

## **What does productivity mean?**

- The state of being productive or process of producing and creating something.
- Flow of energy.
- Accumulation of biomass
- Land and soil productivity.
- Generation of biomass or gain of energy.
- Usefulness.

*“The gain of energy or biomass per unit area per unit time.”*

*“Biomass increase.”*

## **Pyramids of Productivity**

- Quantitative measure
- Flow of energy to the next trophic level
- Rate of transfer
- Per unit area per time
- Graphical model or structure.

Unit- J/m<sup>2</sup> /year

(m<sup>2</sup>= square meter)

## **Primary Productivity (PP)**

- first trophic level
- also called “plant productivity”
- plants producing “usable” energy by transforming sunlight into usable chemical energy through the process of photosynthesis

“Do not use “sun” on the base of your pyramids, use sunlight. Plants transform sunlight into useful chemical energy into useful carbs, energy by using the process of photosynthesis.”

-Greatest Person Ever

## **What does efficiency mean?**

- use resources to full potential
- has to do with quality
- inefficient- waste of time and energy
- 90% lost, 10% gained after every transfer
- plants take in 1% from the sun only, but they use it very efficiently.
- an energy transfer is efficient when low amounts of energy is wasted and maximum is gained.

The plant loses energy in the following ways:

1. Respiration/ heat loss
2. Reflection
3. Photosynthesis
4. Transmission (light passes through)
5. Light wrong wavelength (green)

The consumers lose energy in the following ways:

1. Respiration
2. Fecal matter (excretion)
3. All other life processes.
4. Detritus- any leftover parts which are not consumed or ingested like bones, cartilage etc.

### **Laws of Thermodynamics**

Thermo= heat or energy

Dynamics= in motion/change

#### **First Law**

- energy can not be created nor destroyed, it can only be transferred from one system to another.
- i.e. energy entering a system equals energy leaving it (although it may change forms)

Example- Sun's energy came to the earth many years ago. It was captured by the green plants and used for photosynthesis. This helps in the formation of carbohydrate molecules.

The carbon atoms of ancient plant decay were transformed into energy rich deposits of coal and fossil fuels. Coal is excavated, burned, giving off heat energy which drives steam turbines to produce electricity that heats the coils that help you toast your bread.

- the amount being transferred through the food webs

#### **Second Law**

- energy dissipation
- entropy- disorder / energy and materials go from a concentrated to a dispersed form.
- whenever energy is changed, transferred or transformed from one trophic level to another, there is always a loss of usable energy.
- energy is inefficiently transferred or transformed through respiration and production of heat energy.
- Initial absorption by plants is very inefficient.
- Energy that goes from a concentrated to a dispersed form.