Opening Up Our Closed Reef Aquariums

by Chris Cefola - Freshwater and Marine Aquarium, December 2001

The reef aquarium has been steadily evolving since the early eighties when conventional marine fish aquarium equipment was used to house live rock, invertebrates, and fish in a closed system. These "closed system" aquariums had no way to recycle the build- up of waste products, therefore, creating an imbalance of nutrients in the system.

The first attempt to solve this problem was to use powerful equipment such as large Protein Skimmers, UV Sterilization, Ozone, Activated Carbon, and Denitrators. AU this equipment did was sterilize our aquariums to the point where we had to now rebalance the nutrients lost. This task was accomplished by placing additives and food in the aquarium. It became increasingly difficult to correctly dose the now sterilized water with the proper amount of additives, therefore, causing more imbalances in the "closed system." To solve this new problem, many people, myself included, started looking into open system natural reefs for an answer. Coral reefs are not self-sustaining; they need the ocean and shoreline around them to exist.

This led to external filters called refugiums, in which live rock, algae, and live sand are placed in a separate container where they can supplement the main aquarium with lost nutrients. These systems were a turn in the right direction but still had many shortcomings. To put it simply, a system was needed that could self regulate all nutrient levels not just Nitrogen and Phosphate but Plankton, Algae, and many unknown nutrients that were essential for the long term health of our closed reef systems.

This "open system approach" is best exemplified by a new filtration system application named "Ecosystem Method" developed by Mr. Leng Sy. This method is the closest we have come to emulating an open system reef. The first part of this system is a submerged bio-ball chamber that not only breaks up solid waste but also acts as a plankton rearing area. The second chamber contains a fine silt mud and Caulerpa taxifolia algae. Caulerpa algae in a reef aquarium have many benefits, such as its ability to absorb waste products and its use as a food. It also produces a waste product called Gelvin. As a trace element, Gelvin may be beneficial for our reef aquariums but in most cases the concentration seems to build up to toxic levels. Mr. Leng Sy solves this problem by using a twenty-four hour light source, and a nutrient rich mud for the Caulerpa to feed from. This Caulerpa/mud combination is a true self-regulating system. That is to say, as we add more animals to the system, nutrient balance is restored by increased growth of the Caulerpa, alga and plankton. The third and final chamber contains more bio-balls to prevent the Caulerpa from entering the pump.

I converted my ninety-gallon reef aquarium of ten years from its skimmer/refugia system to the Ecosystem in February of 1999. The system requires a powerful pump of at least 1000 gph @ 4 ft. I run 500 gph through the aquarium and 1000 gph through the sump with the looping return. I also placed a 2' four-bulb florescent fixture over the sump, which stays on twenty-four hours a day. I have tried using many kinds of special bulbs but find inexpensive plant bulbs to work the best.

Finally, I placed the mud in the center chamber, and after allowing it to settle for six hours, I placed twenty small strands of Caulerpa into the mud using elastic bands to hold them onto small pieces of live rock which I pushed into the mud. After the first week, I noticed that most of the Caulerpa died off, but under it I could see small sprouts of new growth. The Caulerpa also became covered by Cyanobacteria Algae, which seemed to be choking it. I physically removed the red and black algae daily for about three weeks until the Caulerpa

started to fill the chamber. Once the system "kicked in," I started to see dramatic results in the form of increased growth and color of both the fish and corals in my aquarium.

To further push the system, I added four stony corals, two soft corals, two clams, and twelve fish to the aquarium over a two-week period. The Caulerpa started growing immediately to compensate. The aquarium is fed with flake food and Caulerpa three times a week and dosed with kalkwasser. The buffers are added to maintain 12 DKH. A five gallon water change is done bi-weekly as well.

I was also given a challenge by a local pet shop to cure a blue tang that had severe fin damage and lateral line erosion. I placed the blue tang in my fifteen-gallon hospital tank and fed it Caulerpa/flake food for four weeks. At this time, I noticed no change in his condition. I subsequently placed him in my ninety-gallon reef and within two months he was completely healed! I have also noticed that my Xenia corals have been pulsing rapidly twenty-four hours a day, and that my Halimeda [money plant] has started growing after ten years of stagnation.

The success with my own aquarium has made me change over many of the reef and marine fish aquariums that I help to maintain. I can honestly say it is time you opened up your reef to the EcoSystem method and leave sterilization to your water company.

About the author: Chris Cefola attended the Florida Institute of Technology for Aquaculture and the University of Georgia for Fish Pathology. He lives in Valley Cottage, New York and is a professional commercial diver and marine tropical collector. He has been a saltwater hobbyist for 28 years. Chris lectures on reef aquariums and also builds aquatic displays for museums, education centers and pet stores. E-mail Reefdoc@optonline.net