

## **Project Update: September 2015**

### **Introduction**

Global warming is a major threat to ecosystems around the world. There is much evidence for its effects on vegetation, soil properties, soil biota and ecosystem processes. However, there is a definite bias towards representation of temperate ecosystems in warming experiments, and consequently, very little is known about the response of tropical ecosystems to temperature rise. We have set up an *in-situ* warming experiment in the fast depleting montane grasslands of the Western Ghats biodiversity hotspot in southern India, an integral part of the unique shola-grassland mosaic ecosystem. Long-term measurements of vegetation and ecosystem process responses to warming that the experiment seeks to achieve can be critical for the informed management and conservation of this ecosystem.

### **Status as of last report**

By April 2015 (2 months since the Grant was received), we had set up 30 open top chambers (OTCs), to simulate *in-situ* temperature rise (Godfree *et al.*, 2011), and paired control plots in montane grasslands in the Nilgiri South Division area in Tamil Nadu. The design of the OTC had been previously tested and honed on site. The OTCs are in 10 fenced blocks matched for slope and aspect. Data from temperature loggers (iButtons) that were set up in a subset of the OTCs showed that the OTCs raised the overall temperature by 1-2°C and the overall daytime temperature by 1-4°C, as expected. Vegetation composition measurements had commenced. Soil respiration measurements were also being conducted in a subset of the OTCs that had been set up by November 2014.

### **Progress in work**

#### *Vegetation measurements*

Baseline measurements of species composition and cover were done before each OTC and control plot was set up. Measurements of vegetation cover at a functional group level (grass, sedge, herbs) and green / brown cover were conducted in April and July 2015. Each time, soil samples for nutrient and soil microbial analyses were also collected.

#### *Soil respiration measurements*

Soil CO<sub>2</sub> emission measurements are being done on a subset of OTCs and control plots at fortnightly intervals since December 2014. Preliminary analyses show an overall higher CO<sub>2</sub> emission under warmed conditions when compared to the control. However, much further analyses need to be done, considering repeated measurements from the same respiration collars.

#### *OTC set up – setbacks and steps taken*

In July 2015, the acrylic walls of the OTCs and the wooden poles of some of the fences that had been set up broke due to high speeds of the monsoon winds in the Nilgiris, despite our efforts to design OTCs that could withstand the rough weather. We remade a subset of the OTCs with polycarbonate, a more resilient material. These have survived this year's monsoon, and we will soon be reinforcing the rest of the OTCs with polycarbonate. The fences have also all been repaired.

## **Future steps**

- OTC walls will be reinforced with polycarbonate sheets, and the fences with metal rods.
- Species composition and cover estimation, and biomass measurements will be done in October 2015 from the subset of OTCs that have already been repaired. Measurements of functional group level and green / brown cover, and soil analyses will be conducted using all the OTCs in January 2016.
- Soil respiration measurements will be continued to be taken at fortnightly intervals.
- Analyses of soil respiration and vegetation change will be conducted towards the end of January 2016.
- A first report detailing the OTC set up and its necessity has been submitted to the local Forest Department. A second report with some of the findings will be submitted in early 2016.