NUS National University of Singapore | Department of Biological Sciences, Faculty of Science

SEMINAR

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How only one degree Celsius more already impacts tropical rainforest ecosystems



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The planet is warming. For instance, the year 2014 was the warmest year across global land and ocean surfaces since records began in 1880. January 2015 globally-averaged temperature across land and ocean surfaces was 0.77°C above the 20th century average of 12.0°C, the second highest on record for January. Such warming climate has led to the worst floods and droughts recorded on all continents, all occurring in the last few years. We remain ignorant of the consequences of the increase of 1-2°C for natural ecosystems and their diversity, much less for human beings. This is particularly alarming in tropical regions where the mean annual temperature is around 30°C, and varies little within and between years. Tropical organisms are indeed poorly adapted to recurrent extreme temperatures (> 30°C), and global warming might have detrimental effects on their biology and reproduction.

In French Guiana, in 2001-2011 we carried out a study to analyze effect of local climate on plant phenology and fruit production in a natural Amazonian forest. There, the average temperature (26°C) had already increased by 1.36 °C whereas minimum and maximum temperatures (21.5-30°C) increased by 1.1°C and 1.65°C, respectively, between 1955 and 2009. We evaluated variation of seed production for a tree community, and found that species were relatively constant in their timing of seed production across years, though differed in quantity of seeds produced across years, possibly in relation to variation in local climate and rainfall. For a couple of masting species, however, we observed important differences across years that might be related to an extreme drought in 2005 across the entire Amazon basin. Such observations may have far-reaching implications for the survival of mammal populations and plant regeneration and diversity. I will discuss how slight changes in mean temperature, rainfall, and the length of the dry season in the humid tropics affect fruit availability and diversity at the community level, and subsequent seed dispersal and tree recruitment.

Artwork by Ann Nee, DBS, NUS