

Strong top-down goat effects on the semiarid island of Bonaire

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Goats were introduced to the Caribbean islands almost five centuries ago resulting in direct and indirect changes in terrestrial and surrounding marine ecosystems. We conducted both field and experimental studies to quantify the top-down effects of feral goats on the vegetation structure and composition of semiarid Bonaire. We found about 2.7 goats per hectare with a male/female sex ratio of 1:2. Goats have shaped the island vegetation dramatically. Comparing the vegetation of long-term (8 year) exclosures with paired adjacent plots reveals strong limitation of tree recruitment by goat browsing. No seedlings and saplings of late successional hardwood tree species grow outside the exclosures. Goats also browse on the three columnar cacti species limiting the establishment of new individuals and reducing adult fecundity thereby shifting population structure towards the dominance of adult individuals. Positive interactions between cacti and other plant species seem unable to significantly reduce the negative effects of current levels of herbivore pressure. These columnar cacti are keystone species that provide essential food sources for native frugivorous and nectarivorous species during the dry season. On the other hand, goats seem to facilitate the dispersal of stem-succulent *Opuntia* cacti in the understory of current thorny shrublands. Our results suggest that the vegetation of Bonaire may be shifting from dry forests and columnar cacti towards an increasing dominance of small cacti species. These strong top-down effects of a novel herbivore on the terrestrial plant communities may exacerbate soil nutrient runoff with deleterious impacts to the island marine ecosystems.