

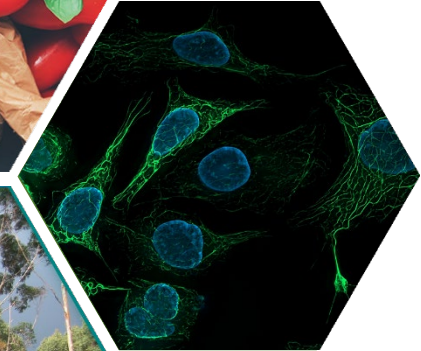
# Matter and energy in ecosystems

Year

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SCIENCE



# Sustainable natural ecosystems



Image 3.0.1 Dryandra woodland

- Natural ecosystems are usually sustainable
- **Sustainability** means that an ecosystem has the ability to maintain suitable living conditions for the community of living things
- For a natural ecosystem to be sustainable it needs:
  - a supply of essential elements necessary for survival and growth (eg carbon, nitrogen, hydrogen, oxygen)
  - an input of energy, usually sunlight
  - the elements in the system are involved in complex nutrient (biogeochemical) cycles
  - biodiversity (a wide range of species living in the ecosystem)



# Sustainable agricultural ecosystems



Image 3.0.2 Harvesting wheat in Mingenew

- Agricultural ecosystems also require:
  - a supply of inputs of elements such as carbon, nitrogen and water
  - an input of energy
- Because agricultural systems are artificial ecosystems a significant proportion of material is removed from the ecosystem as farm produce (eg grain, meat)
- Agricultural ecosystems therefore must be carefully managed if they are to be sustainable
- This careful management is closely aligned to the United Nations Sustainable Development Goal (SDG2) to “End hunger, achieve food security and improved nutrition and promote sustainable agriculture”

# Food in ecosystems

- In any ecosystem, food is vital. It contains the matter and energy required by living organisms
- Every community of organisms must have a source of food. This source of food is manufactured by organisms (such as wheat plants) in the process of photosynthesis. They are therefore known as **producers** or **autotrophs**
- Other organisms (such as plants and fungi) require a ready made source of food. They are therefore known as **consumers** or **heterotrophs**

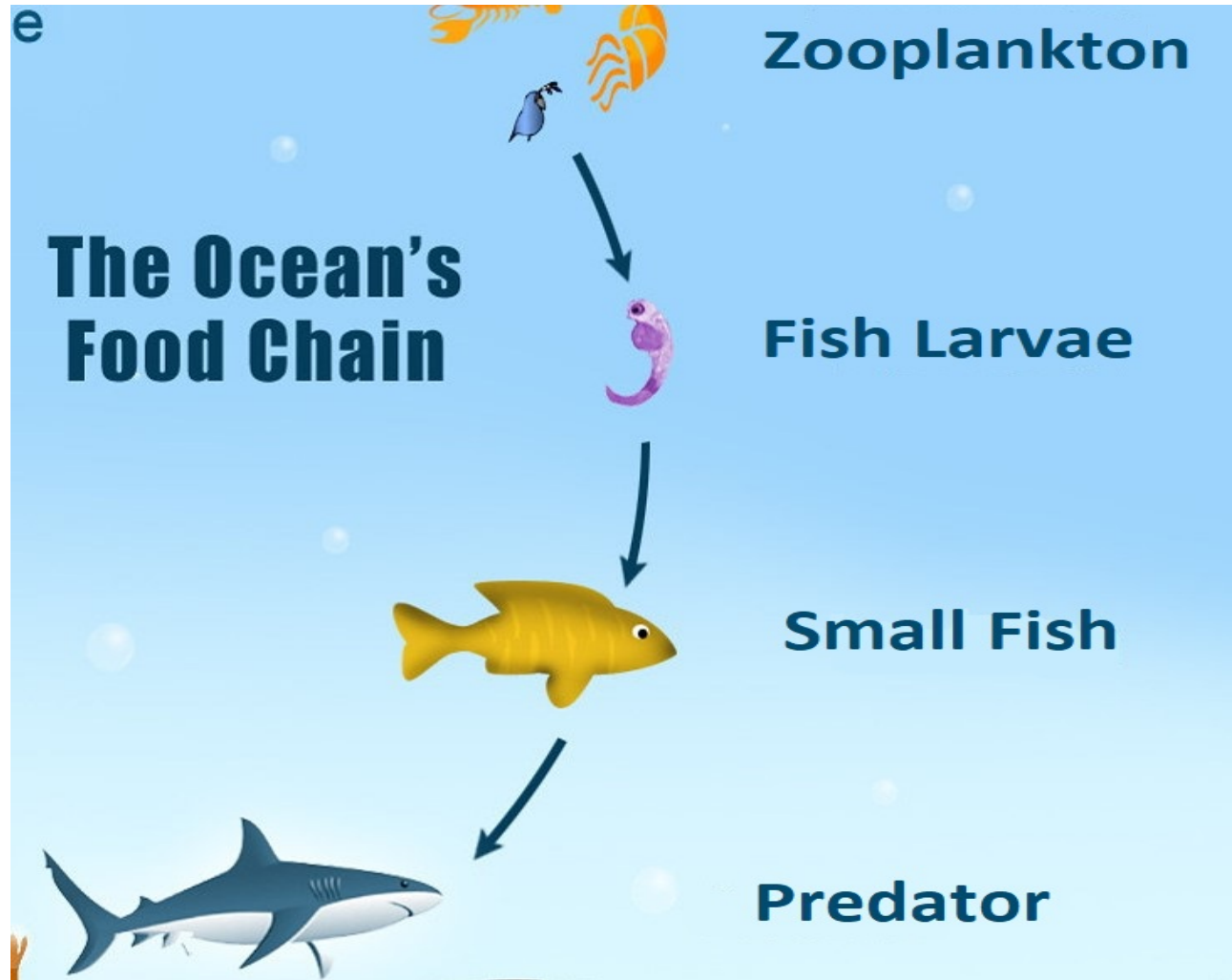


Image 3.0.3 Marine food chain

## Food chains

In both natural and agricultural ecosystems, matter is passed from producers to consumers along **food chains**.

The arrows in a food chain show the direction of the movement of food materials from one organism to another.

In this way the matter and energy needed by organisms pass along food chains.

# Food webs

- There are many different food chains within communities and they are all interconnected. Connected food chains are called **food webs**
- To learn more about food chains and food webs watch the video [Food chains and food webs](#)

# Recycling in nature

A vital group of organisms in any ecosystem is the **decomposers**.

Decomposers are bacteria and fungi.

Decomposers break down dead bodies and wastes and recycle matter for the producers to re-use.

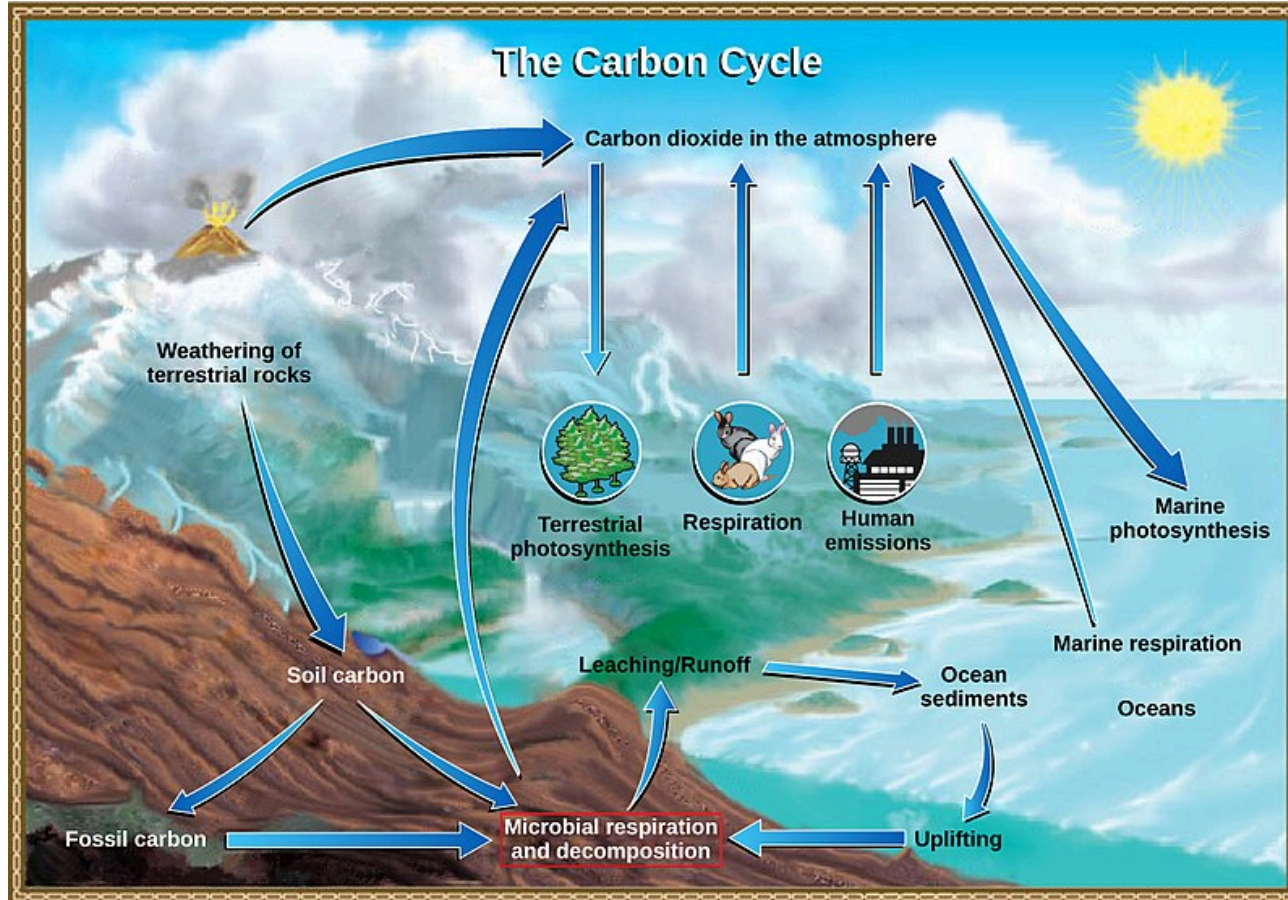


Image 3.0.4 Recycling in nature – the carbon cycle





Image 3.0.5 Fremantle fishing boat harbour

## Sustainable marine ecosystems

Our marine ecosystems are fragile. Because we take fish and other seafood from the ecosystem for food, they must be carefully managed if they are to remain productive, profitable, viable in the long term, and ecologically sustainable.



# Western Australian marine food webs

- Visit at least one of the following Western Australian marine food webs

[Cocos Islands Food Web](#)

[Christmas Islands Food Web](#)

[South Coast Food Web](#)

# Trophic Levels & Energy Transfer

## A food pyramid

Trophic levels are split by a who-eats-who system.

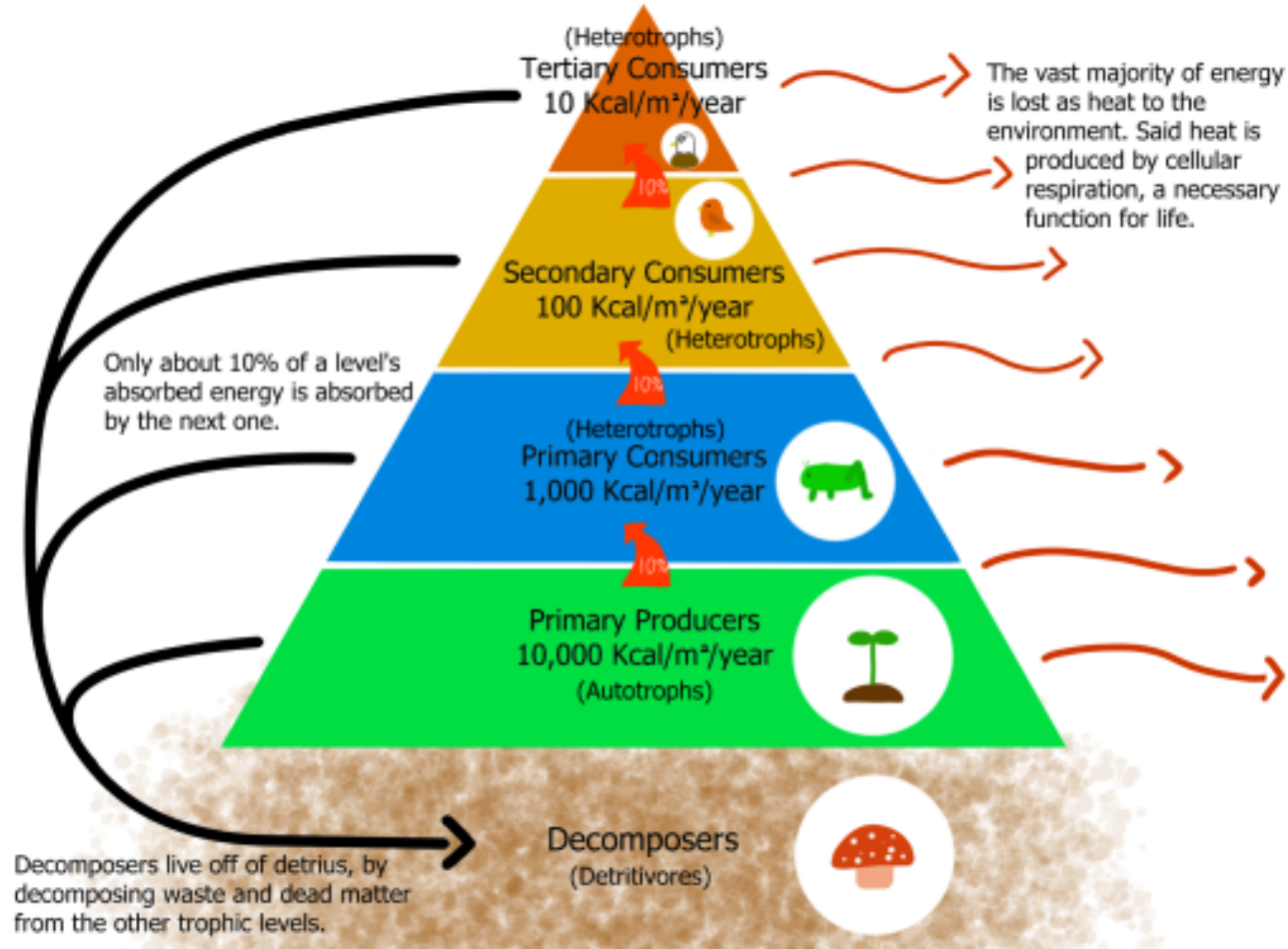


Image 3.0.6 Diagram of trophic layers and energy transfer in an ecosystem

# Aboriginal and Torres Strait Islander management of food webs

- The introduction to Australia of invasive species (such as the cane toad) have impacted negatively on food webs
- Many Aboriginal and Torres Strait Islander communities rely on these food webs for food and other resources
- Aboriginal and Torres Strait Islander peoples have responded to these impacts in an effort to restore traditional ecosystems

To learn more about the management of their environment go to:

- [Deadly story](#)
- [Indigenous hunters vital to robust food webs in Australia](#)



# Acknowledgements

## References

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## Images

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