

# Ecosystems, food webs and energy flows

For a better understanding of Sustainable Agriculture



## Objectives

- To enumerate on types and functions of an ecosystem
- To asses food webs in the ecosystem.
- To review energy flows and the importance of maintaining it in the ecosystem



# Ecosystems, definitions

## An ecosystem is:

A community of living organisms in conjunction with the nonliving components of their environment (things like air, water and mineral soil), **interacting as a system.**(Tansley, 1934)

These biotic and abiotic components are regarded as **linked together through nutrient cycles and energy flows.** (Odum, 1971)

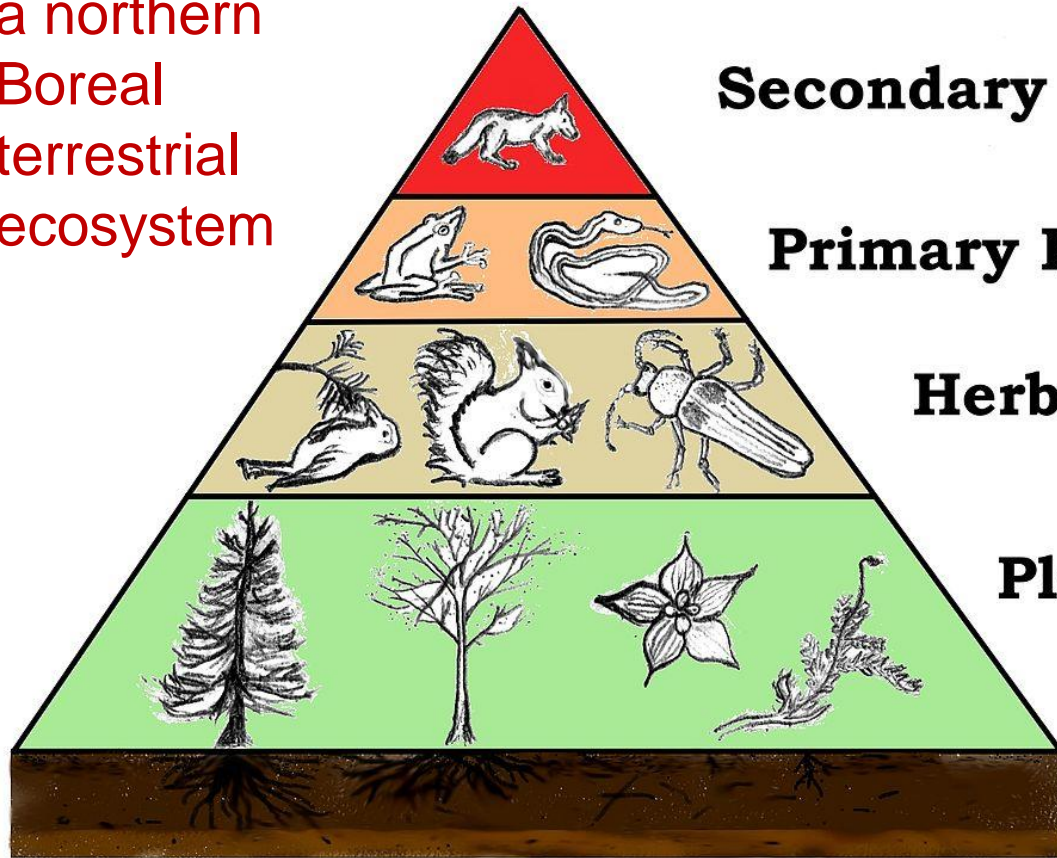
As ecosystems are defined by the **network of interactions among organisms, and between organisms and their environment,** (Schulze 2005) they can be of any size but usually encompass specific, limited spaces (Chapin, 2002)

Some scientists say that **the entire planet is an ecosystem** (Willis, 1997)



# Food webs

A trophic pyramid in a northern Boreal terrestrial ecosystem



**Secondary Predator**

**Primary Predators**

**Herbivores**

**Plants**

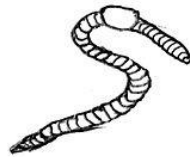
**Soil**

**Heterotrophs**

**Autotrophs**

**Heterotrophs**

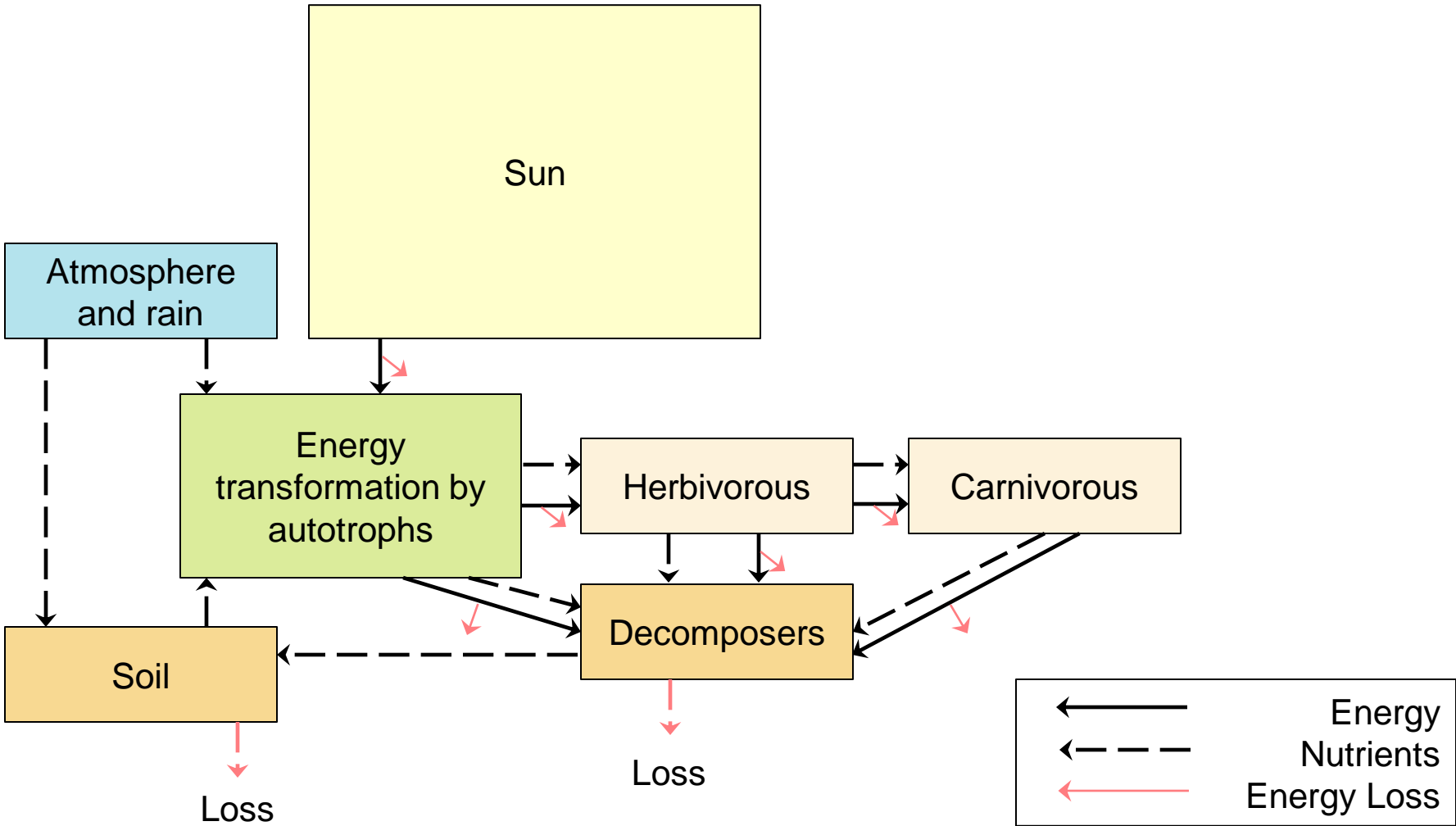
**Decay  
Detrivores**





# Energy flows in ecosystems

# Energy and nutrient flow in ecosystems



Source: modified from Gliessman 2014

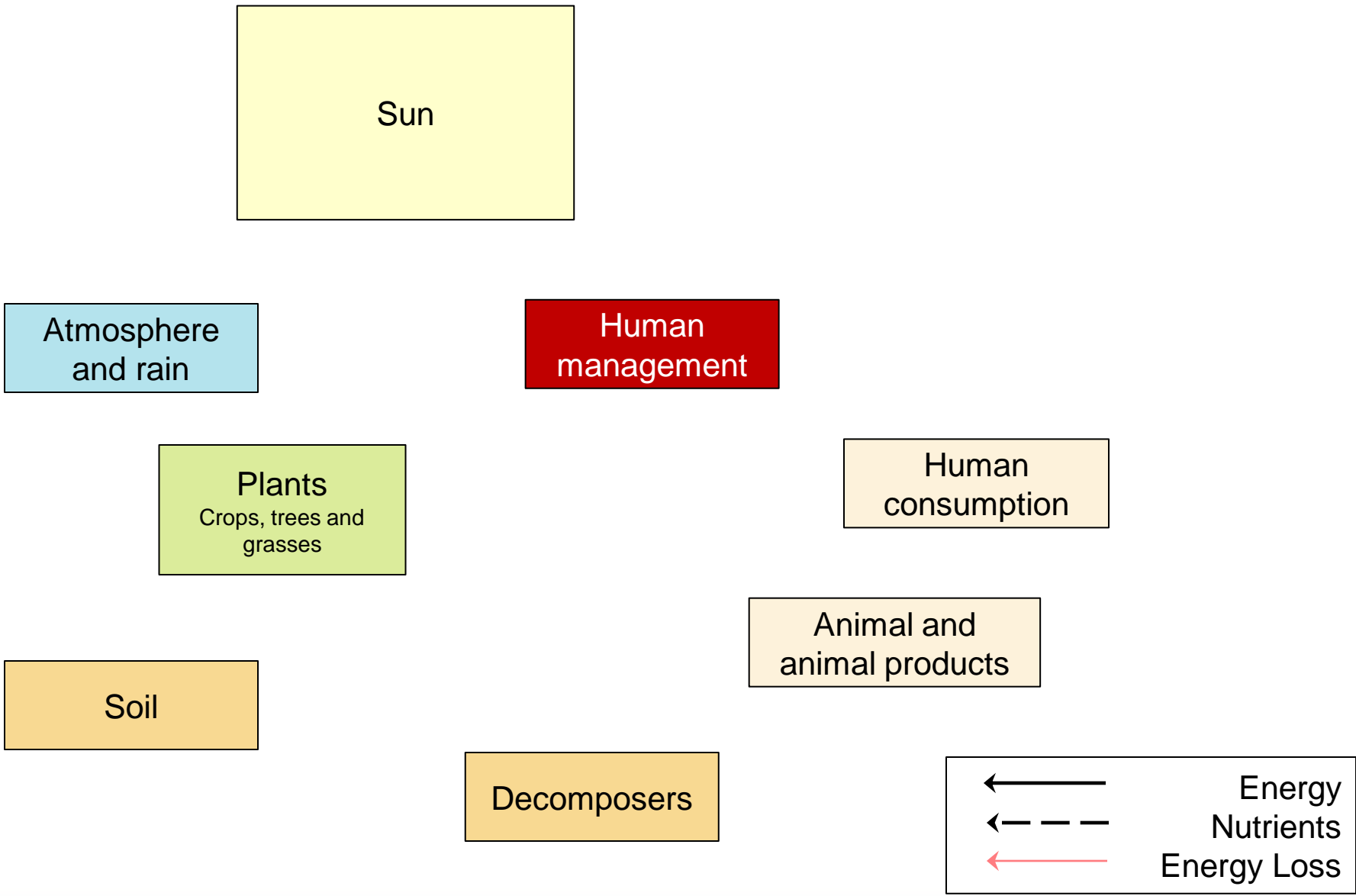




**Group work to energy flows in agroecosystems:**  
draw the elements of an agroecosystem and their  
relation to each other on a white sheet of paper

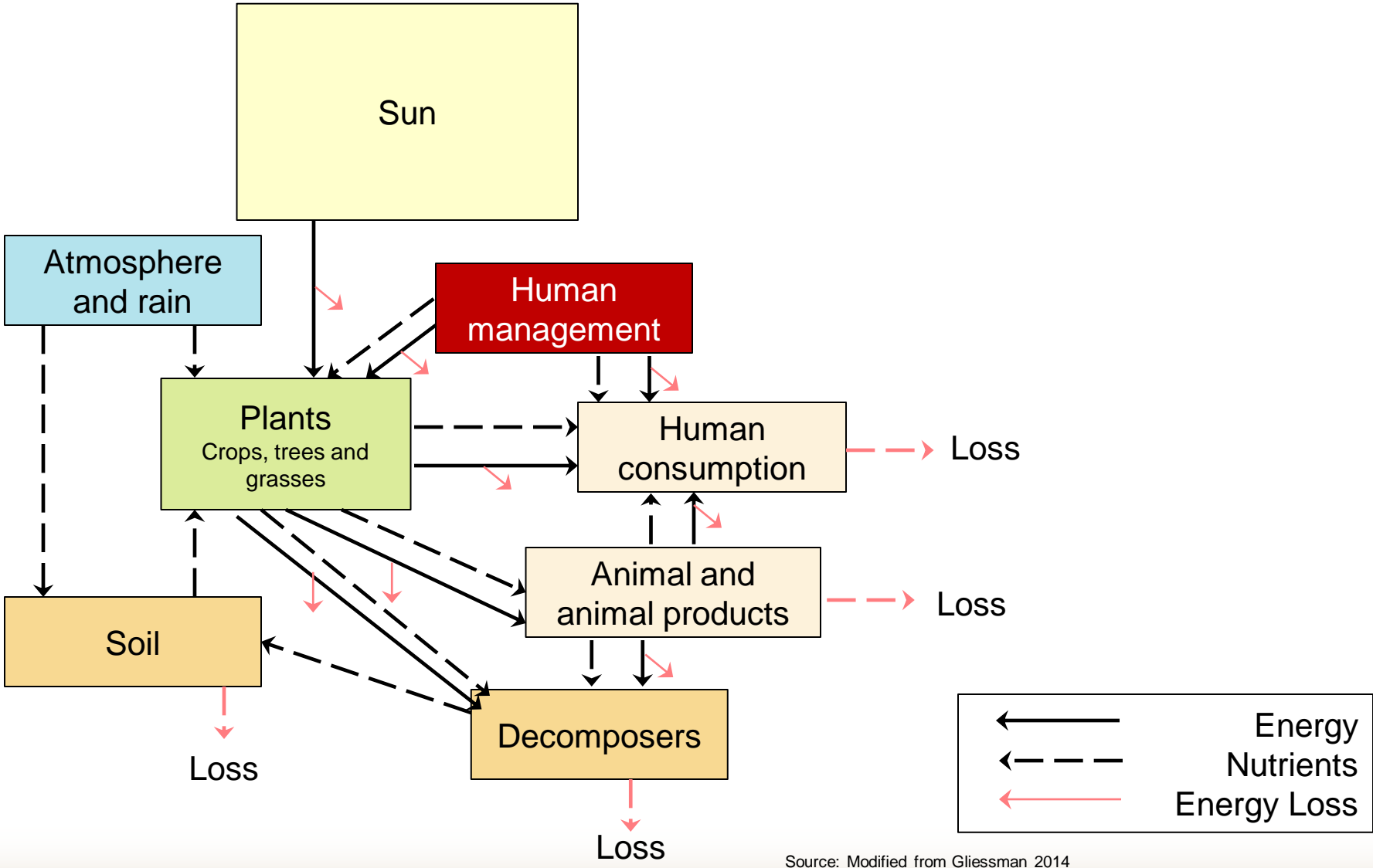


# Energy and nutrients flows in agroecosystems



Source: Modified from Gliessman 2014

# Energy and nutrients flows in agroecosystems



Source: Modified from Gliessman 2014



## Energy flows in agroecosystems

- The ultimate goal of human intervention in ecosystems is to optimize the harvest yield to generate trade and welfare.
- Since modernisation of agriculture:
  - Greater amounts of energy needed for agriculture to increase yields
  - This additional energy input comes directly or non-directly from non-renewable fossil fuels
  - Low return of energy investment for many crops -> we invest more energy than we get back as food energy
- The current energy-intensive form of agriculture **cannot be sustained into the future without fundamental changes**



# Thank you!

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On behalf of



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