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DEN Abstracts

Lizards of the Thar Desert – Resource partitioning and community composition

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Highlights

- First study on resource partitioning in the Thar Desert lizard community.
- Spatial overlap low across habitats, moderate within habitats.
- Species showed finer separation through differential spatial use of same areas.
- Diurnal species showed peaks of activity at different times of the day.
- This study confirms space as an important niche dimension facilitating coexistence within desert lizard communities.

Abstract

How similar species co-exist in nature is a fundamental question in community ecology. Resource partitioning has been studied in desert lizard communities across four continents, but data from South Asia is lacking. We used area-constrained visual encounter surveys to study community composition and spatial and temporal resource partitioning in a lizard community during summer in the Thar Desert, western India, addressing an important biogeographic gap in knowledge. Twelve one-hectare grids divided into 25 m × 25 m plots were placed across four habitats – barren dunes, stabilized dunes, grassland, and rocky hills. We recorded 1039 sightings of 12 species during 84 sampling sessions. Lizard abundance decreased in the order stabilized dunes > grassland > barren dunes > rocky hills; richness was in roughly the opposite order. Resource partitioning was examined for the seven commonest species. Overall spatial overlap was low (<0.6) between species pairs. Overlap was higher within habitats, but species showed finer separation through use of different microhabitat categories and specific spatial resources, as well as by positioning at different distances to vegetation. Diurnal species were also separated by peak time of activity. Space appears to be an important resource dimension facilitating co-existence in this desert lizard community.

Keywords

Desert lizard community; Visual encounter survey; Spatial overlap; Daily activity; India

1. Introduction

How do similar species co-exist in nature? Answering this fundamental question involves studying how species in a community partition multivariate niche space (Schoener, 1974). The three major niche dimensions across which resource partitioning has been studied are space, food and time (Pianka, 1973 and Schoener, 1974). Space is among the most important resource dimensions that is partitioned in lizards (Pianka, 1973, Pianka, 1986, Schoener, 1974, Toft, 1985, Vitt et al., 2000 and Luiselli, 2007a). Species that are broadly sympatric in a region may or may not co-occur within specific habitats; and species that do co-occur within habitats often partition microhabitat resources, restricting further overlap (Pianka, 1973, Pianka, 1986 and Toft, 1985). Time of activity is closely linked to the thermoregulatory and foraging behavior of a species, and exposes lizards to differing food resources, in addition to reducing interspecific encounters (Pianka, 1986). Though differentiation along the trophic niche has been long investigated, a recent meta-analysis using null models demonstrated that most lizard communities do not partition the trophic niche (Luiselli, 2007b). Thus, spatial and temporal segregation appear to be important in allowing the co-existence of sympatric lizards.

Desert lizard communities have proved to be a useful natural system to answer a range of questions in community ecology, with studies spanning four continents (e.g. Pianka, 1986 and Shenhrot et al., 1991; Rogovin et al., 2000). The reasons these communities have been extensively studied include that desert lizards are habitat specific, diverse, relatively abundant, and easily detectable (Pianka, 1986 and Toft, 1985); resources are likely to be limiting in deserts; and that the desert provides a simple system in which to explore ecological questions and hypotheses (Pianka, 1986 and Kotler and Brown, 1988).

The lizard community of the Thar Desert in Western India and adjacent Pakistan is poorly studied, with previous work limited to checklists, and even basic information on community composition lacking. In order to address this biogeographic gap in knowledge, we examined spatial and temporal resource partitioning in the lizard community of the Thar Desert, Jaisalmer District, Rajasthan, India. Besides collecting data on