

Ocean Acidification

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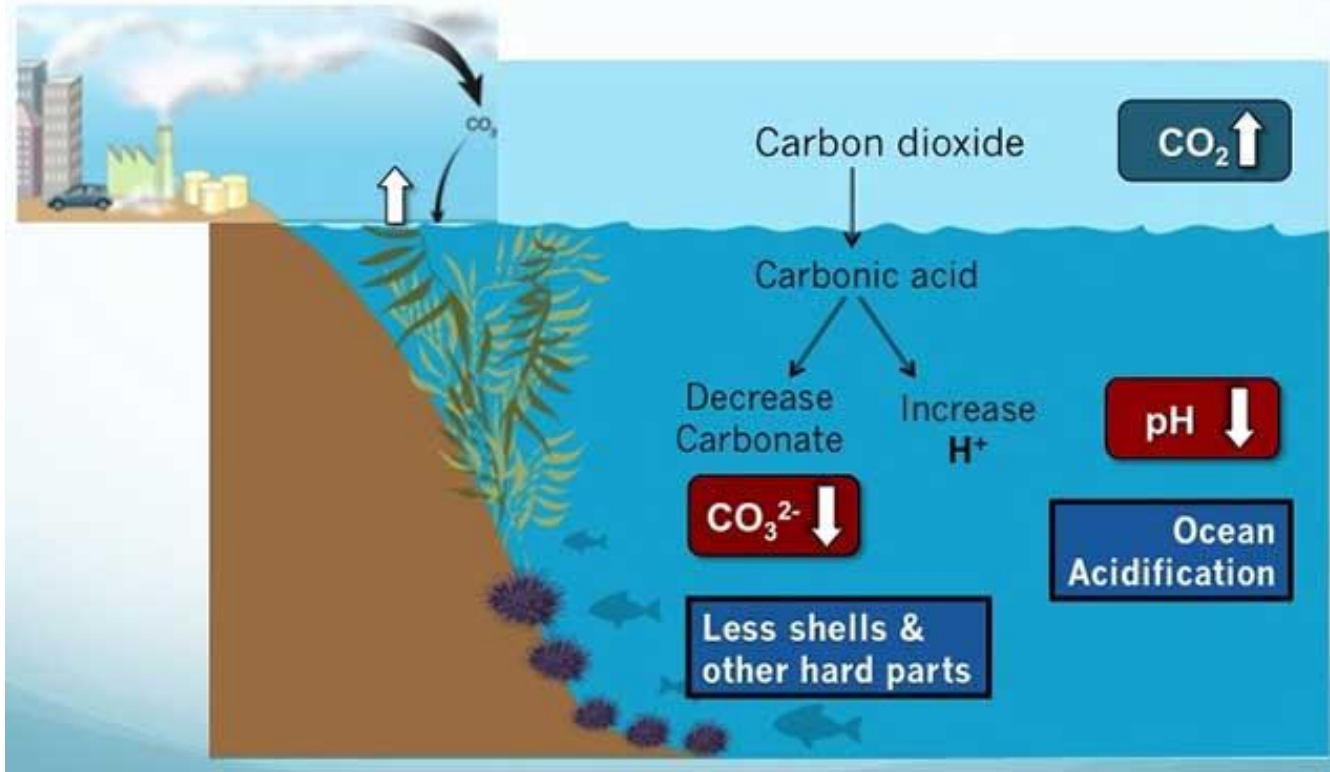
Ocean Chemistry

Ocean acidification is a **change in sea water chemistry** (lowering of pH).

CO₂ reacts with seawater molecules (H₂O) to form carbonic acid (**H₂CO₃**)

The **weak acid H₂CO₃** dissociates to form **bicarbonate CO₃²⁻** and **hydrogen ions (H⁺)**. The ocean is **basic** due to its **buffering** capacity.

However, the **alarming rate** of release of CO₂ (-10 times faster compared to pre-industrial levels) in sea water changes the chemistry to **acidic** conditions.

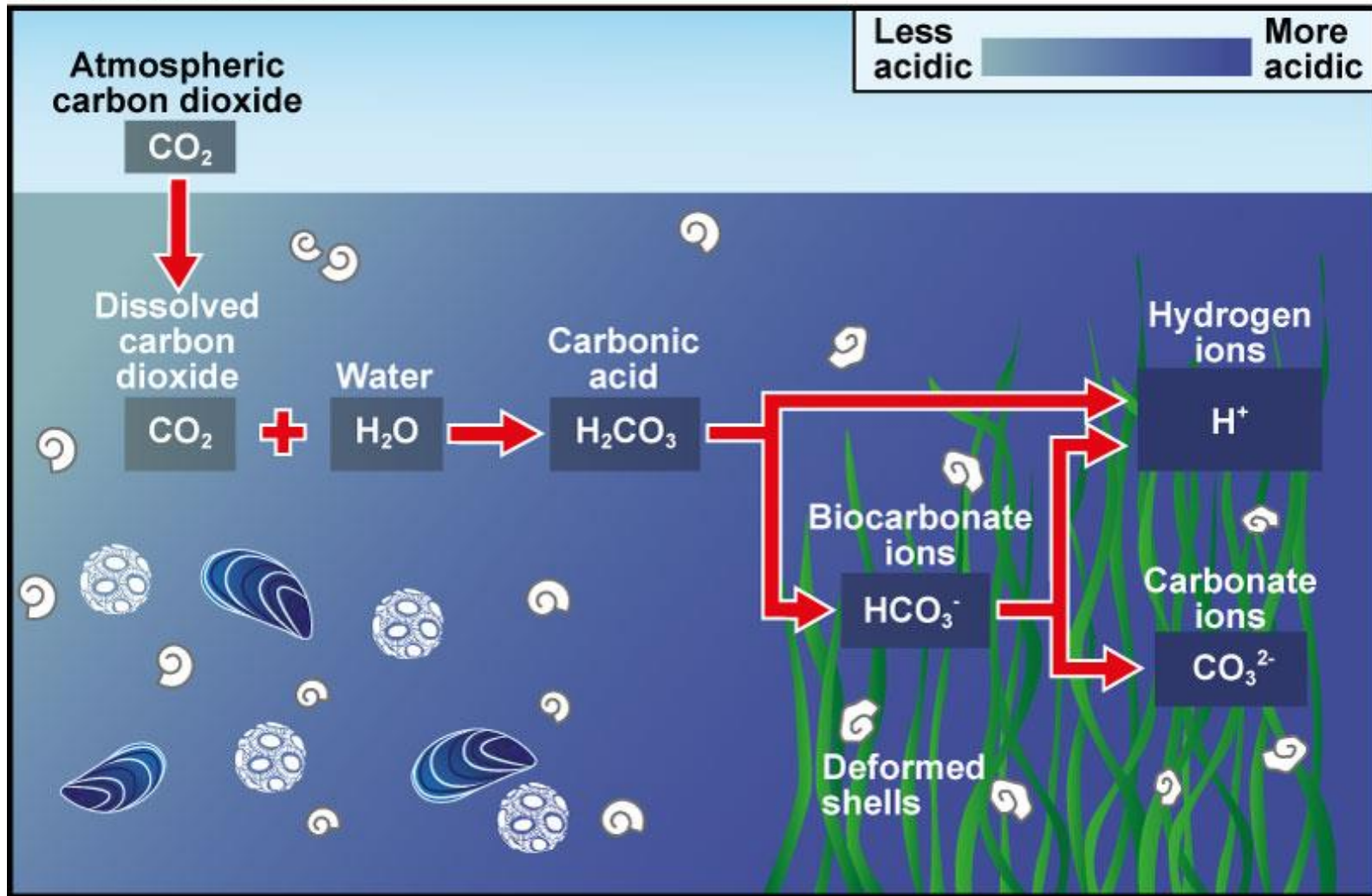


Causes= **increase carbon dioxide gases in atmosphere** stimulated by human burning of fossil fuel, coals and deforestation.

The ocean absorption of **increasing CO_2 = Increase hydrogen ions (pH < 7)**

Increase hydrogen ions in seawater = **low pH (acidic)** and **decrease carbonate ions** (availability for **calcifying marine species** e.,g., clams, corals).

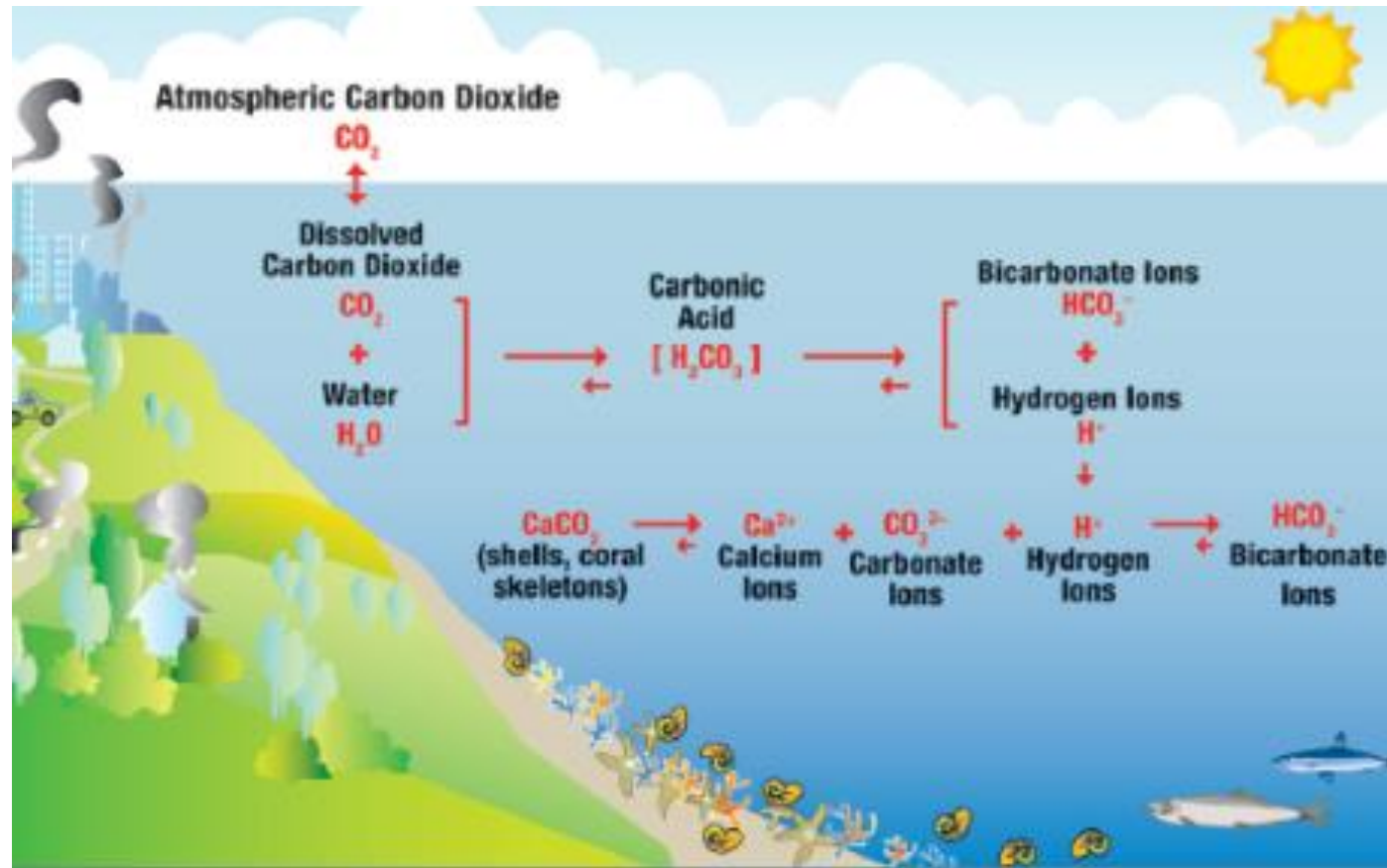
OCEAN ACIDIFICATION



Sea water pH = 8.1 (basic)

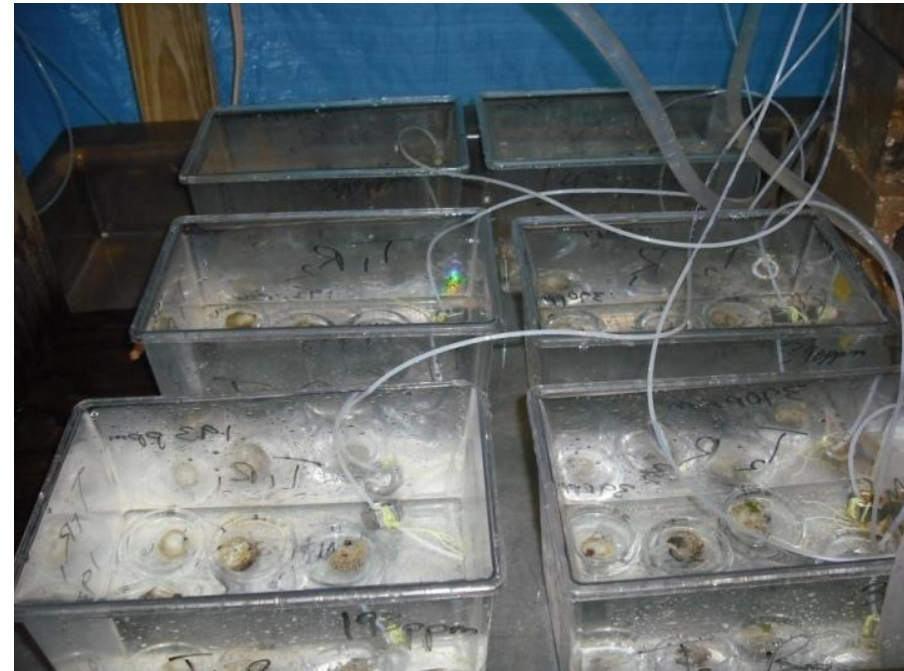
The **lowering** of seawater pH = **Ocean acidification**

Ocean acidification



The biological impacts of ocean acidification: Affect the survival and slow growth of calcareous skeletons or shells for calcifying organisms.

Mesocom : manipulation of **pH levels** by **release of CO₂** for **culture of flat tree oysters** in laboratory of Bermuda Institute of Ocean Science.



Akita, L.G., Andersson, A (2015)



Field culture of flat tree oyster
along natural pH gradient (
acidified waters, **3 stations**) in
Mangrove Bay, Bermuda.

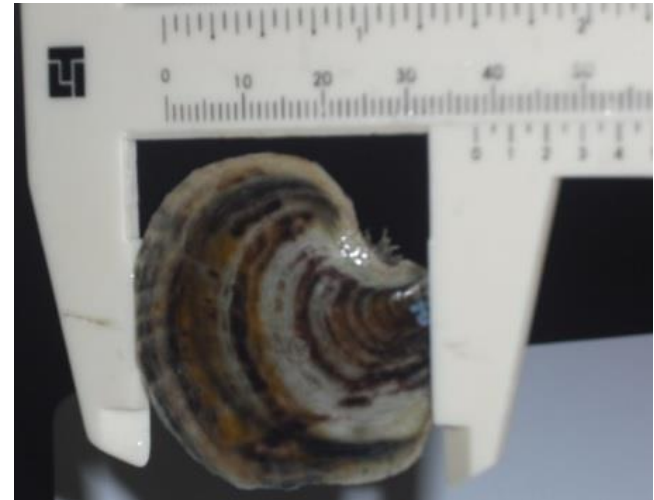
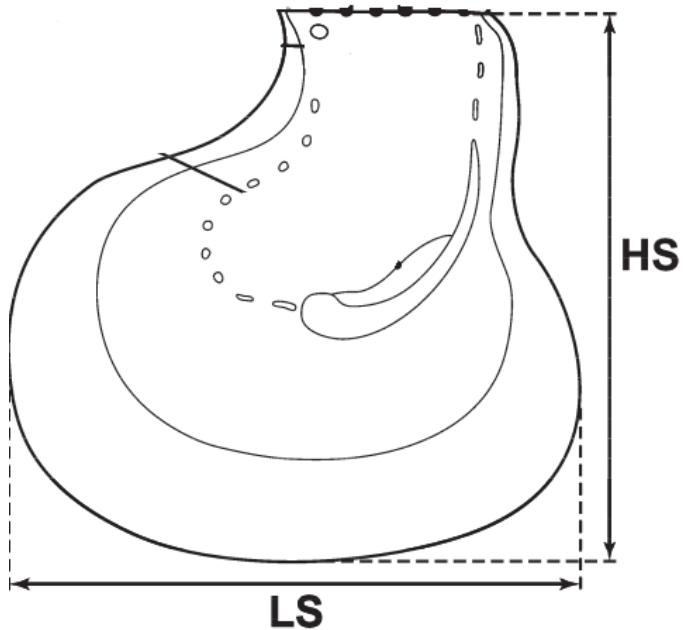


Flat Tree Oyster, *Isognomon alatus*



The acidified waters affect the **shell formation** of calcifying organism (e.g., oysters, calms).

Measurement

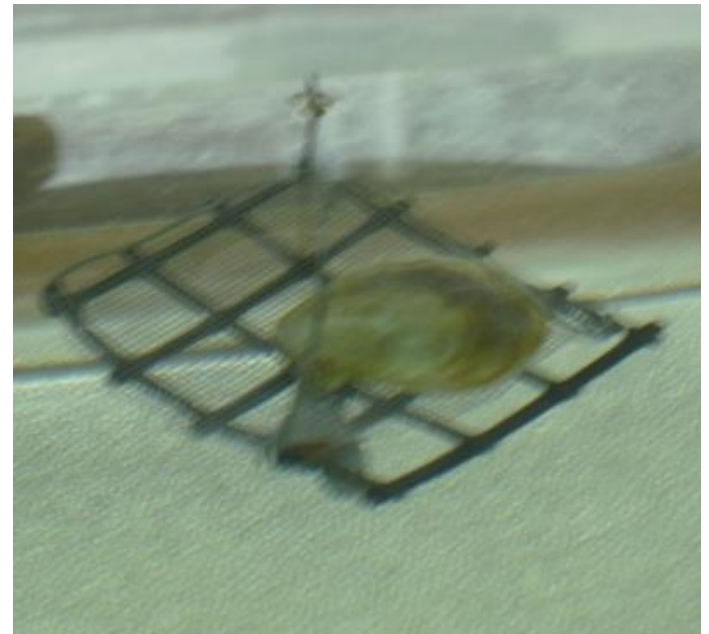


Shell measurement (length, height, cm) of flat tree oyster.

Weight



Determination of **buoyancy weight** of **flat tree oyster**.



Reading

- **Akita, L.G.**, Andersson, A (2015): The effects of elevated carbon dioxide concentrations on the growth of flat tree oyster, *Isognomon alatus*. ISBN 978-3-659-58986-7. LAP Lambert Academic Publishing, 90 pp.
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