

A FIELD AND LABORATORY EVALUATION OF THE
FOSSIL FILTER IN REDUCING HEAVY METAL
NON-POINT SOURCE POLLUTION FROM STREET RUNOFF

LEON R. GESCHWIND

A field and laboratory evaluation of the Fossil Filter in reducing heavy metal non-point source pollution from street runoff

Leon R. Geschwind, GES Program, SOEST, University of Hawaii

Abstract: The goal of this project was to evaluate the laboratory and field performance of the Fossil Filter in reducing non-point source (NPS) pollution derived from street runoff in the residential/commercial setting of Waikiki. Additionally, protocols were established for collecting and analyzing street runoff samples and filter media, in the laboratory and field settings. In order to carry out these objectives, a storm drain filter (Fossil Filter) was installed on the corner of Ala Wai Boulevard and Lewers Street. Specifically, the project assessed the effectiveness of the Fossil Filter in removing heavy metal pollution. The Fossil Filter has prevented at least 1479 mg of zinc (Zn), 345 mg of copper (Cu), 230 mg of lead (Pb), 172 mg of nickel (Ni), and 146 mg of chromium (Cr) from entering the water ecosystem during its first three and a half-month tenure. It has also stopped a total of 1.5 kg of heavy metal laden particulates. Laboratory experiments, which attempted to mimic the field component, showed 50 to 58 percent retention of particulates by the filter medium.

Introduction

The Ala Wai canal is narrow two-mile long man-made estuary, which drains Manoa, Palolo, and Makiki streams, and numerous culverts. It was built in order to control flooding, improve sanitation, and drain the surrounding wetlands.¹ The sedimentation rates vary between one to four centimeters per year, and the canal sediments show highly anoxic conditions.² The canal has been partially dredged two times since its opening in 1927, most recently in 1978.

The Ala Wai Canal is about to be dredged for the first time in twenty years. The dredging of the canal will cost the taxpayers over 11 million dollars, and there is, as yet, no consensus as far as what to do with the dredged material. Land disposal is touted as the more "environmentally responsible" approach, but it is likely to cost significantly more than ocean disposal. A number of environmental groups argue that the contaminated sediments pose a grave risk to aquatic life if the ocean-dumping plan is implemented. Heavy metals, pesticides, as well as oil and greases have been found in the Ala Wai Canal.

More than 90 percent of heavy metals present in aquatic systems are bound on particulates, as opposed to being present in the dissolved phase.

¹ Fryer, Patricia. "The 1991-1992 NSF Young Scholars Program at the University of Hawaii: Science and Engineering Studies of the Ala Wai Canal, and Urban Estuary in Honolulu." *Pacific Science*: 49(4): 319-331, 1995.

² Glenn, Craig R. and McMurtry. "Scientific Studies and History of the Ala Wai Canal, an Artificial Tropical Estuary in Honolulu." *Pacific Science*: 49(4): 307-318, 1995.