Mesophotic Coral Ecosystems

Issue:

Mesophotic coral ecosystems are characterized by the presence of light-dependent corals and associated communities typically found at depths ranging from 30-40 m and extending to over 150 m in tropical and subtropical regions. The dominant communities providing structural habitat in the mesophotic zone can be comprised of coral, sponge, and algal species.

Considered as extensions of shallower coral reef systems, MCEs are likely to have biological, physical, and chemical connectivity with reefs and associated communities. Although these ecosystems harbor many of the species found in their shallower water counterparts, they can be colonized by a disproportionately high number of native species of fishes and invertebrates.

Mesophotic coral ecosystem in the Auau Channel, Hawaii at 70 m. Photo credit: NOAA's Hawaii Undersea Research Laboratory.

Mesophotic coral ecosystem off La Parguera, Puerto Rico at 45 m. Photo credit: Hector Ruiz.

Approach:

In 2006, CSCOR broadened the Coral Reef Ecosystem Studies (CRES) program to include research on mesophotic coral ecosystems. The Deep-CRES program bridges an information gap in corals found at intermediate depths. The goal of the Deep-CRES program is to provide sound science to enable effective ecosystem-based management of mesophotic coral ecosystems. The key objectives of this research are to improve the understanding of the processes that regulate these ecosystems and to assess their vulnerability to exploitation and human disturbance.

Two projects have been funded under the Deep-CRES program, Deep-CRES Caribbean (2006) and Deep-CRES Hawaii (2007).

Management/Policy Issues:

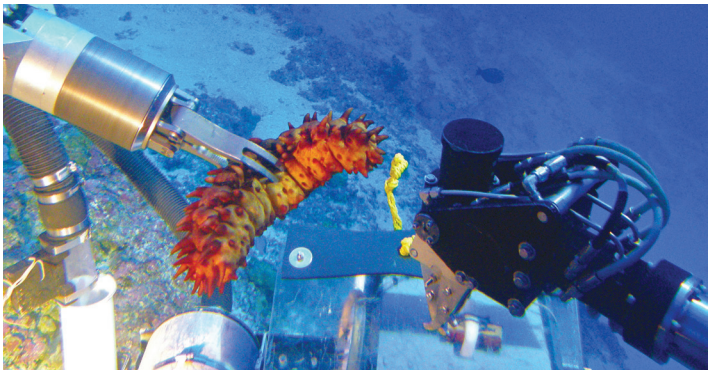
In an era of significant coastal ocean changes and documented human impacts on shallow coral reefs, it is important to understand the value and role of mesophotic coral ecosystems in tropical and subtropical ecosystems.

Mesophotic coral ecosystems may be regarded as extensions of shallow coral ecosystems including sharing common species. It has been hypothesized that mesophotic coral ecosystems may serve as potential sources to reseed or replenish degraded shallow-water coral species.

Mesophotic coral ecosystems may also serve as essential fish habitat for economically- and ecologically-important species, i.e., waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.

In addition, similar to shallower coral ecosystems, these ecosystems contain organisms with specialized defenses to ward off predators and microbial infections. These specialized defenses often yield 'novel' compounds that can be used to develop natural products from the sea (e.g., cancer drugs and skin care products) that benefit mankind.

Mesophotic coral ecosystems may serve as a refuge for heavily exploited species such as the Nassau grouper shown off Puerto Rico at 38 m. Photo Credit: Jorge Sabater.



Scientists shown collecting a specimen from the Pisces IV sub. Photo credit: NOAA's Hawaii Undersea Research Laboratory.

Accomplishments:

- An international workshop – consisting of state, Federal, and international agencies, academia, and nongovernmental organizations – was held in 2008 to discuss and review the state of knowledge regarding mesophotic coral ecosystems.

- A *Mesophotic Coral Ecosystems Research Strategy* – a result of the 2008 workshop – was published in 2009 that idenitfied critical research needs to help inform management and conserve mesophotic coral ecosystems and a special issue of .

- Deep-CRES Caribbean and Hawaii have both documented several new species previously unknown to science.

- Deep-CRES Caribbean has documented the presence of commerically important groupers and snappers at mesophotic depths, suggesting that these ecosystems may serve as a refuge for heavily exploited species.

- Deep-CRES Hawaii has discovered that mesophotic coral ecosystems are home to some of the same species of fish found on shallower coral reefs in Hawaii, suggesting that these ecosystems may serve as a replenishment source for shallower ecosystems.

FOR MORE INFORMATION CONTACT:

NOAA/NOAA Ocean Service/NCCOS/CSCOR
Kimberly Puglise, Ph: (301) 713-3338
e-mail: coastalocean@noaa.gov
www.cop.noaa.gov