

Natural Aspects of the “Cenote”

The Aquatic Food Chain starts with Algae:

Algae and CyanoBacteria take in minerals and absorb air, water and sunlight and then photosynthesize--- make glucose ---same as land plants. Then Fish and Bacteria eat the algae. Then Bacteria and Plants use the fish waste.

Yes! We need algae in the pool. Since algae can all too easily do too well and take over, many of the things that we do are intended to slow the growth of algae, without getting rid of it.

Nutrient Addition / Nutrient Removal

A balanced aquatic eco-system requires both:

Nutrients arrive in leaves, flowers, and dust, and also arrive already dissolved in well water, rain water, and swimmers’ sweat, and dissolve from pool materials, especially the limestone boulders.

Nutrients leave as plant parts pruned and carried away, as fish poop vacuumed off the steps, as sediment vacuumed out from the gravel (the sediment is precipitated minerals, dead algae, and fish poop), and as out-gassing/evaporation from bacterial digestion.

If the water becomes too rich in nutrients, algae will become too abundant.

Limestone and pH:

The limestone boulders were gathered west of Delray Beach during the expansion of Highway 441. These give the pool water a high pH, and provide Calcium and Magnesium and other elements for beneficial bacteria, algae, fish, and plants. [High pH is illegal in chlorinated pools because it drastically lowers the effectiveness of chlorination.] In a naturalized swimming pool, high pH prevents one from using bog plants and prevents one from introducing species of fish, such as Tetras, that require acidic water.

Non-Planted Bio-Filters:

The loose gravel beds piled over the solid concrete pool bottoms are brown quartz Chattahoochie: pea-sized in the shallow pools, and egg-sized in the deep pool. Many of the beneficial species of bacteria that clarify the water work best in darkness--- these attach themselves to the surface of the gravel pieces deep in the beds.

Planted Bio-Filters:

The many plants growing over the water falls are not growing in soil: they are anchored in deep tanks of gravel. Water returning from the re-circulation pump enters the bottoms of the gravel tanks, wells up through the gravel bed and past the plant roots, and over the falls. Beneficial bacteria colonize the gravel surfaces and the plant-root surfaces. The plants also compete with the algae in the pool for whatever dissolved nutrients can be found in the pool water.

Beneficial Bacteria:

CyanoBacteria and over 20 species of Aerobic Bacteria and Facultative Bacteria are needed to maintain water clarity and freshness. Different species eliminate nitrites, eliminate nitrates, sequester phosphate, digest fish waste, etc. For these micro-organisms to do their best, the water must be well-aerated--- have high oxygen content.

These are obtained from commercial lake-maintenance mixes that are labeled as being harmless to humans and aquatic life. Liquid mixes are best, as some of the bacteria needed do not survive dehydration, and therefore are not available in powders. We use MicrobeLift / PBL "Professional Blend," and MicrobeLift / Sludge-Away, and MicrobeLift / Sludge-Away Booster.

Plants in the Planted Bio-Filters:

Most swamp and bog plants need muck and acidic water, neither of which is available in our Cenote! Plants in our planted bio-filters normally don't grow right in water, but are normally found in moist soil in sunny areas above lake or river edges:

Ferns, including Inland Leather-Leaf Fern;

Red Bay;

Elephant-ear species, including Taro and Giant Taro;

Ornamental-Ginger, both red and pink forms;

Butterfly-Ginger;

and several smaller plants for variety.

Algae-Eating Fish:

We do not feed the fish in the pool--- they survive entirely by scraping algae and bacterial slimes off the gravel and the pool sides. They are essential in the Aquatic Ecosystem.

Siamese Algae-Eaters,

Chinese Algae-Eaters (Golden variety),

Tiger-Loaches,

Plecostomus "armored cat-fish,"

Bala-Shark (not a shark),

Fire-Mouth Cichlids,

African Cichlids (Yellow, Orange, Brown, Light Blue, Dark Blue, Aquamarine). We don't recommend African cichlids for pools. They nip.

Plants near the Pool:

Golden Coconut, Green Coconut, Monster-Fruit, Jakfruit, Custard-Apple, Salak, Starburst, Copper-Leaf, Ornamental Banana, Edible Banana, Mango, Plumeria (Frangipani), Sapphire Shower, and Bird-of-Paradise Flower.

The Lizards on the deck are usually Curly-Tail Lizards.