In many habitats, competition is the drama, but benefactors set the stage

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Is the world basically good or basically bad? It appears that in the natural world the answer is "basically good." Positive interactions in which plants and animals benefit from association with one another create the basis for many of the world's ecosystems. Coral reefs, kelp forests, marshes, and other familiar habitats can harbor a diversity of life by providing shelter from both harsh conditions and predators.

New experimental work, published in the February *American Naturalist* by a team of Brown University researchers suggests those positive effects of living habitats are the most important factor in driving the diversity and abundance of organisms in many ecosystems. The team conducted their research with cordgrass and ribbed mussels – two species that form critical habitat along the U.S. Atlantic coastline – because they are similar to other habitat species like corals and kelps but are more easily subjected to experiments in their natural setting.

Cordgrass, which can establish and persist without the aid of other foundation species, facilitates a dense assemblage of inhabitants (e.g., mussels, snails, seaweeds) with roots/rhizomes that stabilize substrate and a dense canopy that baffles waves and provides shade. Within the cordgrass bed community, ribbed mussels further enhance physical conditions and densities of other species (e.g., amphipods, barnacles) by providing crevice space and hard substrate.

"The stage is set by those species that create habitat," said team leader Andrew Altieri, (now at Northeastern University). "The organisms and

interactions that occur within the habitat, such as crabs eating snails or annual plants competing with one another, are just players and roles that we see because of that stage." Previously, the tendency was to focus on negative interactions such as predation and competition. That perspective overlooked the fact that many predators, prey, and competitors were themselves dependent on the positive effects, or facilitation, of species such as marsh grass and mussels that create habitat.

And what about situations where a player on the stage has positive effects of its own? "We call that chain of positive effects a 'facilitation cascade'," said Altieri. The researchers suggest that facilitation cascades could be tapped to aid conservation efforts. Restoration of a habitat-forming species could nurture the return of species including other facilitators in an upward spiral. But Altieri cautioned the findings could cut both ways: "It could make an ecosystem more susceptible to collapse because there are more links in the chain to act as Achilles' heels."

Source: University of Chicago