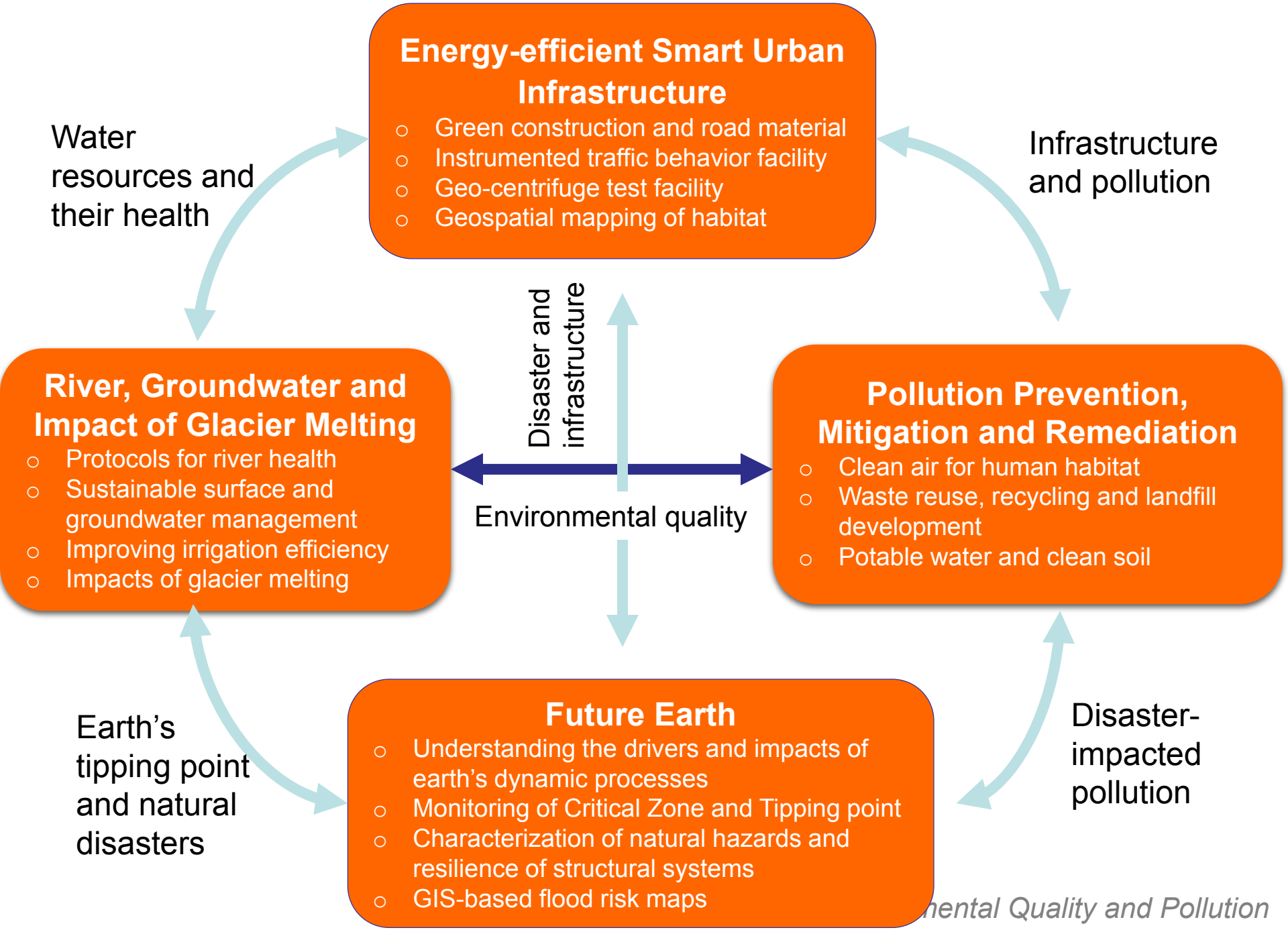
- Challenges:-
  - Sustainable water, land-use and mitigation strategies to be integrated in habitat planning
  - Using waste and recycled materials for construction of roads and buildings
  - Highly contaminated zones requiring efficient remediation strategies urgently
  - Safety of living as well as non-living assets, in the wake of natural and man-made disasters

- Why us?
  - We are technically, culturally and intellectually capable of solving these problems
  - For too long we have neglected environment in the name of development; best to tackle ourselves



Targeted Habitat (up) and Associated Aquifers (below)

Source: UK Groundwater Forum, Public Domain



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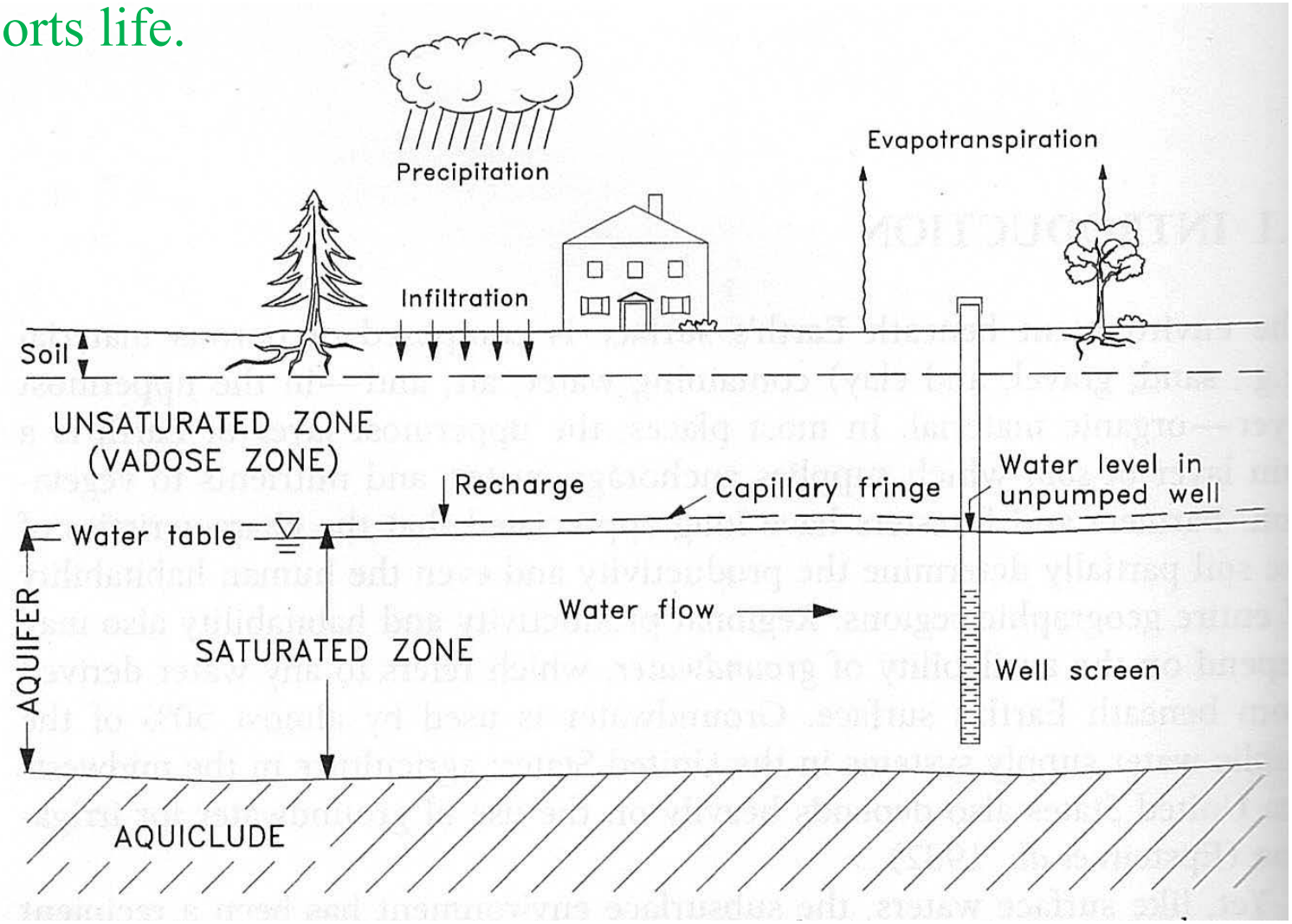
The Biosphere

A thin layer (10 km upwards and downwards) from the earth's surface that supports life.



Source: *Chemical Fate and Transport in the Environment*, 2nd Ed., Hemond, H.F. and Fechner-Levy, E.J. (2000).

Three abiotic components of biosphere are:

1) Atmosphere 2) **Hydrosphere** 3) Lithosphere

Two major components of **Hydrosphere**:

1) **Fresh Water** 2) Saline water

We are mainly concerned with **Fresh Water**, i.e.,

1) Surface water i.e., water found in rivers and lakes

2) Groundwater i.e., water found in the sub-surface

Human civilization is dependent on the quantity and quality of available fresh water.

In this course, focus on the **quality of fresh water**.

Contaminant vs Pollutant

Contaminants: Impurities in fresh water, either dissolved or suspended

- Naturally available fresh water is always impure, i.e., it contains contaminants.
- Presence of contaminants is not harmful to the health of human beings and other organisms.

Pollutants: Contaminants present at concentrations high enough to adversely impact health of human beings and other organisms

Movement of Contaminants to the Subsurface

Source: UK Groundwater Forum, Public Domain
http://www.euwfd.com/assets/images/Groundwater-pollution02.jpg

Class Problem

On a piece of paper provided to you, please answer the following question. Write your name and roll number before submitting the sheet today.

- 1 g of table salt (NaCl) is dissolved in water to make 1 L of solution. For Na^+ in solution, determine:

a) Mass fraction
b) Mass concentration
c) Molarity
d) Normality