1147-92-551 **Monique Chyba*** (chyba@hawaii.edu), Department of Mathematics, 2565 McCarthy Mall, University of Hawaii at Manoa, Honolulu, HI 96822, and **Clément Dell'Aiera**, **Sana Habib**, **Tristan Holmes**, **Yuri Mileyko** and **Anthony Amend**. *Data Acquisition and Mathematical Analysis to Understand the Basis of Sustainability Across the Ahupua'a of Waimea, O'ahu.*

The overall objective is to understand patterns of microbiome biogeography of the Hawaiian ahupua'a (ridge-to-reef) watersheds of Waimea Valley and how they are impacted by environmental factors. This is done by analyzing datasets obtained from terrestrial and freshwater field samplings. In addition, metadata was collected (habitat, host) as well as metadata sourced from pre-constructed GIS layers.We analyze the microbiome datasets combined with the available metadata to identify potential causal relations between environmental factors and microbiome diversity. Due to peculiarities of our data, we represent the relations between the abundance of microbe species and metadata using networks and functions on these networks. The topological data analysis along with standard statistical methods (clustering methods) is then used to determine the shape of the networks and the functions. The idea is to detect correlation between variables in order to understand where the information is redundant. After the analysis we will represent the data through a visualization that will be hosted on a web app. We are collecting high resolution pictorial data using small autonomous aerial vehicles in order to construct a 3D map of the sample sites and to obtain qualitative data on vegetation. (Received January 25, 2019)