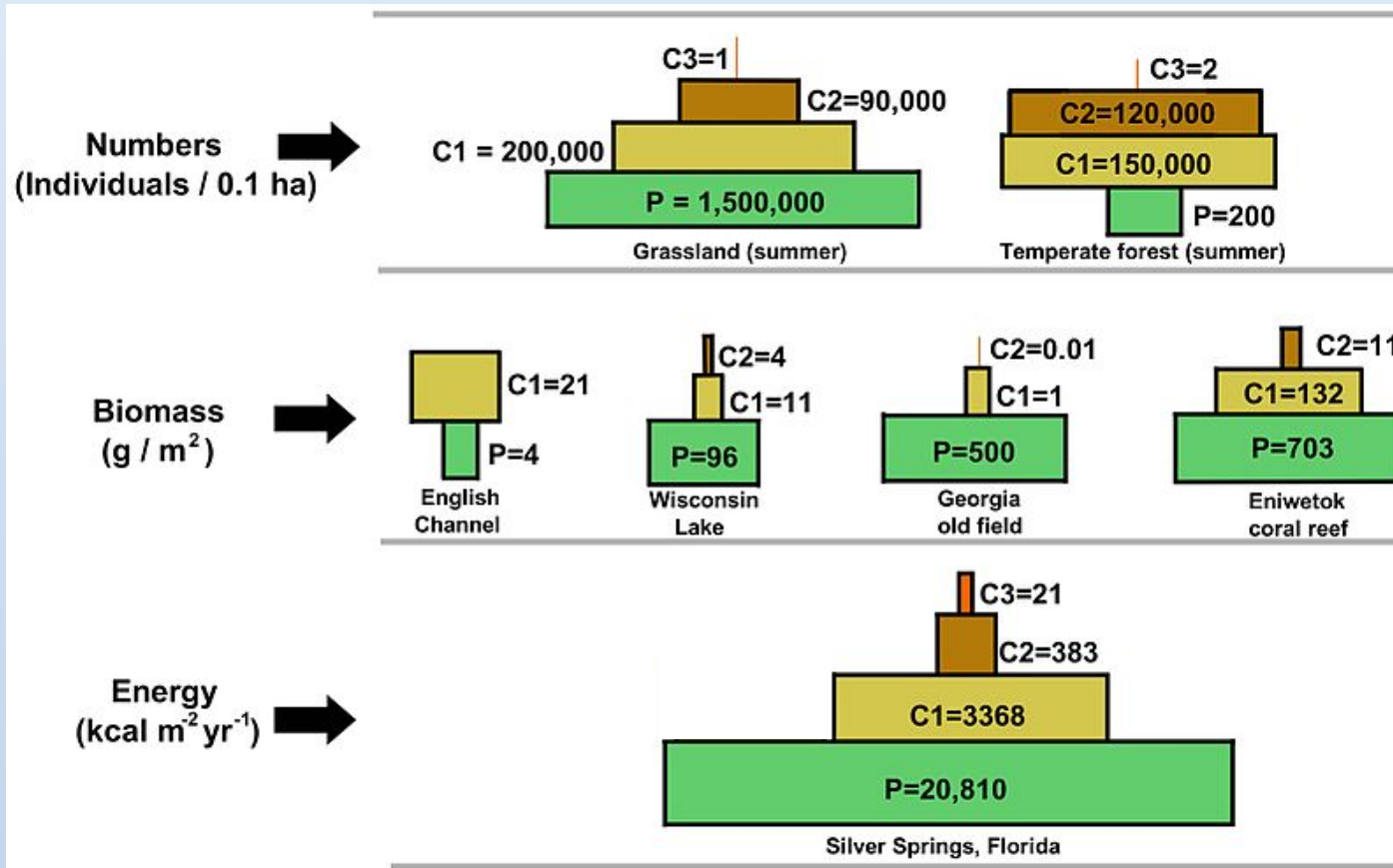


# Three types of Ecological Pyramid



There are three kinds of ecological pyramid:

Pyramid of numbers

Pyramid of biomass

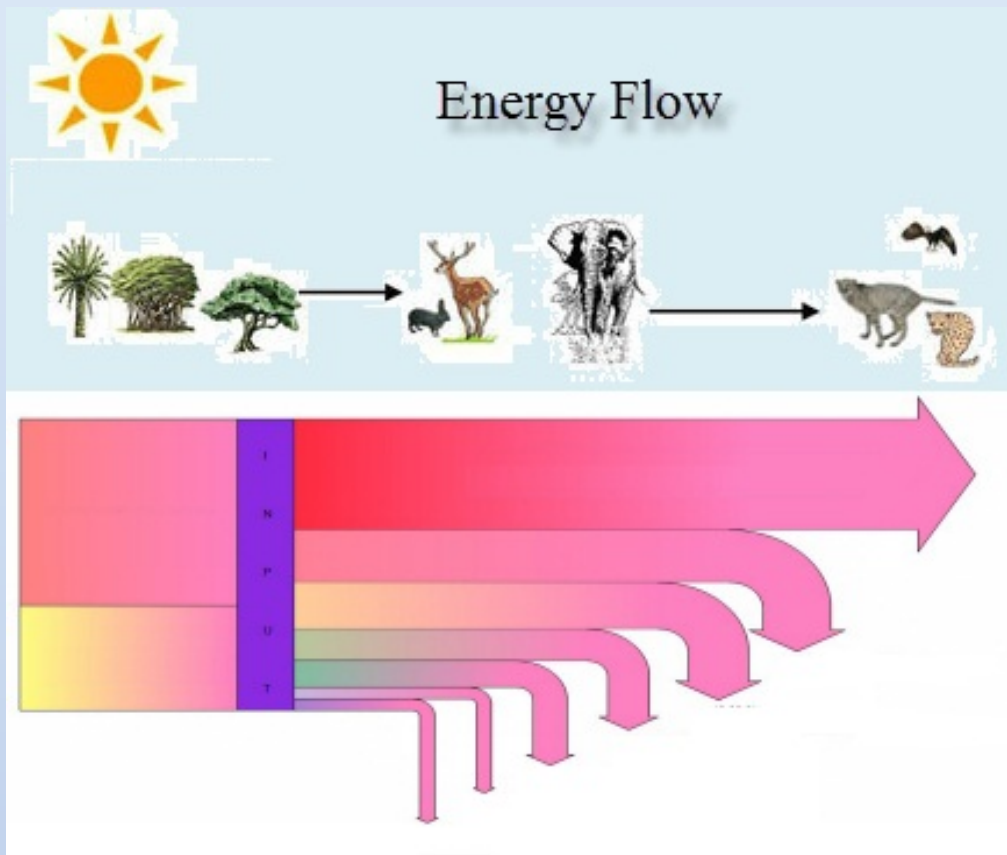
Pyramid of energy

They all show the structure of an ecosystem

[Ecological pyramids](#)

By Thompsma (Own work) [[CC-BY-SA-3.0](#)], [via Wikimedia Commons](#)

# Energy cannot be created or destroyed



Energy in ecosystems begins as sunlight.

Some of this energy is converted into glucose by plants.

Energy passes from plants to animals along a food chain

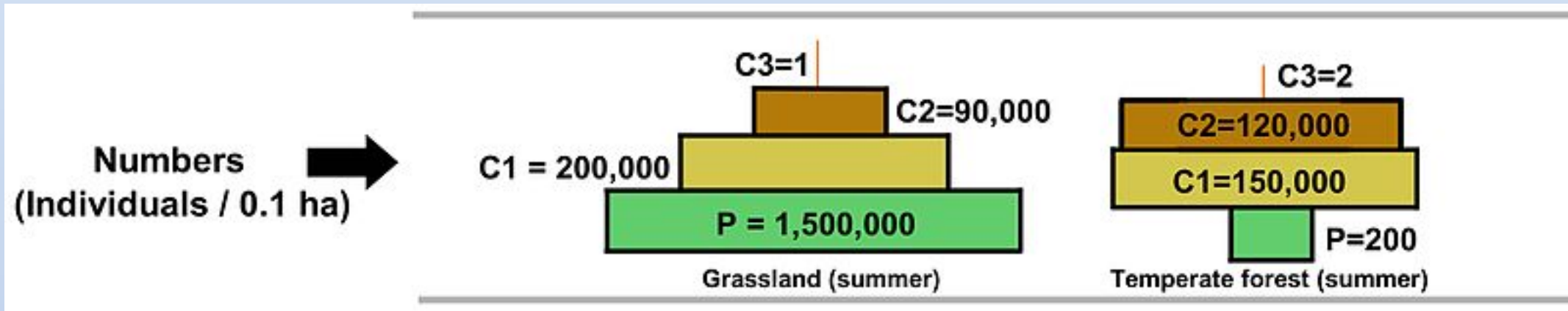
At every step some of the energy becomes heat. A waste product of respiration, movement, or just keeping warm.

As the heat dissipates in the environment it is lost to living things.

Luckily more sunlight energy consistently arrives from the sun.

# Pyramids of Number

- These pyramids are the simplest to calculate and draw.
- They often show a reduction in numbers of organisms as you move along a food chain.
- But only if all the organisms are the same size.

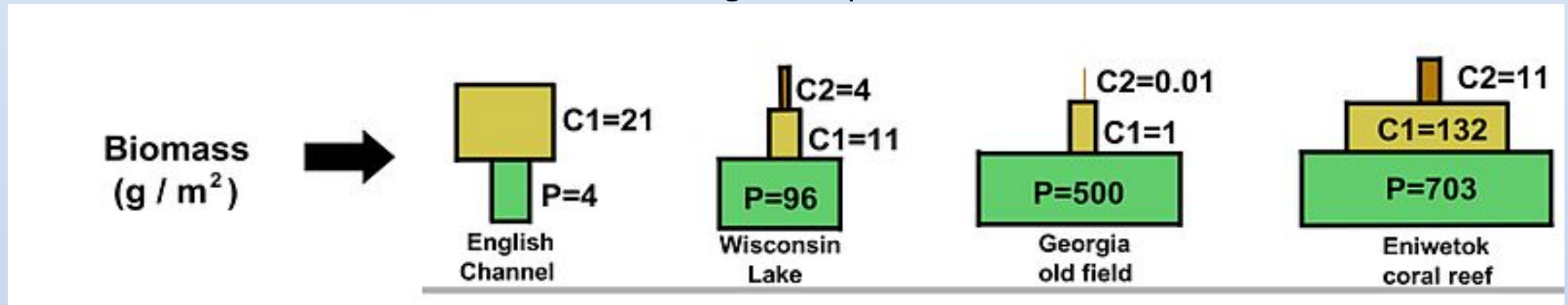


- In a forest trees are usually much bigger than insects feeding on them

# Pyramids of Biomass

Biomass is a better way to measure the amount of living material in each trophic level if the organisms are different sizes.

In many cases the pyramid of biomass shows the trend we expect – there is a smaller mass of organisms at higher trophic levels.



They assume that the populations are the same all year round. We know that in aquatic ecosystems there is a 'bloom' of producers in the spring. Some algae reproduce very rapidly. Although there may be a small mass of algae in the water today, it may have doubled in mass by tomorrow.

Even pyramids of biomass don't show the flow of energy very well.

# Pyramid of Energy

- This type of pyramid diagram takes all these assumptions into account.
- The energy value is calculated over the whole year, which allows for seasonal variations in populations.
- The energy content of the different animals is calculated which takes account of size as well as the nutritional value of organisms.  
(1g of bone has less energy than 1g of muscle)



# Drawing a Pyramid of Energy

- To draw this diagram you need an energy value for each trophic level.
- The units will be  $\text{kJm}^{-2}\text{y}^{-1}$ 
  - that is “kilojoules of energy per metre squared of ecosystem per year”

Pyramid of Energy for a woodland ecosystem	
Trophic level	Energy $\text{kJm}^{-2}\text{y}^{-1}$
Tertiary consumers	240
Secondary Consumers	3200
Primary Consumers	14000
Producers	150000

- Make a scale using the largest energy value and the size of the page.  
If your page was 21cm (A4) then  $1\text{cm} = 10000 \text{kJm}^{-2}\text{y}^{-1}$  is a good scale.

# Steps to draw a pyramid of Energy

1. Choose your scale (1cm = 10000 kJm<sup>-2</sup>y<sup>-1</sup>)
2. Decide the height of each horizontal bar (2cm is usually good)
3. Calculate the length of each bar.
4. Find the centre of the page
5. Draw the producers bar at the bottom, centred on the page
6. Add the primary consumers, and then secondary consumers, etc.
7. For the tertiary consumers a thin vertical line will be OK
8. Add the scale and a title to the graph

Pyramid of Energy for a woodland ecosystem		
Tropic level	Energy kJm <sup>-2</sup> y <sup>-1</sup>	Graph size (cm)
Tertiary consumers	240	0.02
Secondary Consumers	3200	0.30
Primary Consumers	14000	1.40
Producers	150000	15.00



# A Completed Pyramid of energy

