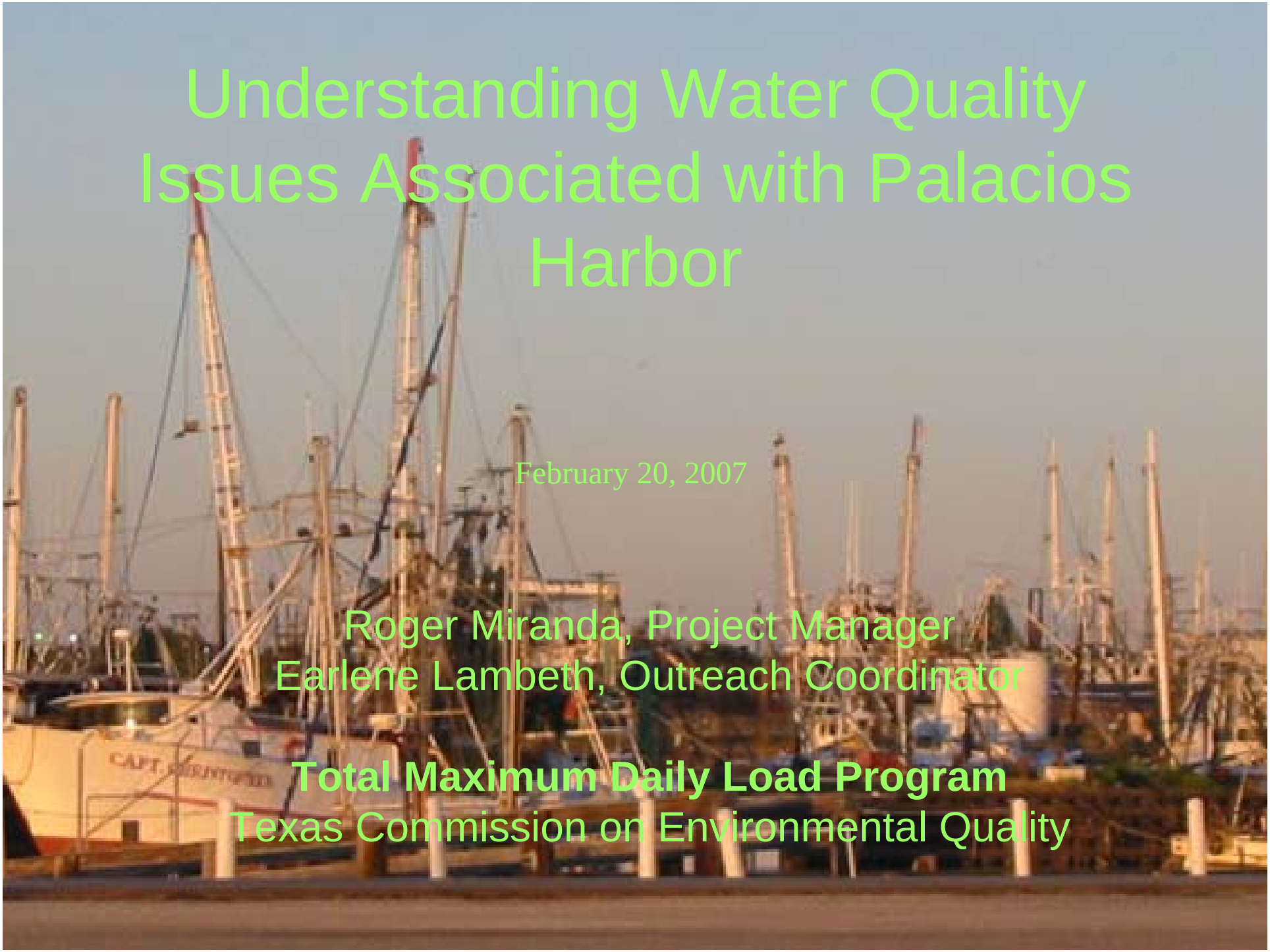


Understanding Water Quality Issues Associated with Palacios Harbor

February 20, 2007

Roger Miranda, Project Manager
Earlene Lambeth, Outreach Coordinator

Total Maximum Daily Load Program
Texas Commission on Environmental Quality

Respiration

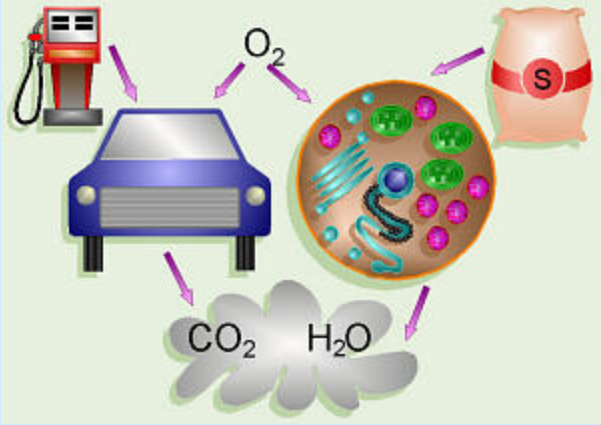
A Type of Organic Matter Decomposition

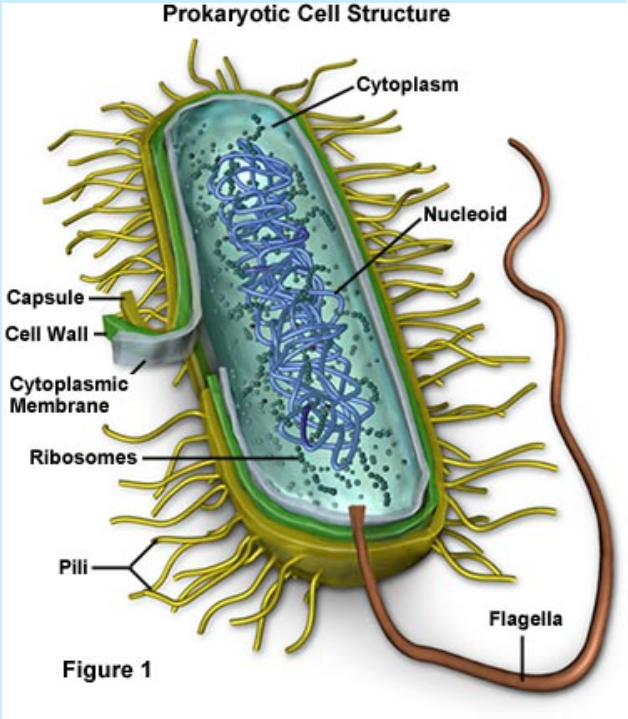
Organic compound + O2 → CO2 + H2O + Energy

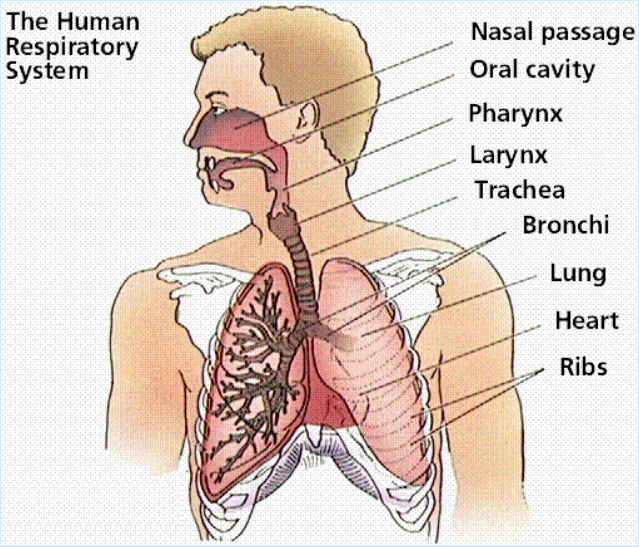
Or…

Organic Compound + Oxygen → Carbon dioxide + Water + Energy

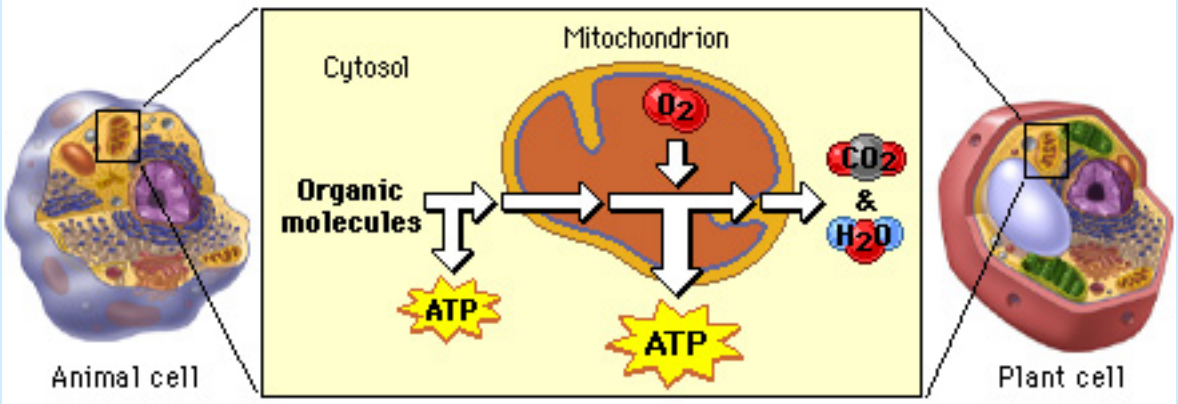
- Rotting
- Food Digestion and Assimilation



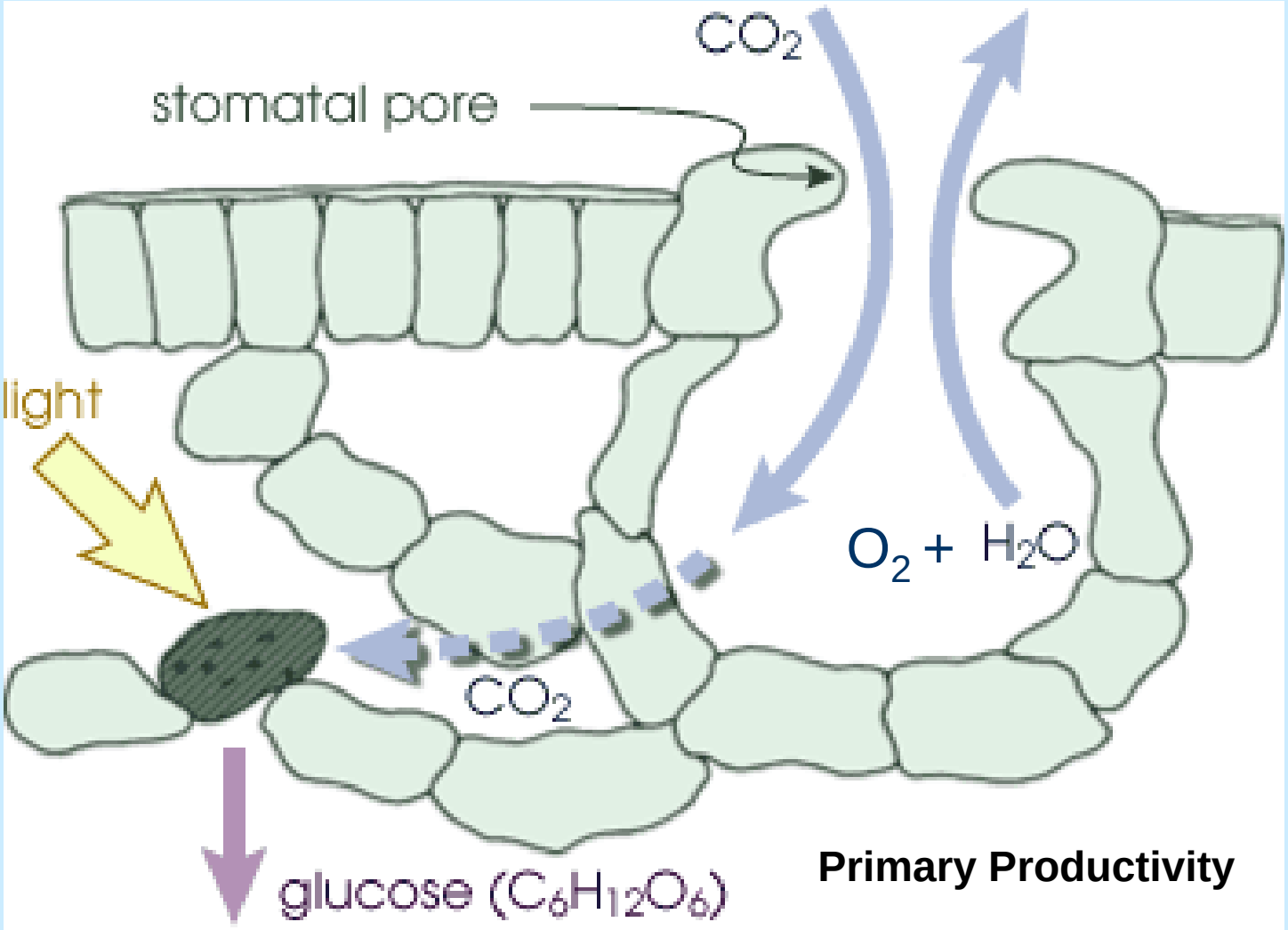




Food + O_2 = Energy



Photosynthesis



Primary Productivity

Photosynthesis

Land Plants

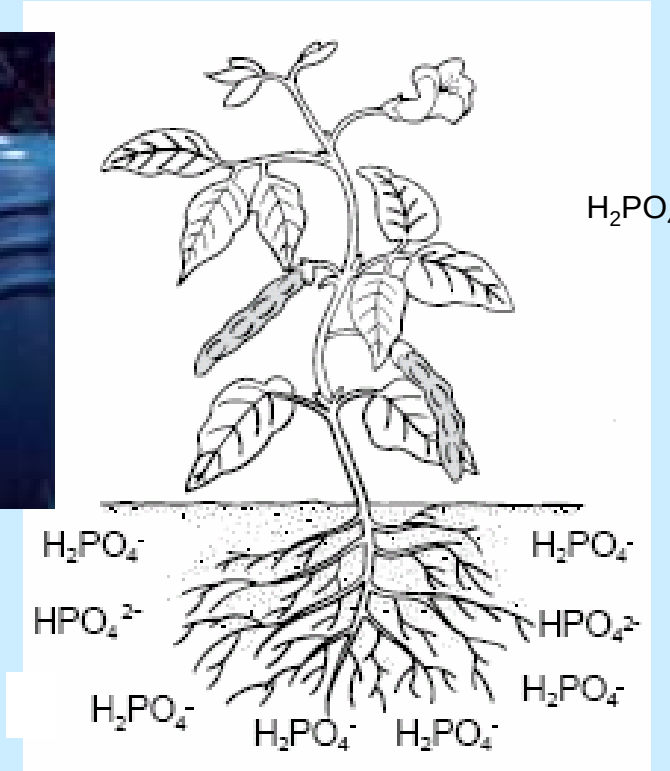
Algae

$6CO_2 + 12H_2O$ + sunlight → $\underline{6O_2}$ + $\underline{C_6H_{12}O_6}$ + $\underline{6H_2O}$

Or...

Carbon dioxide + Water + Sunlight →Oxygen + Carbohydrate + Water

Plant Nutrients



$H_2PO_4^-$

$H_2PO_4^-$

$H_2PO_4^-$

Macronutrients

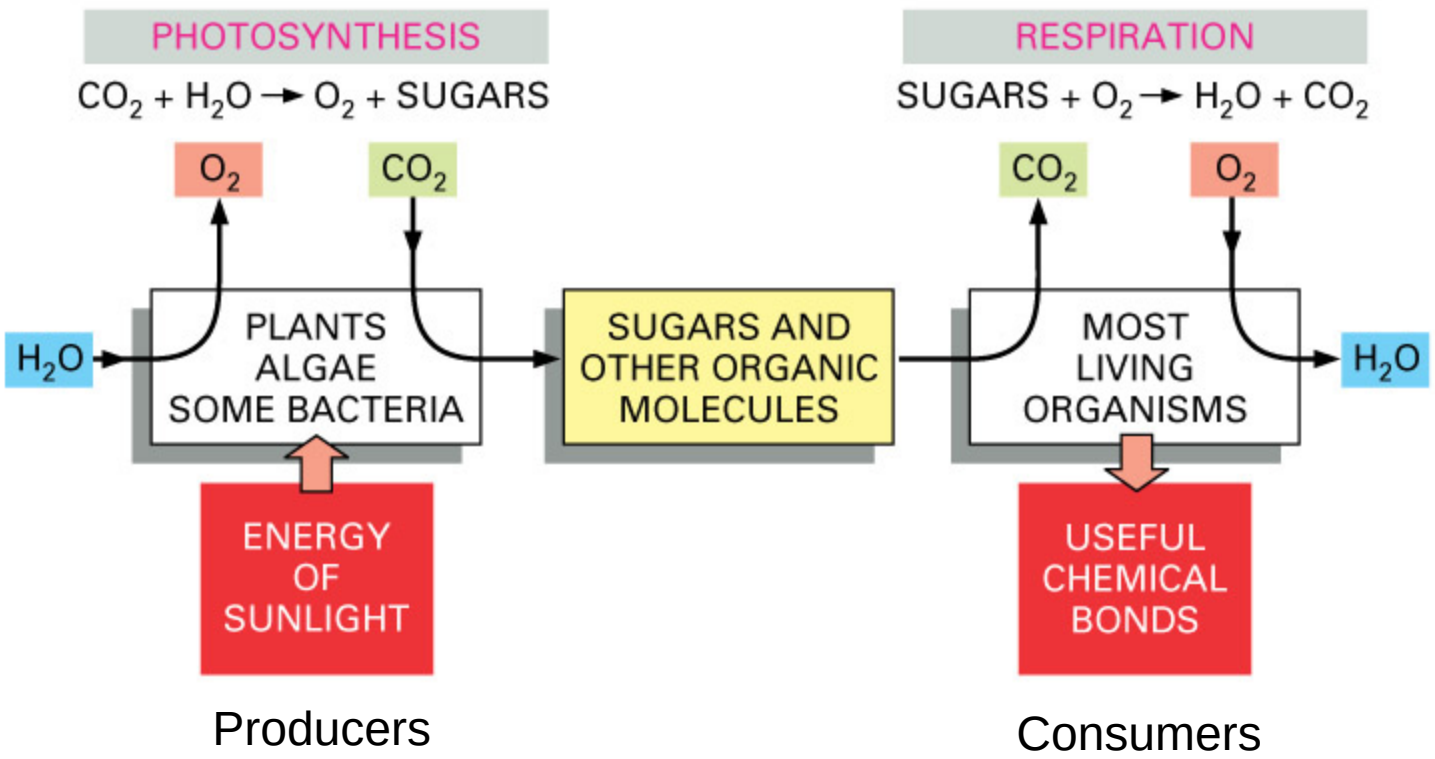
Phosphorus (P)

Nitrogen (N)

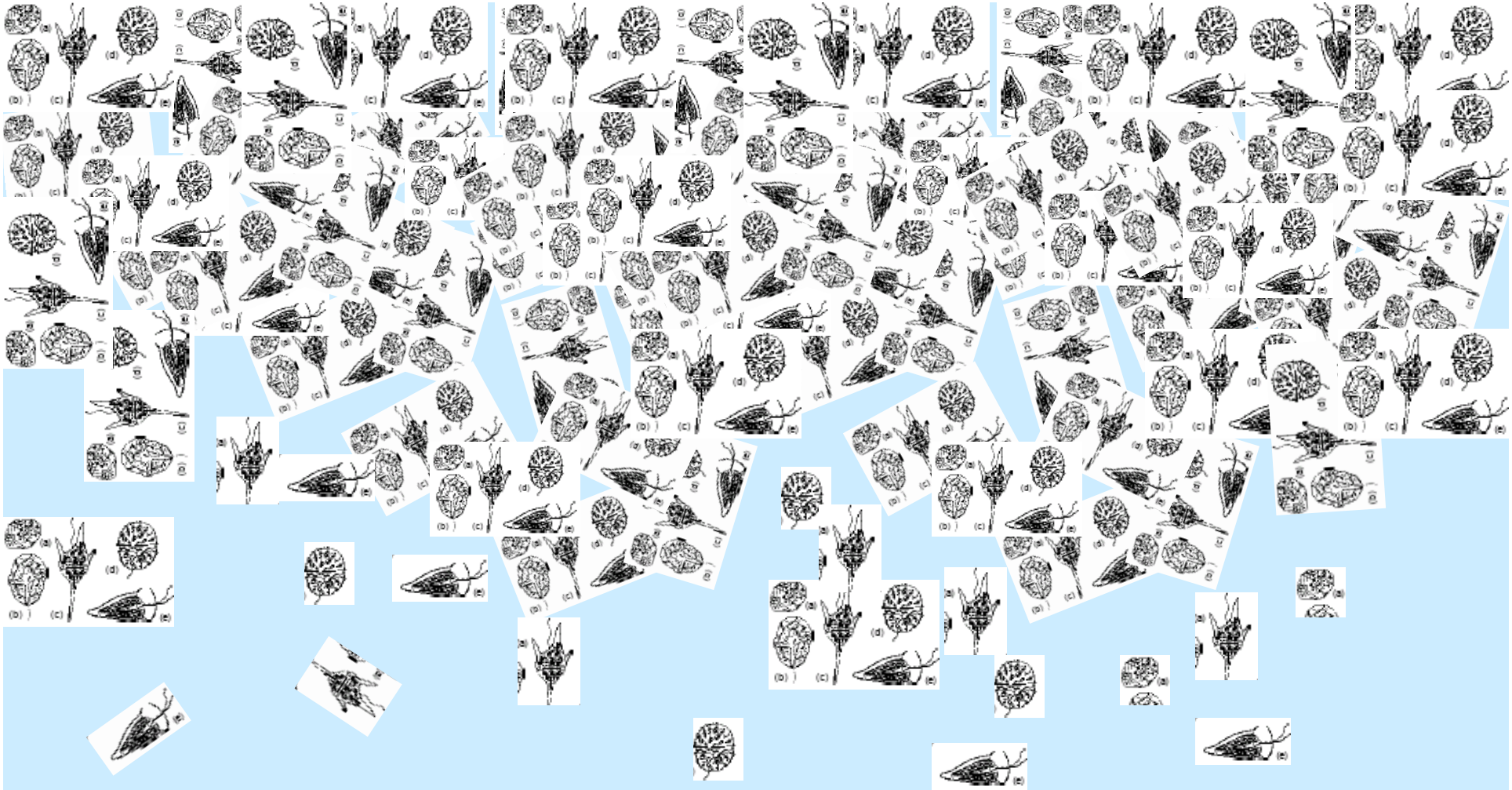
Micronutrients

Potassium

Iron



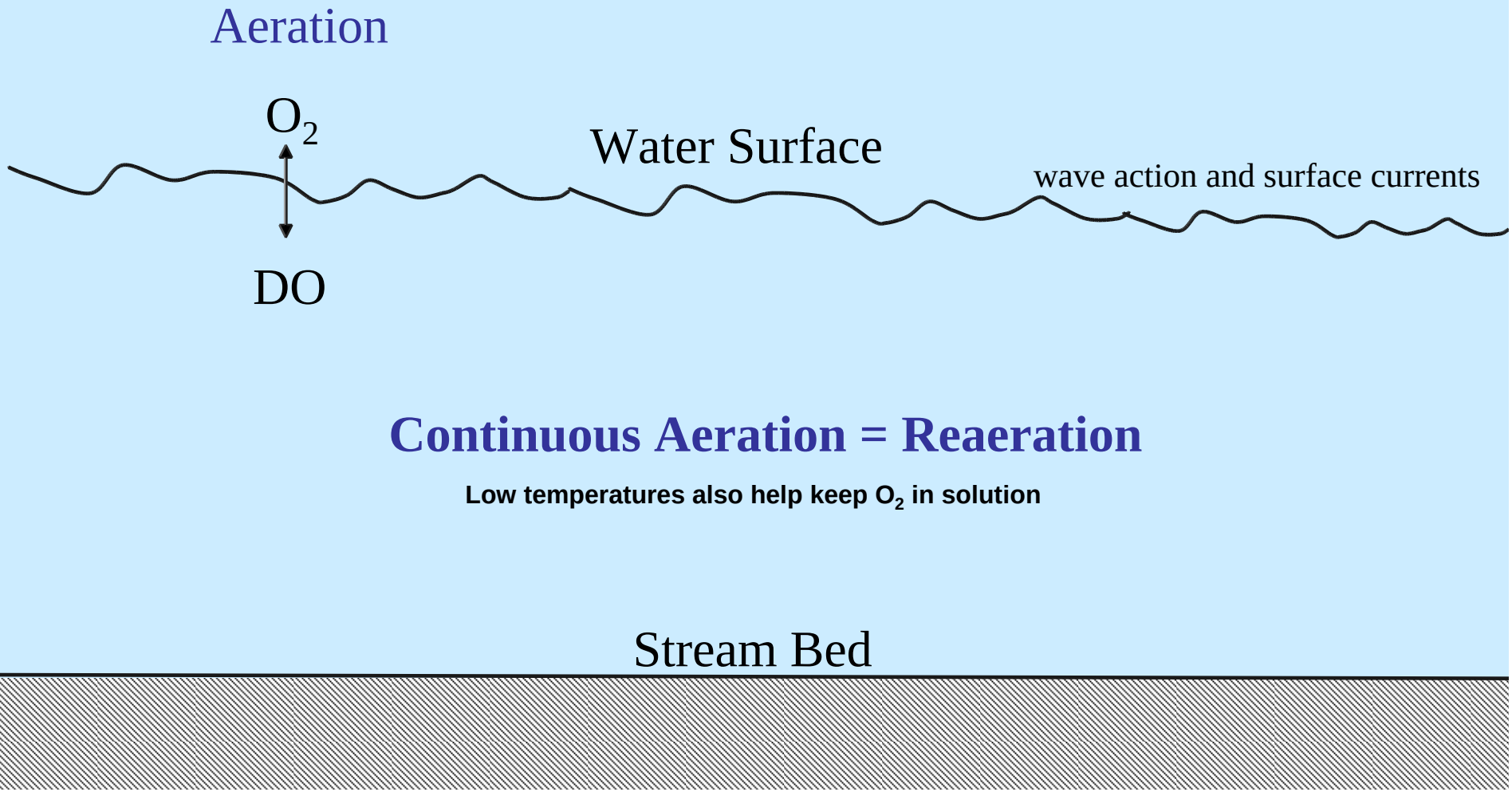
Decomposing Organic Matter ~ Biochemical Oxygen Demand (BOD)
Deposited Organic Matter ~ Sediment Oxygen Demand (SOD)



Excessive Productivity ~ Eutrophication

- High O_2 during the day low O_2 during the night
- High organic matter production

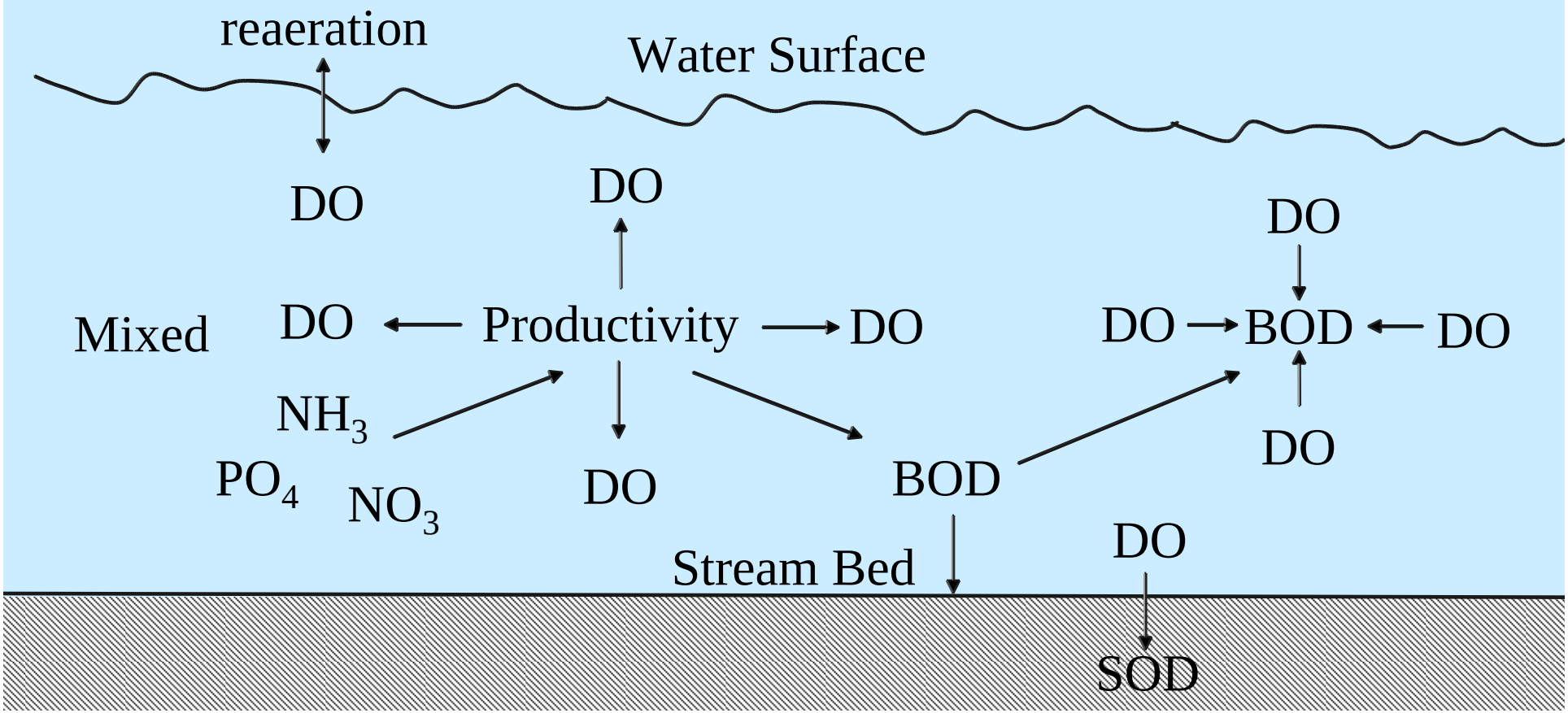
Aeration and Reaeration

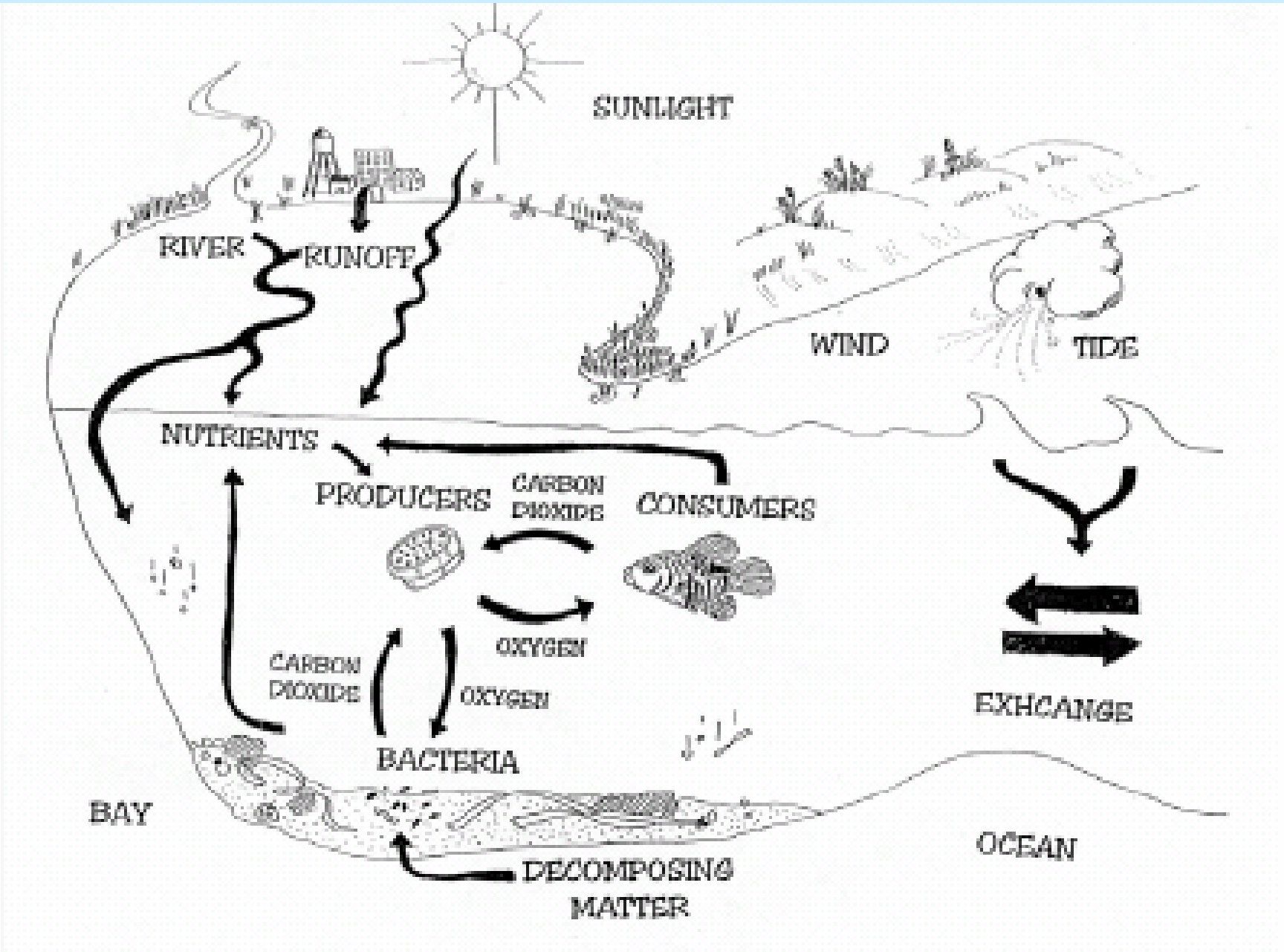


Continuous Aeration = Reaeration

Low temperatures also help keep O_2 in solution

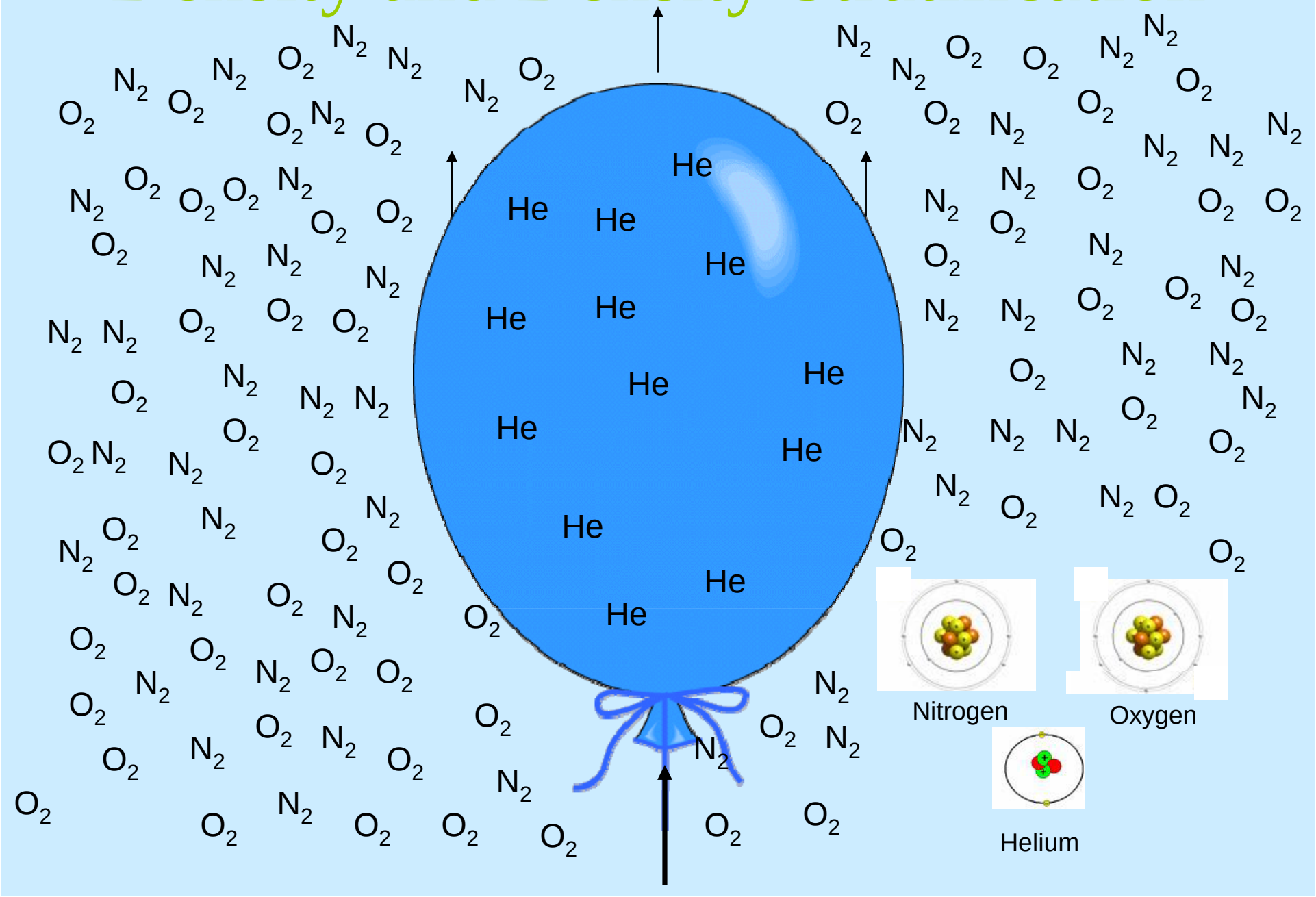
Conceptual 2-D DO Model
Fresh Water Stream



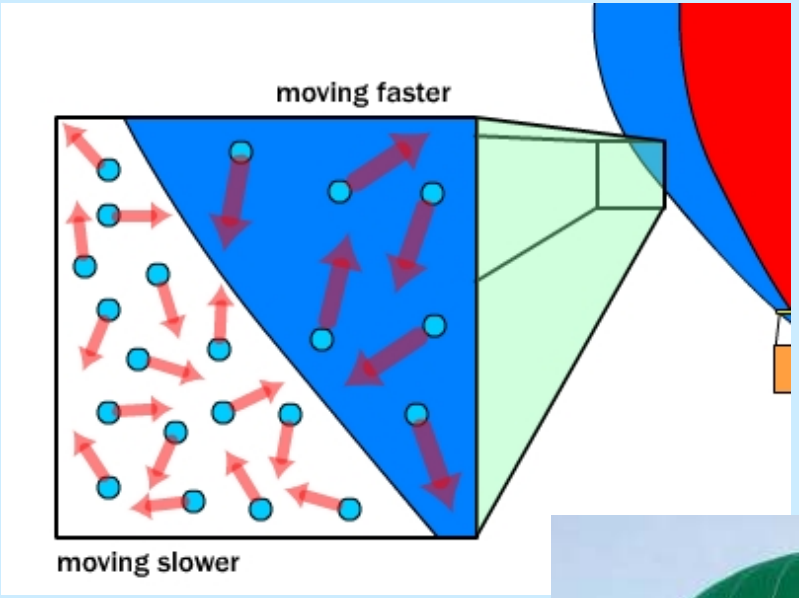


From Montagna et al., 1996

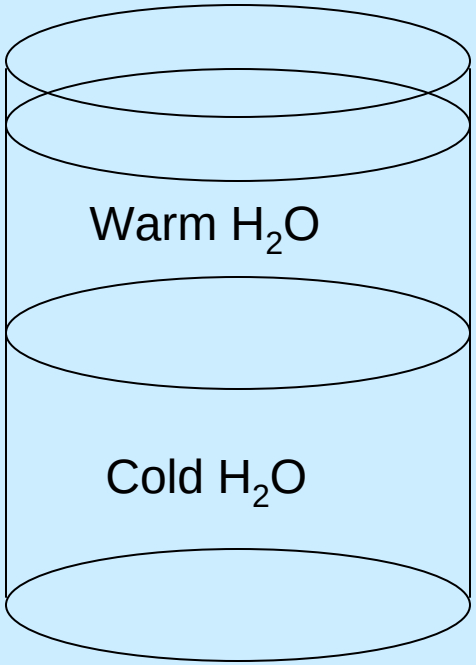
Density and Density Stratification

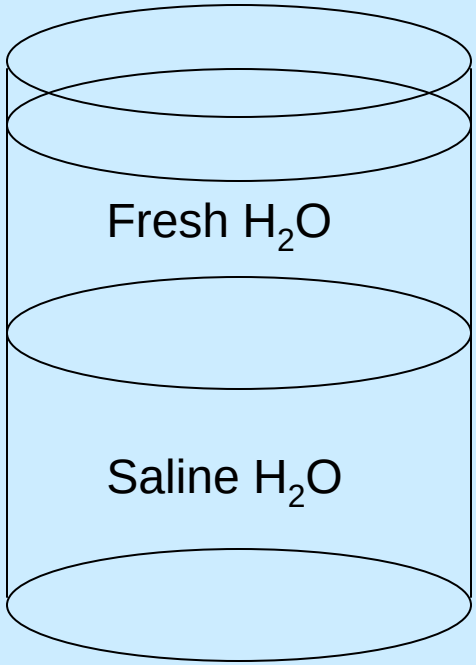


Density and Density Stratification

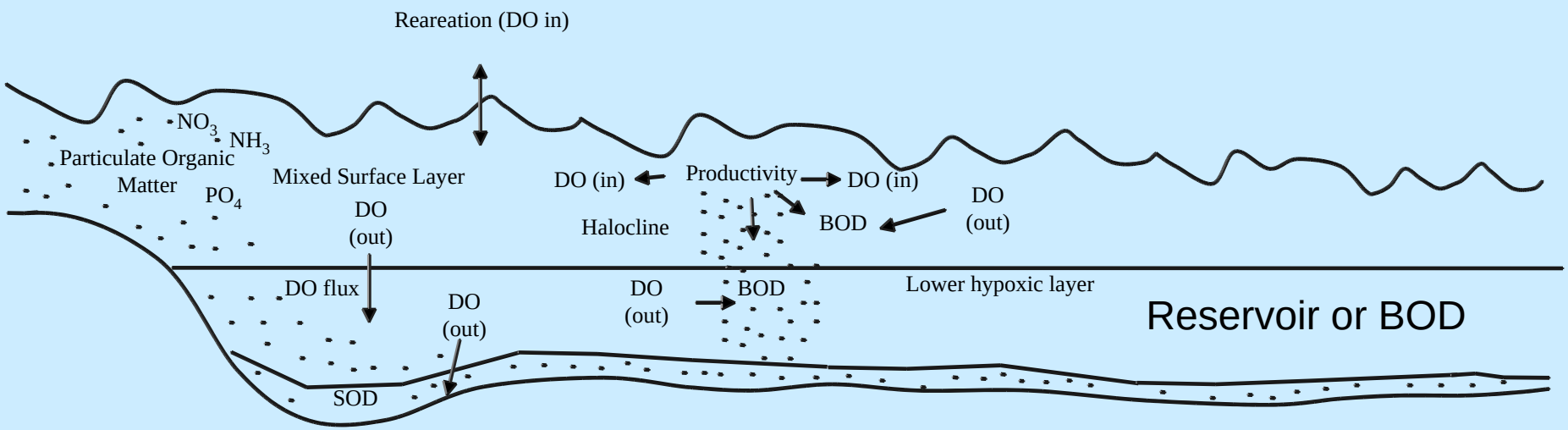


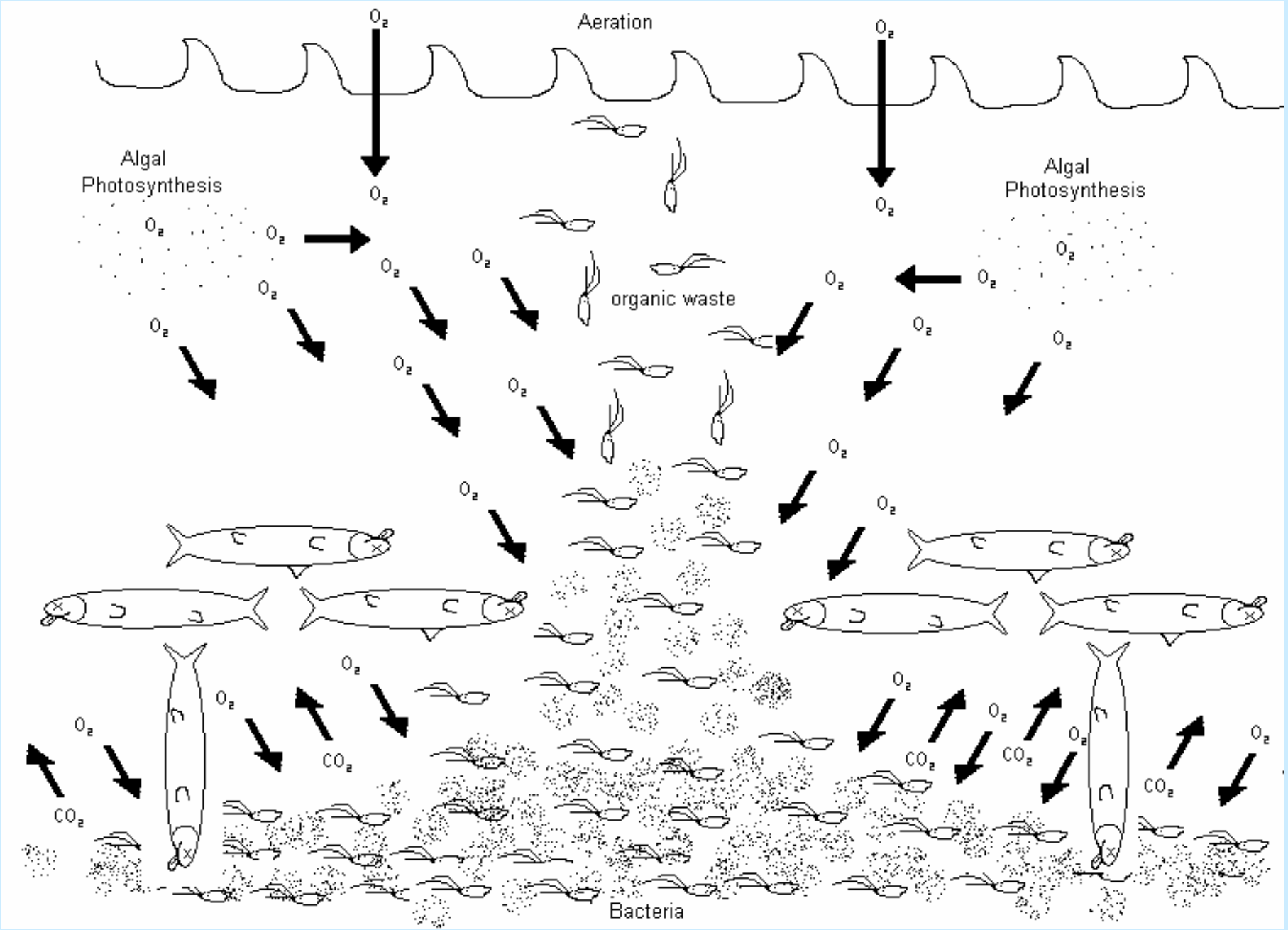
Density and Density Stratification





Conceptual 2-D DO Model
Stratified Water Body




Aeration
O_2
Algal Photosynthesis
organic waste
CO_2
Bacteria

Texas Commission on Environmental Quality

Total Maximum Daily Load Program

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