Project Update: January 2016

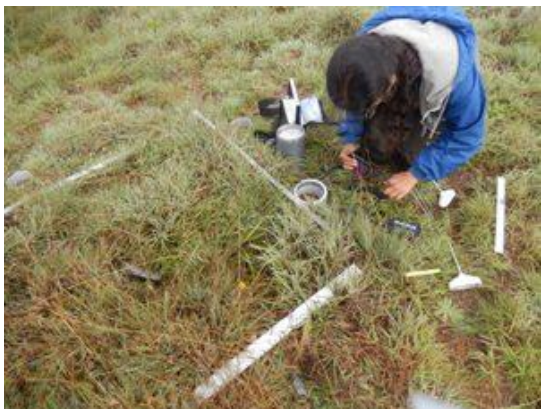
Global warming is a major threat to ecosystems around the world. Management and conservation planning for vulnerable ecosystems such as the shola grasslands of the Nilgiris in the Western Ghats requires an understanding of the consequences of temperature rise for the various components of the ecosystem, based on empirical data. We set up *in situ* passive warming experiments in the montane grasslands of the Nilgiris as a step towards contributing to measuring long-term consequences of warming on vegetation composition and ecosystem processes such as soil respiration.

We now have soil respiration data monitored at ~15 day intervals for a year, and vegetation cover and composition data collected over three seasons. Analyses of the data are currently underway. Soil samples were also collected in these seasons. Soil chemistry data from these samples and the vegetation change data will go towards building a longer term dataset on warming effects in these ecosystems. The project also addresses the paucity of data on global change effects on vegetation and ecosystems from the tropics.

Picture 1: A number of warming experiments worldwide use open top chambers (OTCs) to study ecosystem responses to temperature rise. We modified the OTC design from Godfree *et al.* (2011), and after some setbacks, we have, we believe, OTCs that can withstand the high winds at our field site during the monsoon, despite the sloping terrain they are built on. The OTCs are hexagonal structures, ~3 m in diameter and ~50 cm tall. An iron frame supports the pyramidal structure made of polycarbonate that retains IR radiation within it, thus warming it. The photograph shows us setting up one of the OTCs in the montane grasslands of the Nilgiris. We have now set up 30 OTCs and paired 1 m x 1 m control plots in the region.

Picture 2: We set up collars in the soil within OTCs and in the control plots to measure soil CO_2 efflux, and partition the CO_2 contributed by plant roots, arbuscular mycorrhizal fungi and other soil microbes (Protocol adapted from RAINFOR-GEM;

http://gem.tropicalforests.ox.ac.uk/files/rainfor-gemmanual.v3.0.pdf). The collars are PVC tubes that are inserted into the soil. CO_2 efflux is measured from collars with holes in them to allow roots and mycorrhizae to grow in (like the one inserted into the soil in the picture), or with nylon meshes covering the holes, to keep roots out but let mycorrhizae in (like the one lying outside in the picture), or with no holes at all, to keep both roots and mycorrhizae out. This allows one to 'partition' respiration between the various biotic components of the soil.



Picture 3: Vegetation cover and composition, soil chemistry, abiotic factors like soil moisture and temperature, and soil respiration are being monitored periodically. The photograph was taken while one of our team members was measuring soil moisture, soil temperature and soil respiration.