Faculty Sabbatical Report

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This report documents the achievement of my proposed objectives in my original application for sabbatical leave.

Objectives:

(1) Conduct research in Tropical Forest Response to Climate Change. Especially I wanted to compare the differences of tropical forests in Hawaii and tropical/subtropical forests in south China on the responses to climate change.
(2) Conduct research on the effects of harvesting methods on soil erosion and forest regeneration in tropical/subtropical zones.

Results:
Spending time with faculty and researchers in Fujian University of Agricultural and Forestry and Fujian Normal University provided me with the opportunities to be involved with similar research on forest ecosystems that I had in Hawaii. Especially, I started a new research project of soil warming effects on forest ecosystem structure and processes in subtropical China. During the past two decades most of the soil-warming experiments were conducted in the temperate zones and thus it is very important to provide information on the effects of soil warming on forest ecosystems in tropical and subtropical areas.

During the first 6 months we selected research plots – both watersheds for erosion experiment (Fig. 1) and the soil warming experiment (Fig. 2. and 3). After the determination of the research plots we measured all plant biomasses and basic soil properties in all plots for the Erosion Research project. At the same time we started to install heating cables in plantation and natural forest plots. Since the installation work is highly technically required we invited Dr. Francis Boles from Woods Hole Marine Biological Institute to help. Please see the attached pictures of setting up the research plots for the two projects.

During the second period of my sabbatical I organized some graduate students in the Fujian Normal University to measure the plots. We focused on the land use/change and climate change effects on tropical/subtropical forest production and decomposition – what mechanisms are involved. To compare the natural forests and plantations with different treatments (precipitation control, soil warming, N/P addition, Litter removal and addition) we measured all the variables which are related to the explanation of the research hypotheses. The main variables we measured include CO2/CH4/N2O emission, microbial communities and abundance, C isotope track, soil chemistry, tree growth, sap flow, etc. We also consider establishing big-grid plots in the old growth forests (300 - 600 year old) to study plant succession and biodiversity of subtropical forests.
In general, the sabbatical was an extremely productive time for my research and establishing collaboration relationships with colleagues in China. I have obtained some preliminary data on my focused research that is potentially important for my future external funding application. Now I am preparing a manuscript “Soil warming effects on subtropical forest productivity and decomposition in subtropical China”. Also, the research results can be incorporated in my teaching, especially in the courses of NRES 420 – Watershed Management and FOR 430 – Forest Ecosystem Restoration. For the collaboration, a few students in the Fujian University of Agriculture and Forestry indicate their interest in applying for the master program (TCBES) in University of Hawaii at Hilo. I will facilitate future potential collaboration between the two universities in research and exchanging students.

The sabbatical provided me with new knowledge, experience, cultural understanding, and other new perspectives that clearly run through all of the areas of my teaching and research interests. I appreciate the opportunities this sabbatical provided. Although I had financial constraints it is worthwhile to take a year-long sabbatical for research and pursing collaborations.

Fig. 1. Research plots for studying forest harvesting methodology on soil erosion in watershed and forest regeneration
Fig. 2. Pre-test of soil warming experiment – maintaining stable temperatures of the heating cables with different moistures.

Fig. 3. Soil warming plot. Heating cables were buried under the labeling lines. The plots will be heated for five years with an increased soil temperature of 5 °C.