


The Role of Herbivores

Herbivores play a critical role in coral reef resilience by limiting the establishment and growth of algal communities that impede coral recruitment.

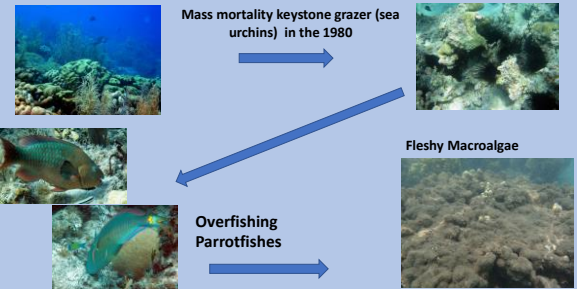
In the Caribbean region, fishes and sea urchins are the dominant group of herbivores. Major families include surgeonfishes, parrotfishes, and sea urchins

By grazing on algae, herbivores can prevent macroalgae from overgrowing corals or occupying space important for coral recruitment.



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Issues




Mass mortality keystone grazer (sea urchins) in the 1980s

Overfishing Parrotfishes

Fleshy Macroalgae


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- Rates of change in macroalgae & herbivores diverge in recent decades:
- Macroalgae increasing, herbivores decreasing
- Herbivores decreasing, sea urchins recovering



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- Herbivorous reef fishes are also important agents of **bioerosion** on reefs (i.e. the removal of material from the reef by biological processes).
- Bioerosion** plays a critical role in coral reef resilience by removing dead coral and cleaning areas of substratum for colonization by benthic organisms, facilitating the settlement, growth and survival of coralline algae and corals



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Functional Groups

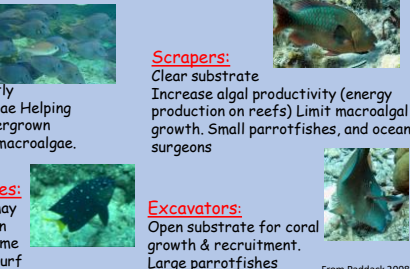
Browsers:
Eat macroalgae directly &/or eat epiphytic algae Helping corals from being overgrown/shaded/abraded by macroalgae. parrotfishes

Scrapers:
Clear substrate Increase algal productivity (energy production on reefs) Limit macroalgal growth. Small parrotfishes, and ocean surgeonfishes

Grazers/detritivores:
Localized protection may enhance biodiversity on reefs. Schooling consume large amount of algal turf

Excavators:
Open substrate for coral growth & recruitment. Large parrotfishes

From Paddock 2008



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Browsers:
Kyphosus sectatrix
Acanthurus coeruleus
Sparisoma chrysopterygum
Sparisoma rubripinne
Scarus coeruleus
Sparisoma atomarium
Sparisoma radians
Cryptototomus roseus

Scrapers:
Scarus coelestinus
Scarus guacamaia
Scarus taeniopterus
Scarus iserti
Scarus aurofrenatum
Acanthurus bahianus
Acanthurus chirurgus

Grazers/detritivores:
Stegastes spp.
Microspathadon chrysurus

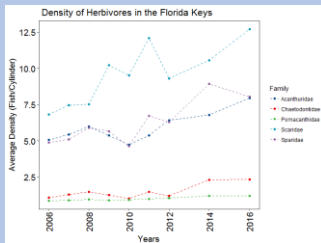
Excavators:
Scarus vetula
Sparisoma viride

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Use of Existing Data to Detect Change



- Understanding how different species of herbivores affect reef ecosystems is critical for developing effective management strategies;
- For example: e.g., parrotfishes are effective at controlling algae and facilitating corals but different species of herbivores have unique and complementary impacts on reef ecosystems.

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Management implications and next steps

- Spatial management**, particularly herbivore management, is critical to coral recovery:
 - Establishing a network of permanent no-take MPAs
 - Establishing a network of Herbivore Fishery Management Areas
- Fisheries rules**, especially pertaining to parrotfish are particularly important component of any coral reef recovery action:
 - Prohibit all use of SCUBA for spearfishing
 - Prohibit all take (commercial and noncommercial) of herbivorous fish
 - Prohibit all take (commercial and non-commercial) of parrotfish
 - Establish bag limits to protect parrotfishes

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A range of conventional fisheries management tools and strategies are available for protecting herbivores

- Area closures** — Prohibiting removal of herbivores (or general bans on fishing)
- Gear restrictions** — Herbivores generally are not caught in hook and line fisheries, and instead are targeted using traps, nets or spears.
- Species bans** — The most effective way to protect herbivores is to place a total ban on collection of key herbivore species.
- Temporal closures** — The role of herbivores can be especially important after disturbance events that kill corals, such as hurricanes or mass coral bleaching
- Active restoration** — In cases where herbivore populations have been reduced through overfishing or disease, active restoration may be the most feasible way to rebuild populations

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Management implications and next steps

- Conservation managers, planners, and practitioners needed to better understand the biological consequences of each level of protection to know when and where to best implement each type.

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Message to Managers and Fishermen

- Parrotfishes are an important part of the coral reef ecosystem
- They help to maintain the reef habitat that supports many species of other fish & invertebrates



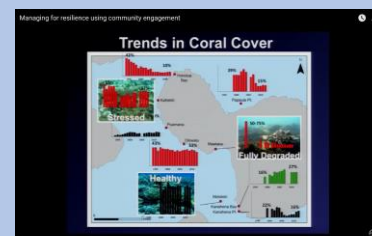
Fish this resource with great care. Overfishing herbivores will only make things worse.

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For further information

Case study from Hawaii – Kahekili Herbivore Reserve

https://www.youtube.com/watch?v=ZYPK_L_L_4Q#action=share



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