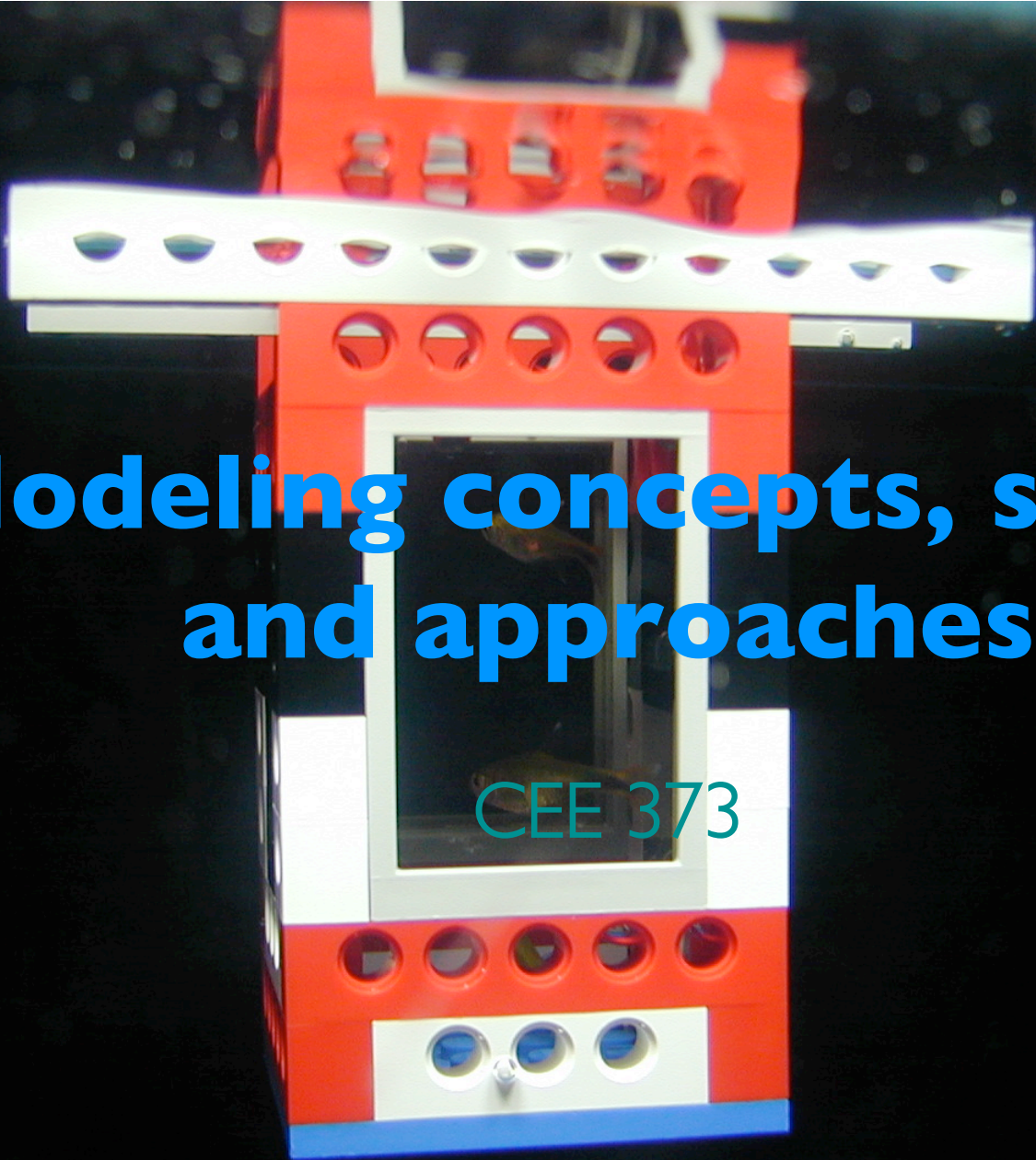
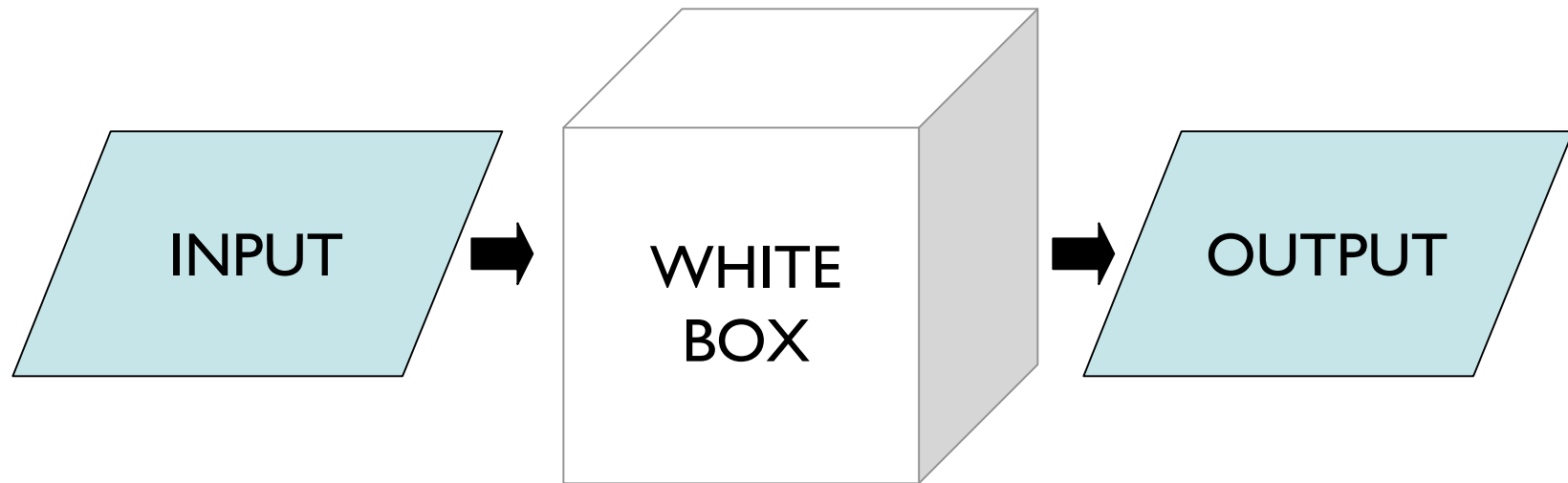


A LEGO Technic model of a fish tank. It features a central rectangular viewing window framed in white. Above the window is a horizontal white bar with a series of semi-circular cutouts, resembling a light fixture. The main body of the model is constructed from red and white Technic bricks. The background is dark and out of focus.

Modeling concepts, scales and approaches

CEE 373

Build a Model Conceptually



Define:

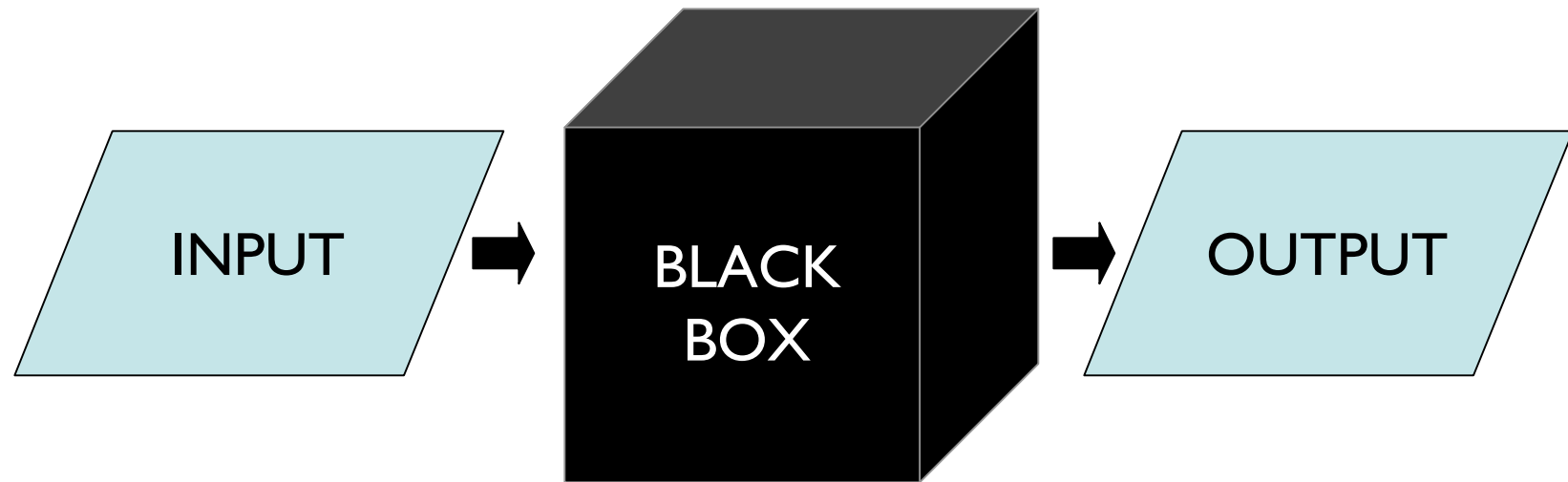
Scope

Initial conditions

Boundary conditions

Granularity

The Working Model



Defined:

Scope

Initial conditions

Boundary conditions

Granularity

Governing equations

Environmental Compartments and Processes

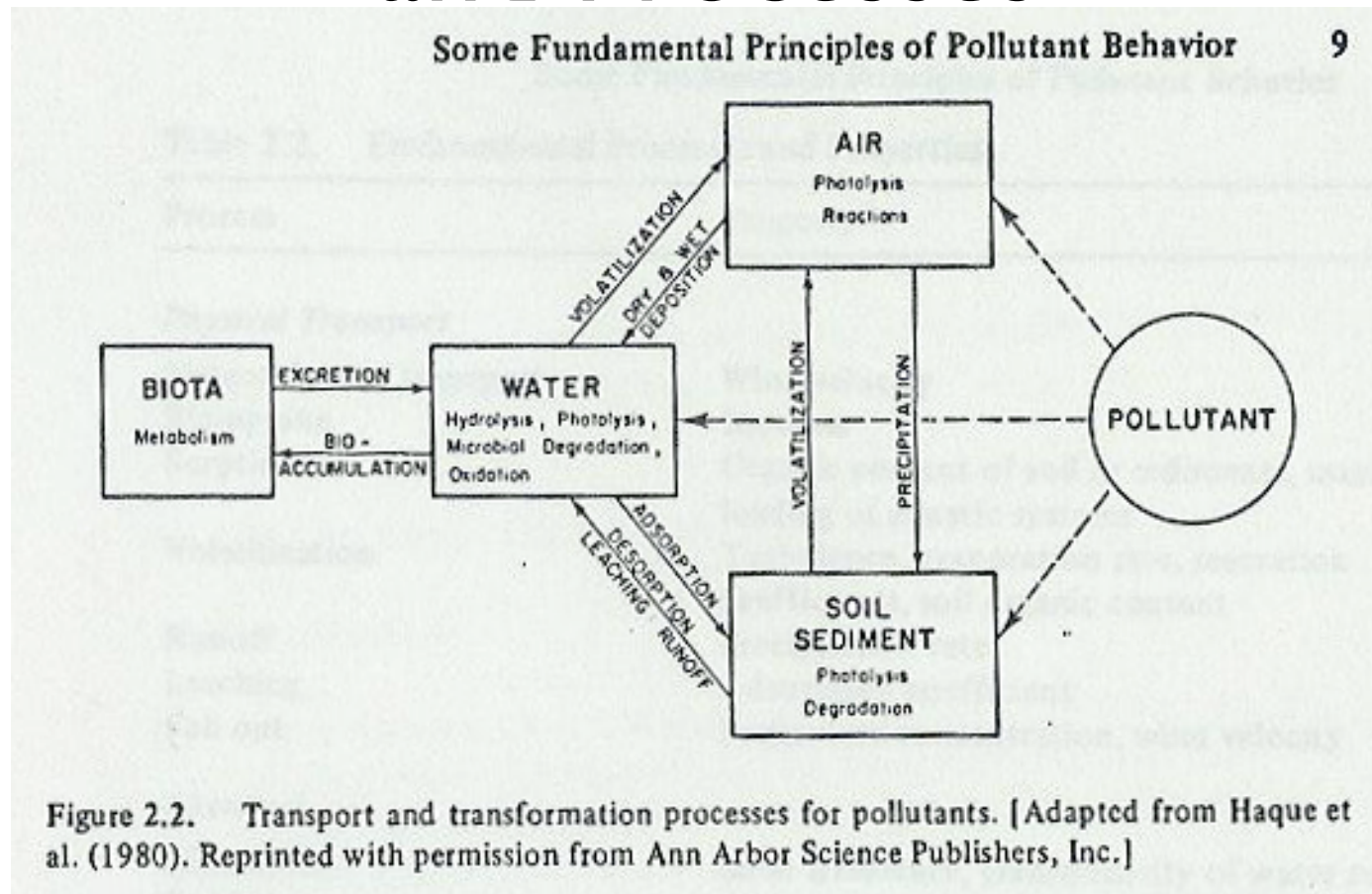
- How do you organize the knowledge to start working with a model?
 - Set scope of compartments and processes
 - Interconnect compartments
 - Set system conditions

Environmental Compartments and Processes

Compartment	Transport	Transformation
Air	Meteorological transport: Diffusion and dispersion Precipitation and fallout	Photolysis Oxidation
Water	Sorption Volatilization Bio-Uptake	Photolysis Hydrolysis Oxidation Metabolism/biodegradation
Soil	Sorption and sediments Runoff Volatilization Leaching Bio-Uptake	Hydrolysis Oxidation Photolysis Reduction Metabolism/biodegradation

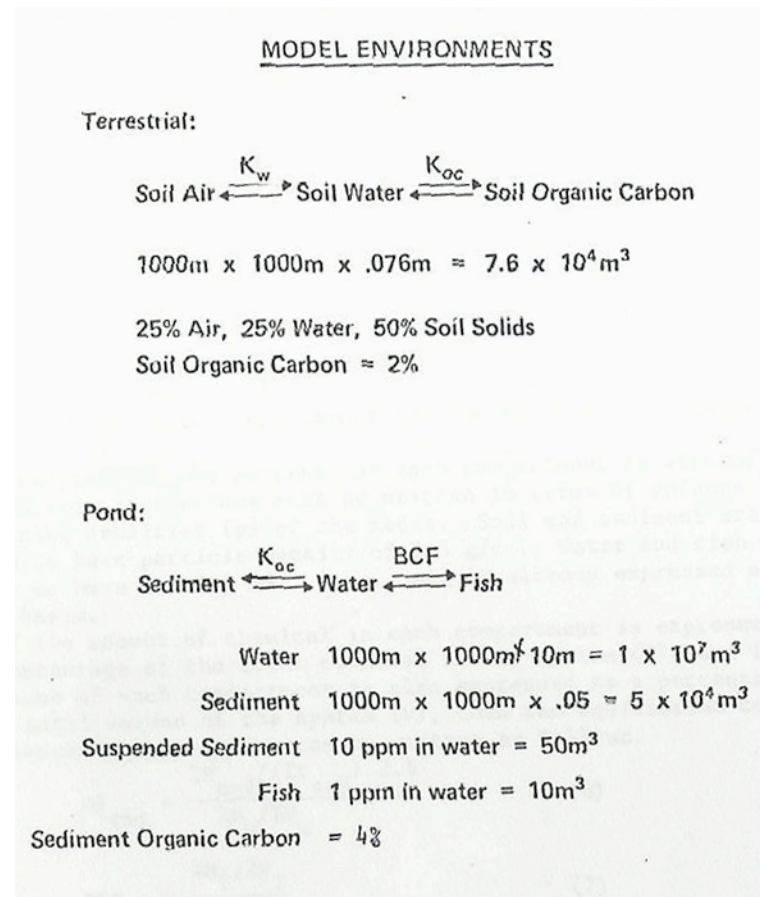
Connell and Miller (1984)

Environmental Compartments and Processes



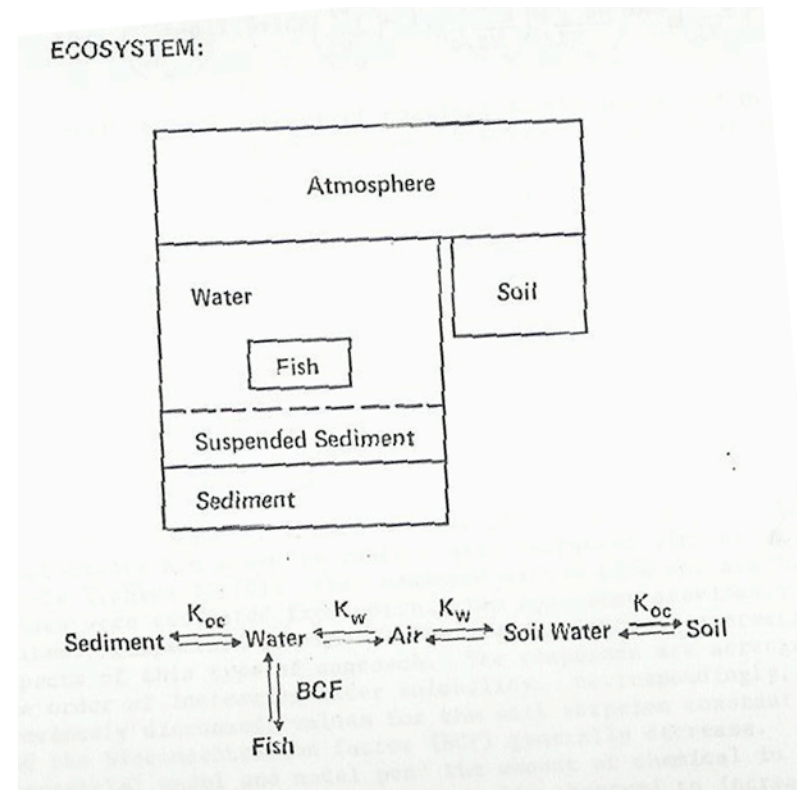
Connell and Miller, 1984

Model environments



McCall et al, 1983

Model environments



McCall et al, 1983

Model environments

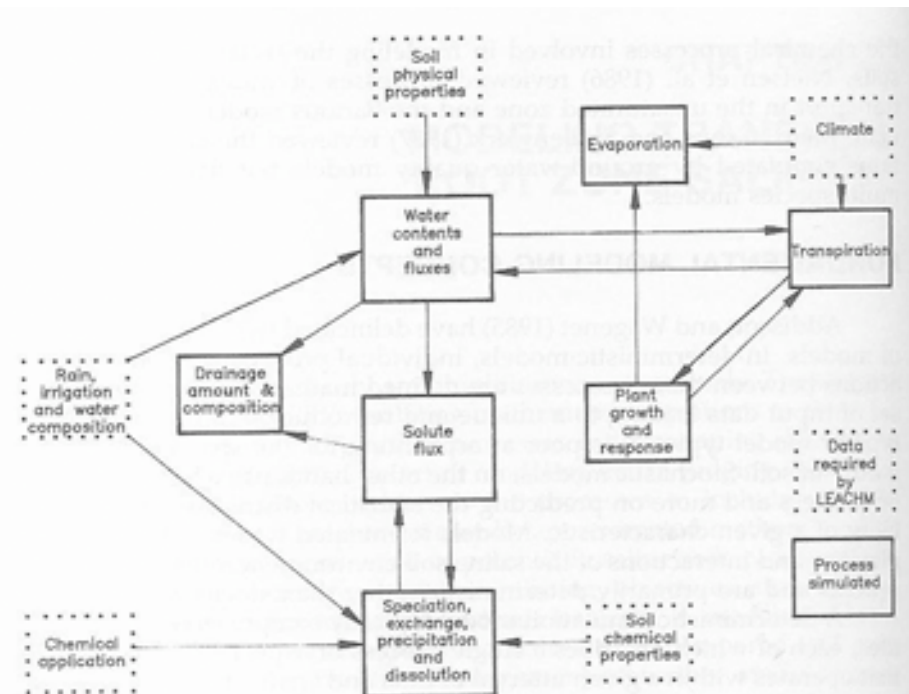
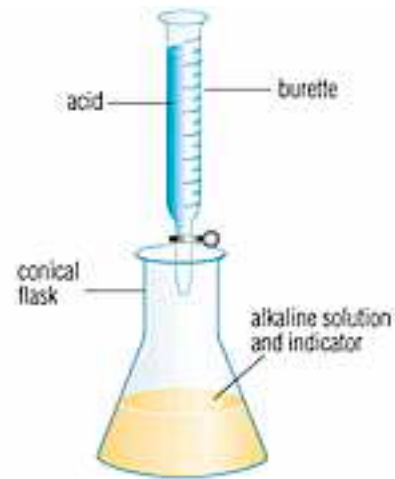


Fig. 23.1 Schematic Outline of Structure of LEACHM

Scales:

Bench-scale



Scales:

Microcosm



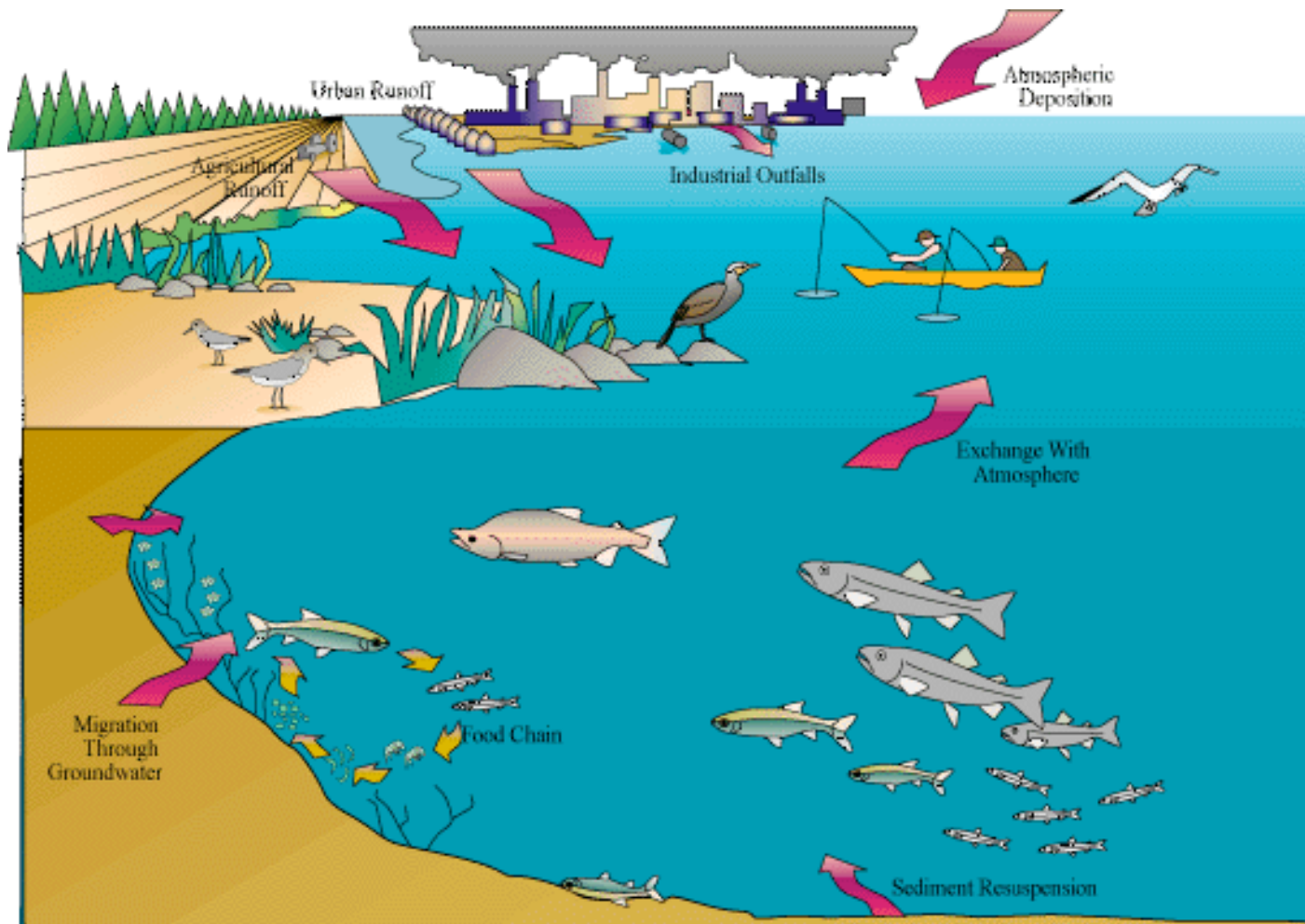
Scales:

Field Scale

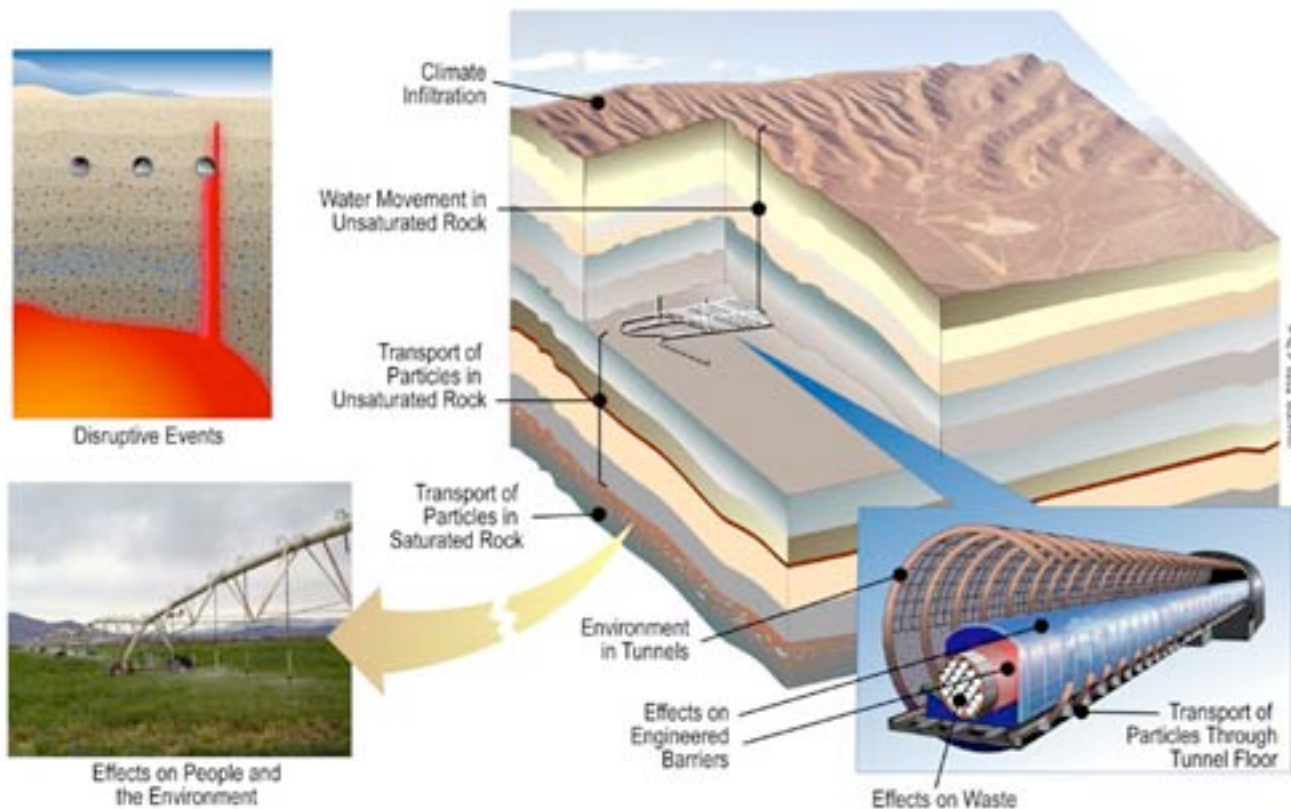


Scales:

Regional Scale



Scales: Geologic



Types of Chemical Models

Zhu & Anderson, 2002	Another list
• Speciation-solubility • Reaction path • Inverse mass balance • Coupled mass transport	• Equilibrium Speciation • Quasi-equilibrium solubility • Process (equilibrium) • Process (rate-limited) • Transport

Types of Chemical Models

- Equilibrium Speciation

- Scope is "Local"

- Quasi-equilibrium solubility

- Super-saturation
 - Crystallinity
 - Efflorescence
 - Settling
 - Coprecipitation

- Process (equilibrium)

- Changing condition(s)

- Process (rate-limited)

- Consecutive Rxns
 - Competing Rxns

- Transport

- Non-reactive
 - Reactive

Roadmap

