Applications of EM at the Zoological Gardens

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Introduction
The Honolulu Zoo consists of 43 acres in Kapiolani Park on the island of Oahu. Like other zoological institutions, the zoo faces several challenges in keeping the facility safe and pleasant for staff, visitors and animals. These include but are not limited to odor and algae control and manure management. In December 1997, the Zoo was approached by EM Hawaii to be a research/demonstration site for the use of EM in a zoological setting as an alternative to using chemicals.

Applications/Results
The Honolulu Zoo has been involved in the use of recycled materials and products throughout its grounds. It utilizes plastic benches made from recycled plastic containers, glassphalt which is a mixture of crushed glass and asphalt and plastic wood for animal fencing. In addition, Zoo produces approximately 6 cu yds. of animal waste per day. In the past, the manure was placed in a dumpster and hauled to the landfill. In recent years, the Zoo is storing this waste product and producing compost. Left to decompose on its own, manure normally takes 6-8 months to reduce to a useable product. With the application of EM, this period has been reduced to 3-4 months and there has been a significant odor reduction which is appreciated by residents surrounding the Zoo and pedestrians walking by.

In addition, the Zoo is required to store a large volume of wastewater from the hippo exhibit in a holding tank and leak it into the sewer line during non-peak hours (2400-0500) so as not to overtax the lines. Previous to using EM, Zoo staff would have to regularly enter the holding tank to remove solids to be hauled away to the landfill. With the daily use of EM, the solids have been reduced to the point of severely reducing if not altogether eliminating the need to clean the holding tank.

The Zoo also manages large moats of brackish water in animal exhibits for use as a barrier against escape as well as aesthetically to add to the authenticity of the ecosystems. This brackish water is pumped from beneath the Zoo and distributed to the various exhibits, thus reducing the Zoo's dependency on potable water for pools. Although the water is recirculated, and filtered, there is no ozonator or chemical injection system for algae. Algae growth in these large pools was a significant problem both aesthetically as well as requiring many man-hours to clean when these large moats were drained (typically twice per year). Through the use of EM (ceramics and solution), the time required to clean the moats has been reduced by 50% due to the reduction of algae growth. In addition, it is safer for employees to enter the moats with this reduction in algae growth.

Outcomes
The use of EM at the Honolulu Zoo has resulted in the following benefits:

1. The reduction of manure odor and significant reduction in the time to produce compost.
2. The reduction of chemical dependency for algae control.
3. Savings of man-hours to clean moats and holding tanks due to a reduction in algae growth and organic matter.

Additional applications in the Zoo will likely include the following:

1. Use of EM in restroom odor management and cleaning.
2. Use of EM bokashi as a replacement for chemical fertilizers on the Zoo's lawns and in its landscaping.

Conclusions

EM has been effective in its use at the Honolulu Zoo. The Zoo has procured a 50% reduction time in its composting cycle as well as the reduction of odors, a 50% reduction in man hours required to clean its pools and moats and a healthier environment for the animals, staff and visitors.