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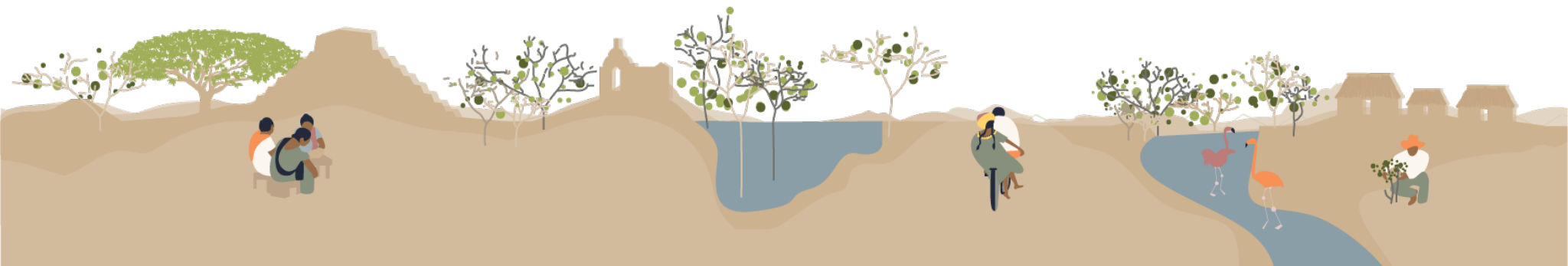

Anthropic effects on pollinators in the southernmost limits of subtropical dry forests

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Human activities are dominant drivers of current biodiversity changes throughout the world. Land use practices such as deforestation, grazing, and agriculture affect ecosystem structure and functioning and regional climate. The southernmost limits of subtropical dry forests have experienced the highest rates of deforestation worldwide over the past decades, and such landscape changes can alter plant-pollinator interactions in different ways. Animal pollinators are responsible for the sexual reproduction of 80% of angiosperms and also play a key role in fruit/seed production of domesticated species and in the reproduction of many useful wild species. Due to the essential ecosystem services provided by animal pollinators it is particularly important to learn about their dynamics in such changing environments. Here we assess pollinator richness and abundance in different anthropic scenarios: i) a gradient of habitat fragmentation landscapes, ii) unburned, high and low fire frequency sites, and iii) a gradient of agricultural intensification. Habitat fragmentation strongly reduced richness and abundance of Lepidoptera and Diptera and small solitary bees. More mobile pollinators such as hummingbirds, *Bombus* spp. however, showed no changes. *Apis mellifera*, showed an increased in relative abundance in smaller habitat fragments. Fire frequency also elicited species-specific responses of pollinators. *Bombus* spp. were equally abundant across sites whereas other pollinators such as *Megachile* sp., *Notanthidium* sp., *Trimeria* sp. were either reduced in abundance or absent. Bee richness and abundance decrease in highly managed orchards as compared to organic management. We discuss the implications of these findings for the reproduction of native plants species in ubiquitous human-altered landscapes.

Keywords: Pollinator, habitat loss, fire, agriculture

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Tuesday Merida
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Reproductive plant phenology and pollination networks in a Costa Rican montane tropical forests

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Background: Reproduction in vascular plants is expected to synchronize with biotic and abiotic conditions that allow successful pollination and seed maturation. Pollinator mediated selection is believed to be a predominant selective factor shaping flowering patterns in plants. Climatic conditions may also influence phenology as they may regulate resource availability or the seasonal abundance of pollinators. The reproductive schedule of plants may also be limited by phylogenetic constraints, where flowering time is similar among related individuals. Given the forthcoming changes in climate, the relative importance of factors shaping reproductive schedules in mountainous habitats will provide information on how plant species adjust to climatic changes, and how such adjustments affect animal-plant interactions. **Methods:** Starting on 2013 we recorded flowering phenology on 70 herbaceous species and woody shrubs in an upper montane forests of Costa Rica. The number of flowering individuals per species was recorded monthly along a 1 km transect. We also collected and identified all insects visiting flowers and recorded bird visitors. We used circular statistics to describe flowering patterns and generalized linear models to relate flowering phenology to climatic conditions. Phylogenetic relationships were determined using Phylomatic and a multivariate phylogenetic eigenvector regressions analysis (PVR) was used to assess the influence of phylogeny and climatic factors on flowering phenology. Pollinator networks were created and interaction evenness and pollinator generalism were estimated for each species. **Results:** Most species (68/70) showed distinct seasonality with only 10 species flowering in the rainy season, while the flowering peak of most species (66/70) occurred during the dry season (Nov-Mar). Only two species flowered continuously. Changes in precipitation and temperature did not affect the onset of flowering, nor changes in peak flowering dates. Phylogeny influenced the flowering phenology of species in the upper montane forests of Costa Rica. Pollinator networks showed low specificity among taxa. **Conclusion:** Our results suggest that flowering phenology of the upper montane forests in Costa Rica occurs more commonly in the dry season and that phylogenetic restrictions predominately affect flowering patterns in these species. Predicted climatic changes for the Costa Rican highlands could affect the phenology and reproduction of this plant community.

Keywords: Phenology; Montane-forests; pollinator-networks; climate change; Costa Rica

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