

## Introduction to Marine Biology

### Chapter #13: Life in the Ocean Study Guide

Life on Earth is notable for both unity and diversity: diversity because there are perhaps **100 million different species** (kinds) of living things on Earth; unity because each species shares the same underlying mechanisms for basic life processes.

Living things are not exempt from the second law of thermodynamics, but they can delay that inevitable descent into disorganization through the **transformation of energy**.

Producers assemble food molecules using energy from the sun (**photosynthesis**) or from energy-rich inorganic molecules (**chemosynthesis**).

**Productivity** is expressed in grams of carbon bound into carbohydrates (food) per square meter of ocean surface per year ( $\text{gC}/\text{m}^2/\text{yr}$ ).

**Primary producers-autotrophs**-are organisms that synthesize food from inorganic substances by photosynthesis and chemosynthesis.

Producers and heterotrophs (consumers) interact in often-complex energy relationships called **food webs**.

All of Earth's organisms are composed of about **23 of the 107** known chemical elements. **Four elements-carbon, hydrogen, oxygen, and nitrogen-make up 99% of the mass of all living things**.

Living organisms are supported and sustained by huge **nonliving reserves**, and there is a large-scale transport of elements between the reserves and the organisms themselves.

The great bulk of the ocean lies in **perpetual darkness**. The upper part of the photic (lighted) zone sustains photosynthetic producers.

**Cold water can hold more gas** in solution than warm water can.

**Seawater tends to buffer solutions**, preventing wide swings in pH (acid-base balance).

**Diffusion**, the movement of substances from regions of high concentration to low concentration, and osmosis, the movement of water through membranes, are important processes in moving substances within and between living cells.

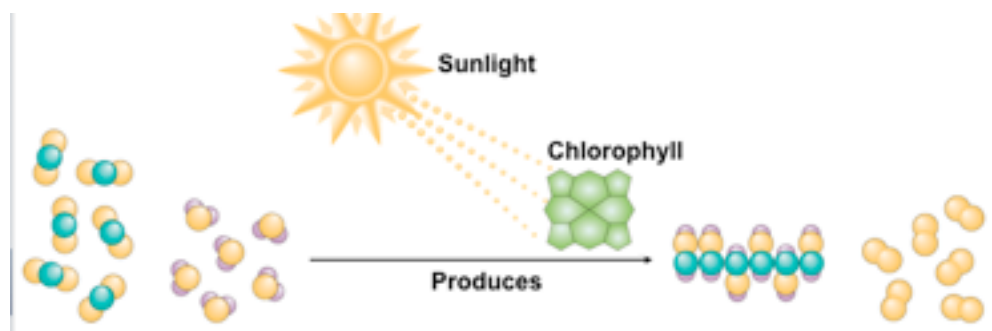
The environments populated by marine life may be **classified** by their physical characteristics.

## Chapter #13: PPT- Guided Viewing Notes

1: What is **biodiversity**? What **4 elements** make up 99% of all species?

2: What is **photosynthesis**?

Label the diagram of photosynthesis:



3: Describe the **flow of energy** through systems. **What is the main storage molecule of energy in animals?**

4: What is **chemosynthesis**? *What source* of energy is used instead of sunlight?

5: What is **primary productivity** a measure of?

6: Looking at the map of productivity around the world- *Discuss what you see:*

*Why* is productivity **higher near the coasts** of continents than in the open oceans?

Why is productivity **higher near the poles**?

Define the following:

**Autotrophs:**

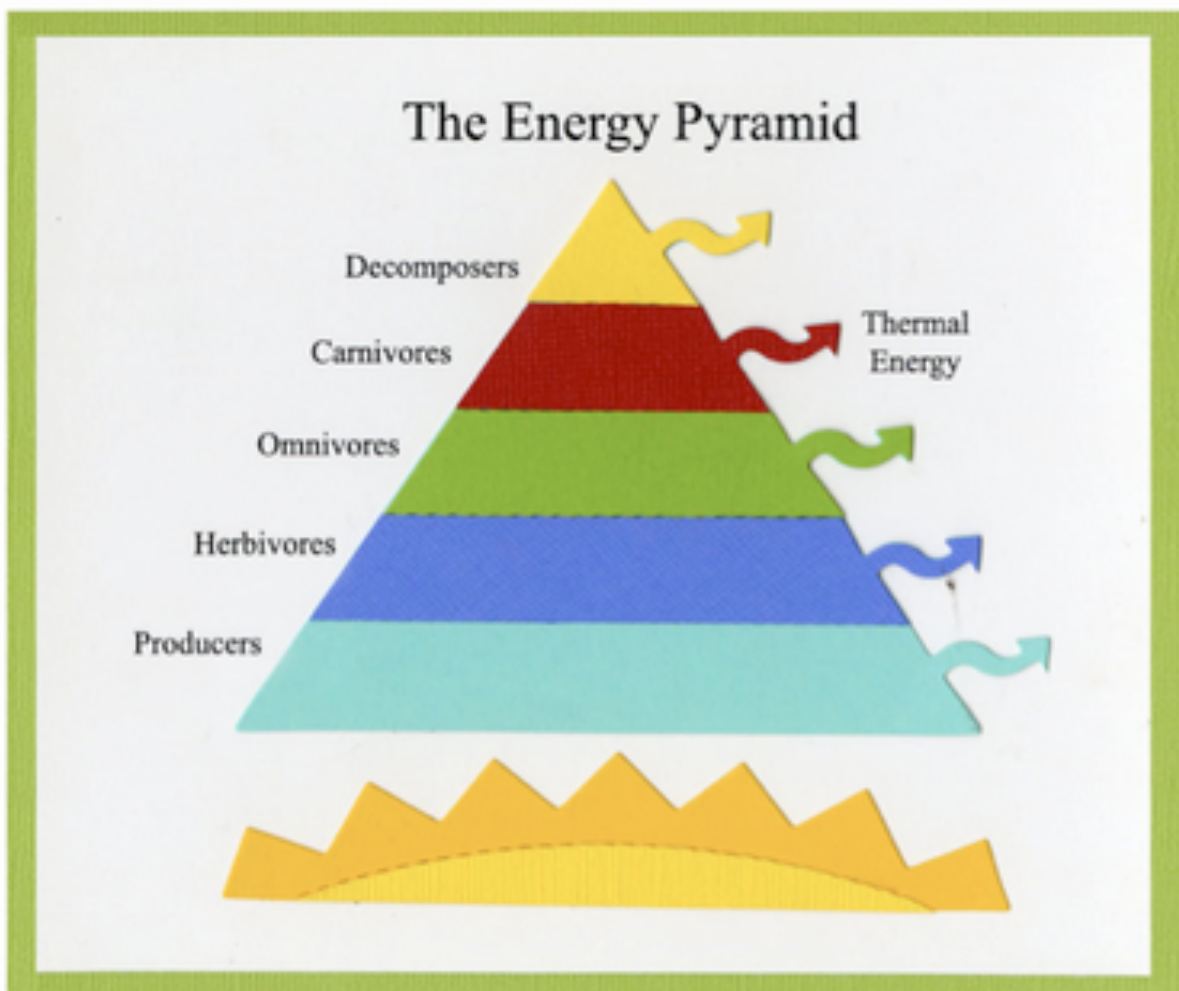
**Heterotrophs:**

**Trophic pyramid:**

**Primary consumers:**

**Secondary Consumers:**

**Top consumers:**



7: In a food web, *what do the arrows represent?*

8: What are some **atoms and molecules** that cycle in biogeochemical cycles?

9: Diagram the **Carbon Cycle** in the Ocean:

10: Diagram the **Nitrogen Cycle** in the Ocean:

11: Diagram the **Phosphorus Cycle**:

12: What is a *limiting factor* in ecosystems?

13: What are the **most important physical factors** for marine organisms?

14: What are some **biologic factors** that affect ocean organisms?

15: Define the following zones:

**Euphotic:**

**Disphotic:**

**Aphotic:**

16: *Define the following nutrient transports:*

Diffusion:

Osmosis:

Active Transport:

18: What are the **major zones** of the ocean?

*(see assignment below)*

19: What is **natural selection**?

20: Who was Carolus Linnaeus? *What did he do?*

21: What is **taxonomy**?

22: What are the **6 kingdoms** and how are they further divided?

[http://oceanexplorer.noaa.gov/edu/learning/3\\_deepsea\\_corals/activities/ocean\\_zones.html](http://oceanexplorer.noaa.gov/edu/learning/3_deepsea_corals/activities/ocean_zones.html)

Go to the above website: **Exploring the Ocean Zones** and label the following zones:

\* **Light Zones**

\* **Habitat Zones**

\* **Lifestyle Zones**

**Draw, label and describe each of the zones of ocean below:**