

Coral Reefs

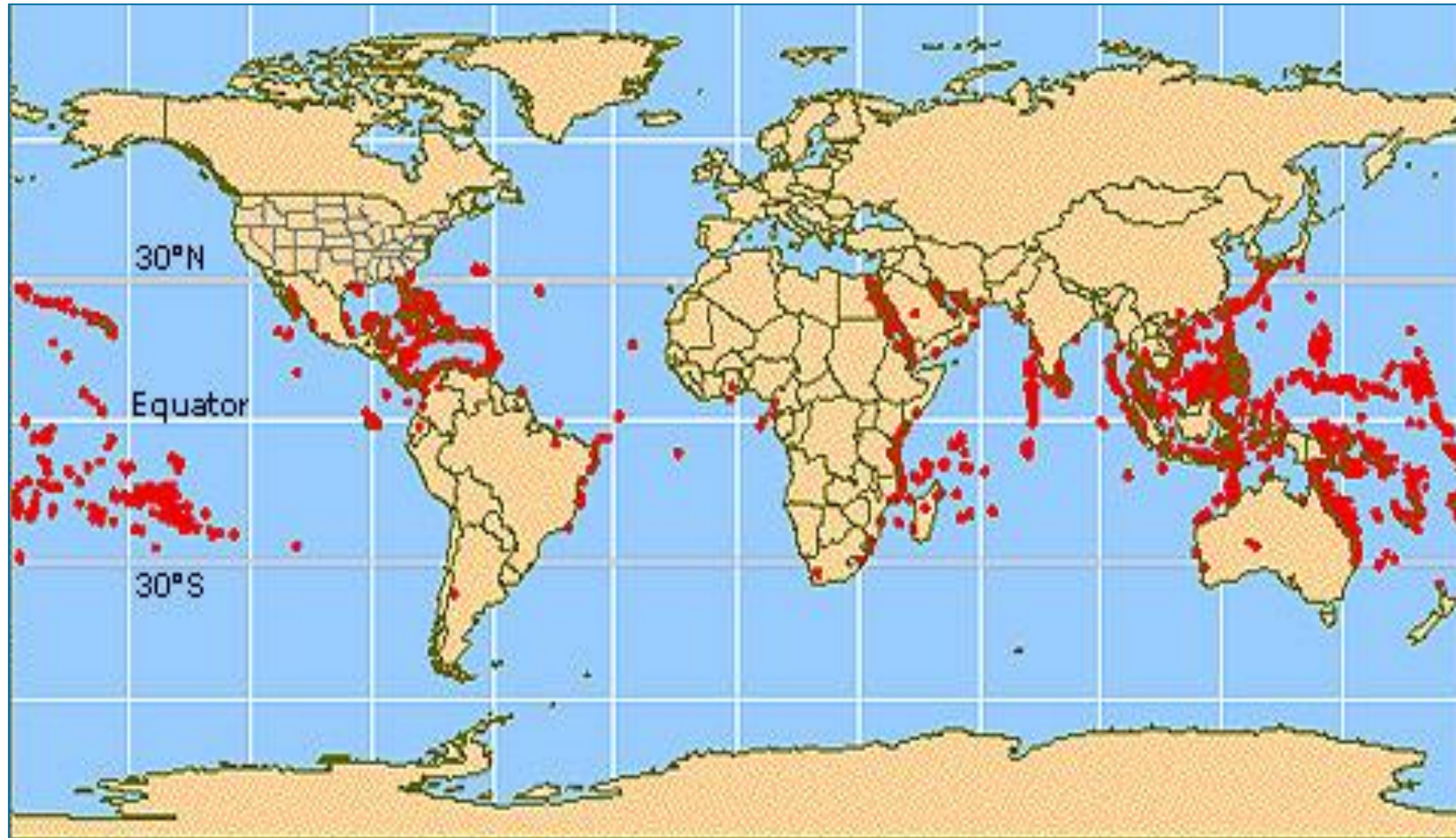


Why are they so important?

- Coral reefs provide physical, coastal protection by forming large, wave-resistant limestone structures
- Some promote fish species diversity through increased habitat complexity providing more variety of habitats for different species to survive
- High biodiversity is attractive to tourists, reinforcing coral reefs important economic role
- **Tropical waters are actually very nutrient poor!** However, coral reefs are very productive ecosystems. Most of production is recycled within the system. Rate of gross primary production by reef algae range from 1 to $40 \text{ g C m}^{-1} \text{ d}^{-1}$

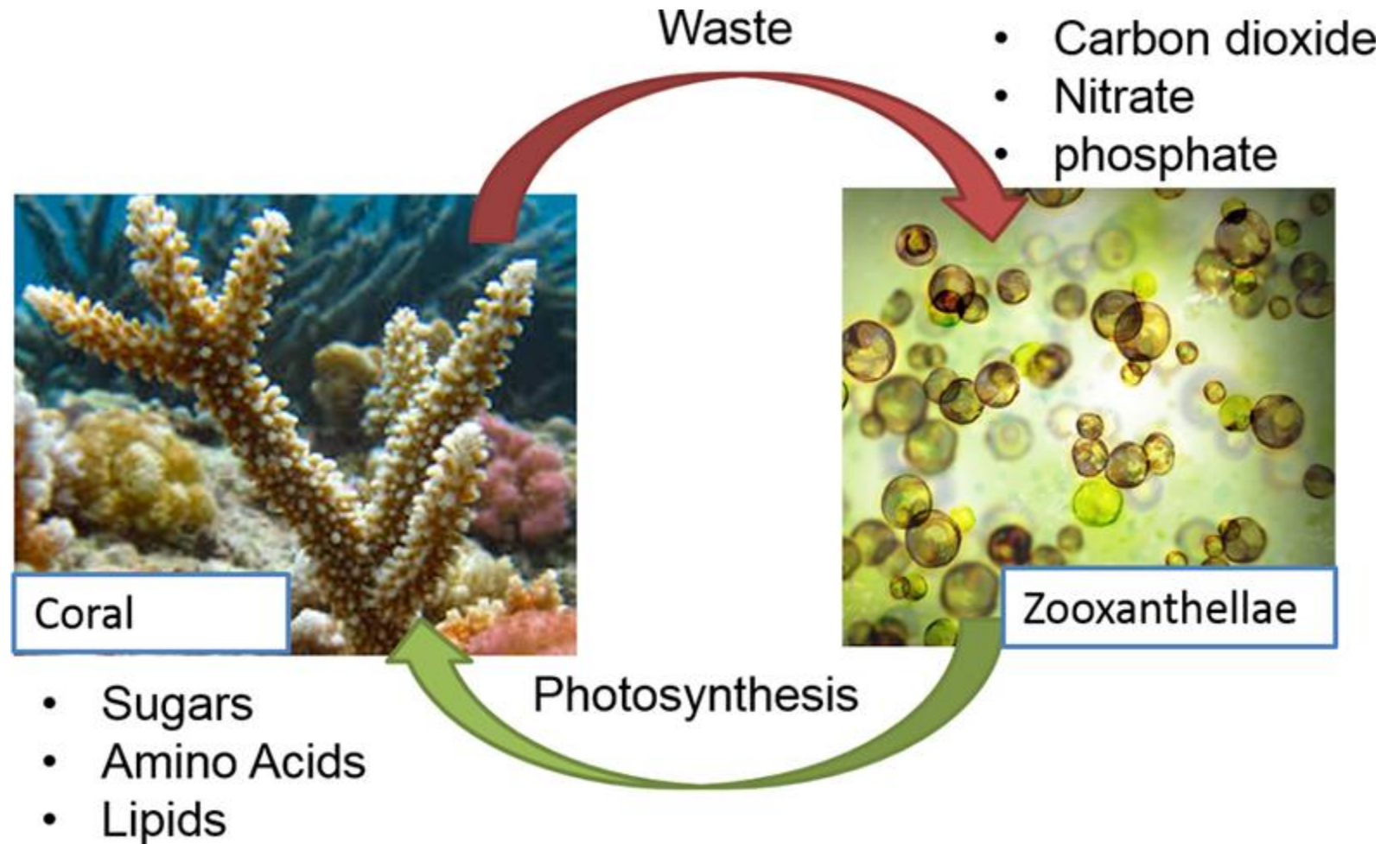


Distribution



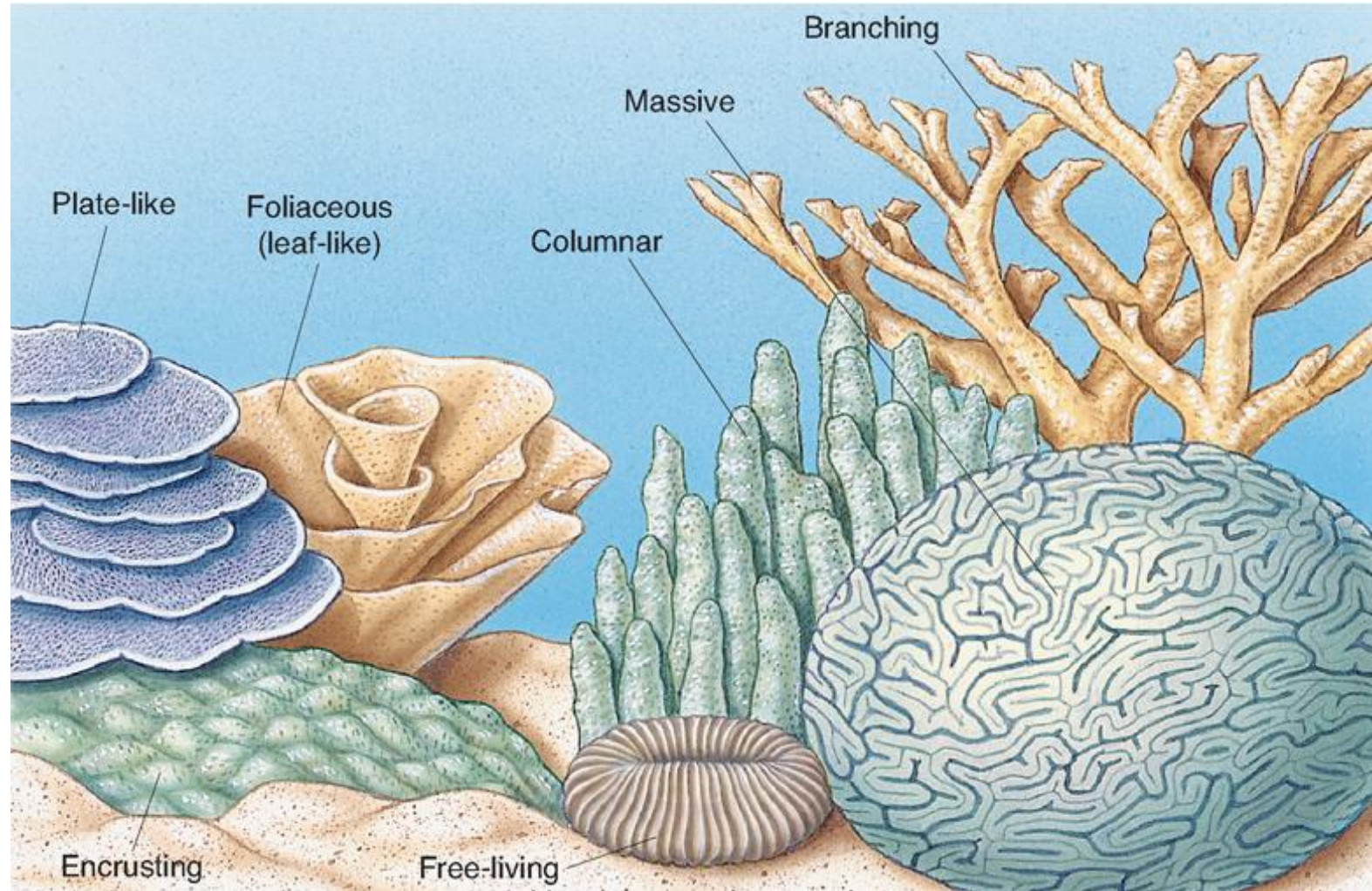
How corals “feed”

- Reefs comprised of coral polyps
- Contain algae called zooxanthellae- provide ~90% energy for coral
- Endosymbiotic relationship (provide for each other)



Reef-building (Hermatypic) corals

- Branching: tree-branch or elk-horn shapes; grow in linear dimension fairly rapidly 10 cm per y; storms may break apart corals which can grow into new colonies
- Massive: mound-shaped and irregular; produce lots of calcium carbonate but grow more slowly in linear dimensions, about 1 cm per year



Reproduction

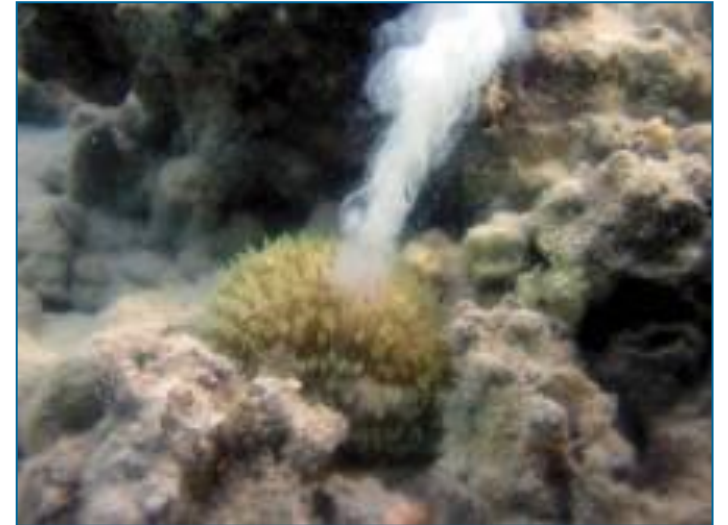
Asexual

- Budding
- Fragmentation



Sexual

- Release eggs and sperm
- Fertilised eggs develop into ciliated larva
- Brooding
- Influenced by physical environment



Types of reef

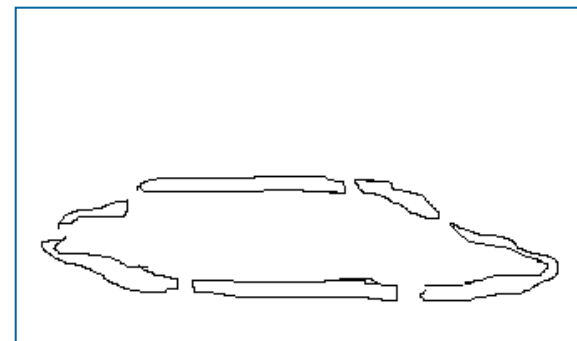
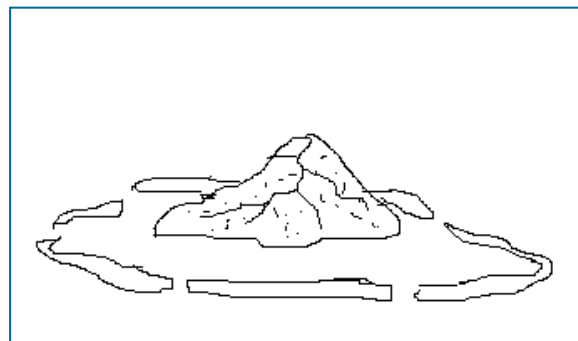
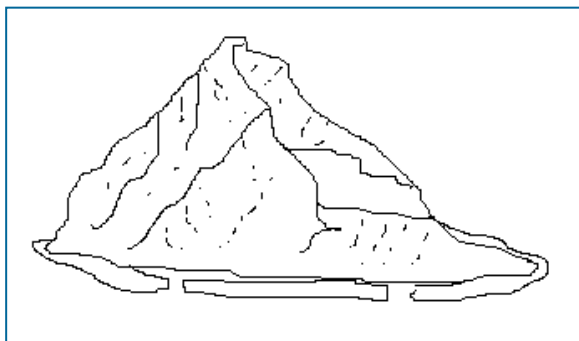
Fringing



Barrier



Atoll



Threats to coral reefs

- Disease
- Storms, cyclones and hurricanes
- Climate change
- El Nino
- Bleaching
- Competition, grazing and predation
- Pollution, sediments and nutrients
- Illegal and over fishing



Bleaching

- Response to stress and attributed to high temperatures
- Zooxanthellae cannot photosynthesise to provide nutrients for the coral, so there is no longer an endosymbiotic relationship and they expel the zooxanthellae as a result
- This leads to loss of colour (turns white) and coral death after a period of time.
- If temperature returns to levels zooxanthellae can photosynthesise at again, then some corals can recover, but only during a short period after the bleaching has occurred.

