USGS

WATER RESOURCES RESEARCH GRANT PROPOSAL

01. Project Number:

1.
2. **02. Title:** Applicable Indicators of Risk for Coastal Waters in Tropical Environments

03. Focus Category: Water Quality

04. Key Words: Bacteria, Bays, Beaches, Biomonitoring, Coastal Zone, Lagoons, Marinas, Recreation, Risk Analysis, Viruses, Water Quality, Water Quality Monitoring, Water Quality Standards

5. **Duration:** August 1998 to July 1999
6. **Fiscal Year 1998 Federal Funds**: $50,000

07. Non Federal Funds allocated to project: $27,675

08. Name(s), University and of Principal Investigator(s):

Mayra E. Suárez-Vélez, M.S.

Eastern Caribbean Center

University of the Virgin Islands

St. Thomas, USVI 00802

Tel. (340) 693-1392

Fax: (340) 693-1395

Gary Toranzos, Ph.D.

Department of Biology

University of Puerto Rico

P.O. Box 23360

San Juan, Puerto Rico 00931-3360

Tel. and fax: (787) 751-5708

9. **Congressional District of the University performing research: N/A**
10. **Statement of the critical regional or State water problem(s):**

The proposed project will be a joint effort between the University of the Virgin Islands, the University of Puerto Rico and the University of Hawaii. Scientists at the University of Hawaii and University of Puerto Rico have done extensive research concerning the inadequacy of using USEPA Water Quality Standards for tropical areas given the difference in environmental conditions between tropical and temperate zones. Because of the geographical location, excellent professional staff and technical facilities, our islands provide the best option to carry out the proposed research.

Strong evidence has been found recently against the use of fecal coliforms

(including *Escherichia coli*) as indicator organisms of fecal contamination in tropical waters. Because of higher annual temperature, people may spend more time in direct contact with water. In addition, since there are few sewage and water treatment plants adequately functioning, there is a real need for the development of a rapid, easy, inexpensive and accurate method for assessing tropical water biological quality. Currently used bacterial indicators of fecal contamination have been found to be inadequate in the tropics. This is due to the presence of these indicators as part of the resident microflora in these environments. Coliphages seem to be excellent alternate indicators of the biological quality of waters. If a correlation can be established between the presence of coliphages and the presence of fecal contamination we will more safely be able to determine the possible impact these waters have on public health. Current water biological quality standards also need to be reevaluated in order to develop a more reliable indicator more specifically designed for tropical areas. A great deal of effort is being placed in improving the biological quality of waters in tropical areas without taking into consideration the autochthonous nature of coliforms and fecal coliforms.

11. Statement of results, benefits and/or information:

This study will be the first in its kind and will unequivocally show whether Escherichia *coli* can in fact be used as an indicator of fecal contamination of surface waters in the tropics. It will also show if coliphages can be used as an alternate indicator of fecal contamination. Future goals will also include setting the standards for future work on DNA fingerprint analyses to identify and differentiate between strains isolated from Hawaii, Puerto Rico and the Virgin Islands which will further develop a databank with the DNA fingerprints of *E. coli* isolates which will be made available to any researcher involved in water quality analysis in the tropics.

The first year the project will be focused on Puerto Rico and the Virgin Islands and subsequent work will be done in Hawaii, Puerto Rico and the Virgin Islands.

The region will also benefit from a long term water quality monitoring at important recreational waters.