



Project acronym: ECOHERB

Project title: Impact and drivers of insect herbivory on nutrient cycling in broadleaf forests globally

Project leader: Benice Hwang, Lund University, Sweden

Discipline: Earth Sciences & Environment: Ecosystems & Biodiversity

Station(s): Kevo Subarctic Research Station (Finland), Mukhrino Field Station - Nymto Park (Russia)

Impact and drivers of insect herbivory on nutrient cycling in forests globally

Current models of climate change impacts frequently fail to consider the effects of herbivores – central to ecosystem structure and function – and are often either treated as constant, included as a disturbance factor, or simply ignored. Though they make up the most species rich and abundant group of herbivores, insects' impact on ecosystems is largely unknown. The proposed project will use a pioneering new interdisciplinary approach to provide the most complete picture yet available of the rates, underlying drivers and ultimate impacts of key nutrient inputs from invertebrate herbivores across forest ecosystems worldwide. Specifically, we will: (1) Establish a global network of insect herbivory monitoring stations across major forest types, and across key natural environmental gradients (temperature, rainfall, ecosystem development) to monitor natural and anthropogenic influences on herbivory and nutrient cycling in the context of climate change. (2) Perform field experiments to examine the effects of herbivore deposits (excreta, bodies) on soil processes under different temperature conditions. (3) Integrate this information into a cutting-edge ecosystem model, to generate more accurate predictions of forest carbon sequestration under future climate change.

Methods: (1) Leaf litter collection from 20 litter baskets (0.5 m x 0.5 m mesh with rigid frames) in each forested plot to estimate biomass and herbivory rate, and analyze nutrients. (2) Fresh foliage collection from 10 trees in each plot once during each year or wet/dry season to analyze nutrients. (3) Soil collection (30 cm depth) at 10 locations per plot once during the lifetime of experiment to analyze nutrients.

Locations: (1) Kevo Research Station, (2) Mukhrino Research Station.