

## **Genki Ala Wai Project**

The Ala Wai Watershed encompassing eight of Honolulu's most densely populated urban neighborhoods is home to more than 160,000 people and additional 71,000 visitors daily. The Ala Wai Canal was built in 1921 as a land reclamation project and as a structure to protect Waikiki from being flooded due to heavy rainfall along three streams, the Makiki, Manoa and Palolo streams. Storm drains were built to feed directly into the Ala Wai.

### **THE PROBLEM: Accumulation of sludge.**

Over the years, the canal has been a depository for mud, organic debris, trash and various pollutants. Sludge (rotten, organic material) forms and accumulates due to oxygen deficiency. In the sludge, putrefactive bacteria produce harmful gases such as methane, ammonia and hydrogen sulfide from decomposing organic matter. Foul odors are evidence of highly impacted waters. In 2002 there were areas where sludge was so deep that the depth of the Ala Wai was only a few inches. In 2002 - 2003, a total of 185,801 cubic yards of sludge, debris and trash were removed. Some sludge was identified as "toxic" and disposed of accordingly.

**PROJECT GOAL: To make the Ala Wai Canal swimmable and fishable within seven years.** A systemic approach that empowers all stakeholders in the ahupua'a to be involved in solution strategies will be used to address eco-system restoration and flood mitigation in the watershed. Academic institutions (K-12) will develop meaningful place-based STEM education. Students, teachers, community, and other stakeholders must work together to accomplish the project goal.

### **A POTENTIAL SOLUTION: BIOREMEDIATION**

Bioremediation, or the use of living organisms (e.g. bacteria) to remove pollutants from soil, water, and wastewater is becoming increasingly popular. Nearly all organic compounds, and many synthetic ones, no matter their molecular weight or complexity can be degraded by bacteria. In Japan, there are multiple successful examples of the use of Effective Microorganisms® (EM®) to remediate waterways by eliminating sludge. To remediate the Ala Wai Canal by bioremediation is the potential solution.

### **USE OF EM® MUDBALLS OR "GENKI BALLS"**

To digest the sludge, EM® must reach the bottom of the canal. This is accomplished by throwing soft-ball sized, dried mud balls that contain EM®, healthy soil, molasses, rice or wheat bran and water into the canal. According to the USDA, one teaspoon of healthy soil contains one hundred million to one billion individual bacteria. Soil provides a "home" for EM®. Once embedded in the surface of the sludge, the fermentative bacteria will digest and oxygenate the sludge. At the same

time, phototrophic bacteria will consume the harmful gases so foul odors would be contained.

### **HOW DO WE KNOW THAT THESE MICROBES ARE EFFECTIVE?**

Sludge levels will decrease. Water quality will improve. Long-term and planned application of beneficial microbes will enable small fish, shrimp, crabs, and shellfish populations to re-establish themselves and increase. The microbes contained in EM-1® will improve the self-purification ability of streams and rivers.

**WHO DISCOVERED EM®? DR. TERUO HIGA**, Emeritus Professor of Horticulture at the Rykyus University, Okinawa, Japan

After suffering pesticide poisoning and fifteen years of exhaustive research in microorganism mixtures, Dr. Higa accidentally combined a mixture of microorganisms that stimulated extraordinary success in the cultivation of crops in 1981. **EM Technology®** today is used in more than 100 countries in agriculture, aquaculture, animal husbandry and waste-water treatment.

### **WHAT IS EM®?**

EM® is a mixed culture of aerobic and anaerobic beneficial microorganisms that are found in the natural environment. They are primarily lactic acid bacteria, yeast and phototrophic bacteria that co-exist and work with other microbes in the environment. The main function of EM® is to decompose and ferment organic matter. They also effectively suppress harmful microbes, decompose harmful chemicals, prevent oxidation and eliminate foul odors.

### **IS EM® SAFE FOR THE ENVIRONMENT?**

Lactic acid bacteria and yeast are used in food production and the US Food and Drug Administration has them on the GRAS list (generally recognized as Safe). All the microbes are classified as Biosafety Level 1 meaning they are not known to cause disease in healthy human. EM-1® has been sold in Hawaii since 1997 with approval from the Department of Agriculture. There has been no negative impact.

### **LEADERSHIP:**

Kenneth Y Kaneshiro, PhD, Principal Investigator; President of the Hawaii State Exemplary Foundation (HSEF), Director of Center for Conservation Research and Training, University of Hawaii at Manoa  
Paul Arinaga, Genki Ala Wai Project Manager. Community Liaison  
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Mary Ann Kobayashi, School Liaison, Project Administrator

### References:

<http://hbmpweb.pbrc.hawaii.edu/exemplary/>  
[www.emhawaii.com](http://www.emhawaii.com)  
[www.genkialawai.org](http://www.genkialawai.org)