Invertebrate and mammal biodiversity on some sadas (ferricretes) of the Western Ghats, India

by

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Abstract

The Western Ghats, or the Sahyadri range, are a long chain of hills and mountains aligned parallel to the west coast of peninsular India and are one of the most important biodiversity hotspots of the world. A ground foraging invertebrate study was conducted at four locations on characteristic ferricrete rock outcrops, known locally as sadas) in the Londa range of the Western Ghats in northern Karnataka state. Sadas are characterized by extreme environmental conditions such as large temperature variations, relative lack of soil, and heavy seasonal precipitation. Because of these characteristics and the stark difference to the surrounding vegetation these habitats are regarded as edaphic island communities. Most notable is the ephemeral flush vegetation a prominent example of highly seasonal communities characterized by the prevalence forbs, herbs and grasses. Invertebrates make up a major component of these ecosystems and are essential in maintaining critical ecological processes. Most invertebrate species are strictly seasonal in their activity preferring only a particular set of habitats and climatic conditions.

This study aims to quantify invertebrate biodiversity to test the assumptions that invertebrates on the Sada are distinct assemblages to that of the surrounding forest habitat type. Furthermore it assumes that environmental factors, climate in particular, are the driving force to this distinction. Sadas also attract a number of anthropogenic uses that include seasonal burning, collecting of forest produce, monoculture plantations and grazing of domestic stock. Wild animals also use the sadas for grazing and resting. For a better understanding of the uses of the sada by local communities and wildlife and the effects these uses might have in the long term ecological health of sadas, past studies on Indian grasslands are analysed along with some of the data collected during the course of the study to explore some impacts that these uses can have and what should be done in order to minimize these impacts in the future.

Field work was conducted over three distinct seasons, i.e. summer, post the monsoon and winter, over a two year period beginning in 2008. All taxa were collected and sorted and identified to at least genus level. Springtails (Collembola), mites (Acarina), harvestmen (Opiliones) and pseudoscorpions were not counted individually due to their sometimes very high abundance. The data was used to compare total species richness and abundance between habitat types (sada and forest), for analysis of assemblage composition and to identify
indicator taxa for both sadas and forests. Species composition over seasons was analysed and
significant differences in some taxa were noted.
The study also examined the role of mammalian wildlife and domestic stock grazing and
their possible role in maintaining the sadas. Seasonal scat counts over two week periods were
used as an indirect way of determining the type of animals that use the sadas as a feeding
/resting ground. Identifications were done based on the local knowledge of the forest tribal
community and the local forest guards.
The sadas are also used by local tribal communities as a source of firewood, medicinal plant
extraction and for grazing their livestock. A review of this is done by summarizing work done
in the past in the area.

A total of 206 recognizable taxa from 151 genera in 51 of families were represented in this
study. Of these, 139 taxa from 103 genera in 39 families were on the sada and 163 taxa
from 124 genera in 50 families were found on the forest floor. Twelve families and 52
taxa were represented on the forest alone and not on the sada. Although the sada had no
families that were confined to that habitat, there were 29 taxa from 25 genera present on the
sada that were not shared with the forest habitat. The abundance of taxa related directly to
seasonality. The post monsoon period was the most productive period for invertebrates and
this is attributed to vegetative growth, which in turn results in more foraging opportunities for
fauna.

Ants and spiders are shown to be numerically dominant taxa in both sada and adjacent forest
habitats. To get a better understanding of the community composition and ecosystem function
these two groups were further analyzed by allocating ants to functional groups and spiders to
foraging guilds respectively. The profile of functional groups of ants differed between the
major habitats. Analysis showed that Generalized Myrmicinae, Opportunist and Subordinate
Camponotini functional groups were the dominant ants on the sada whereas in the forest
habitat Tropical climate specialists, Generalized Myrmicinae and Opportunist functional
groups dominated. This shows that the sada habitat is preferred by generalists and
opportunists which are able to readily adapt to changes in the local environment. The forest
floor provides a more stable environment where specialized taxa thrive. Likewise the spider
foraging guilds showed significant differences between habitats. The forest was dominated by
orb-web builders, ground runners and ambushers. On the sada, ground runners were the
dominant guild followed by foliage runners and ambushers. Wandering sheet web guild was
the least represented of the guilds in both habitat types. The most significant difference here is the lack of orb web builders on the sada which correlates to the difference in vegetation types between the two habitats.

The mammal scat study showed that the sadas can be an important grazing resource for wildlife (depending on the season) and for domestic cattle. More studies need to be done on whether the soil-depleted sadas require this grazing in order to sustain vegetative growth and how regular burning influences the vegetative growth within these plant communities.

Despite its limitations, this study provides for the first time a broad perspective on the invertebrate communities on the sadas of the Londa region and some of the environmental factors influencing their distribution and activity patterns. My results indicate that seasonality in the climate, especially precipitation, is a large scale driving force. The monsoon sets the sada in bloom and rejuvenates the vegetation, which underpins a surge in invertebrate populations. This suggests that when conditions are conducive, numerous opportunistic and generalists species migrate onto the sada from the adjoining forest habitats.
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