

STARS Faculty/Staff Sustainability Research

Nick Kaplinsky

Biology (faculty)

Title: Understanding plant responses to high temperatures

Brief description: We work on understanding how plants respond to elevated temperatures at a cellular and molecular level

Contribution to sustainability: Elevated temperatures are predicted to significantly reduce crop yields. Understanding the fundamental mechanisms that allow plants to deal with these temperatures may be important for breeding crops in a globally warming world.

Completion: unknown

Collaboration: no

Can report on website: Yes

Jose-Luis Machado

Biology (faculty)

Title: Stoichiometry of the soil-plant-atmosphere continuum: a long-term ecological field-based curriculum for biology undergraduates

Brief description: This proposal seeks to enrich the ecology curriculum at Swarthmore College by establishing a long-term field study demonstrating the mechanistic and experimental nature of ecological science in which undergraduates can engage at all levels of instruction, from freshman to senior year. The subject is ecological stoichiometry. The setting is the Crum Woods of Swarthmore College, a tract of 236 forested acres (95 ha) adjacent to the College. Students will investigate the balance of multiple chemical elements, their influence on distribution and productivity of plant populations, community structure, and ecosystem functions and services

Contribution to sustainability: Students measure in the field both the above and belowground annual productivity of the forest and calculate the forest service as a sink of carbon dioxide.

Completion: 2012

Collaboration: Yes (no information given)

Can report on website: Yes

Christy Schuetze

Sociology and Anthropology (faculty)

Title: Restore the Mountain: Conservation and Development in and Around Gorongosa National Park, Mozambique

Brief Description: I have and will continue to conduct ethnographic research on the expansion of Gorongosa National Park to incorporate (for the first time) the upper elevations of a mountain in central Mozambique. The beginnings of this process of expansion began in 2006 when I was living on Gorongosa Mountain. From 2006-2008, I conducted ethnographic research on the relationships between mountain residents and park officials. I plan to continue in-depth ethnographic research on this changing relationship and the ongoing conflict over land and natural resources in the summer of 2013 and during my sabbatical leave in 2014-15.

Contribution to sustainability: This research examines human-environment relationships in Mozambique, exploring approaches to sustainable development and resulting conflicts over land and natural resource use.

Completion: unknown

Collaboration: no

Can report on website: **NO**

Tali Moreshet

Engineering (faculty)

Title: Energy-Aware Memory Synchronization for Embedded Multicore Systems

Brief description: This project investigates the energy implications of system-level concurrency issues in high-end embedded systems such as smart phones, game consoles, GPS-enabled automotive systems, and home entertainment centers. In particular, it aims to develop energy-efficient techniques of synchronizing memory accesses, and tries to understand the optimal division of tasks between hardware and software.

Contribution to sustainability: It contributes to reducing the power consumption of mobile devices.

Completion: unknown

Collaboration: no

Can report on website: Yes

Title: Power-efficient easy to program 1000-core desktop supercomputer

Brief description: This project addresses the energy-efficiency of a new approach to parallel computing, which targets single task completion time in a many-core processor. Ensuring that the new architecture meets power and thermal constraints will enable it to serve as a viable alternative approach to parallel computing.

Contribution to sustainability: It contributes to reducing the power consumption of future computers.

Completion: unknown

Collaboration: no

Can report on website: Yes

Alison Holliday

Chemistry and Biochemistry (faculty)

Title: Chiral biodegradation of triazole fungicides

Brief description: Many pesticides are produced and applied as a mixture of stereoisomers, but, in most cases, one stereoisomer is much more effective than the other(s). If biodegradation pathways are chiral, agricultural soils may become disproportionately depleted in one stereoisomer, which may or may not be the effective stereoisomer. This project investigates the chirality of biodegradation of triazole fungicides using bacteria isolated from soil. It also seeks to identify and characterize the bacteria involved.

Contribution to sustainability: Understanding the biodegradation of pesticides is essential to determine their impact on the environment.

Completion: unknown

Collaboration: Amy Vollmer, Biology

Can report on website: Yes

Carr Everbach

Engineering (faculty)

Title: Biodiesel formulation and testing

Brief description: Biodiesel is a fuel that can work in existing diesel vehicles that can be made from waste plant oils or plant oils derived for the purpose of producing biofuels. An ongoing research project with Prof. Macken (Engineering) involving several students (most recently, Matthew Bowers '12 in Summer 2011 and Jonathan Martin '12 for his Senior Design Project in Engineering) is to produce biodiesel from different plant oils, varying the procedure to increase yields, improve quality of the biodiesel, and minimize waste and water use.

Contribution to sustainability: Developing realistic alternatives to fossil fuels and avoiding ethanol production from plant sources that displace food production.

Completion: unknown

Collaboration: Nelson Macken, Engineering

Can report on website: Yes