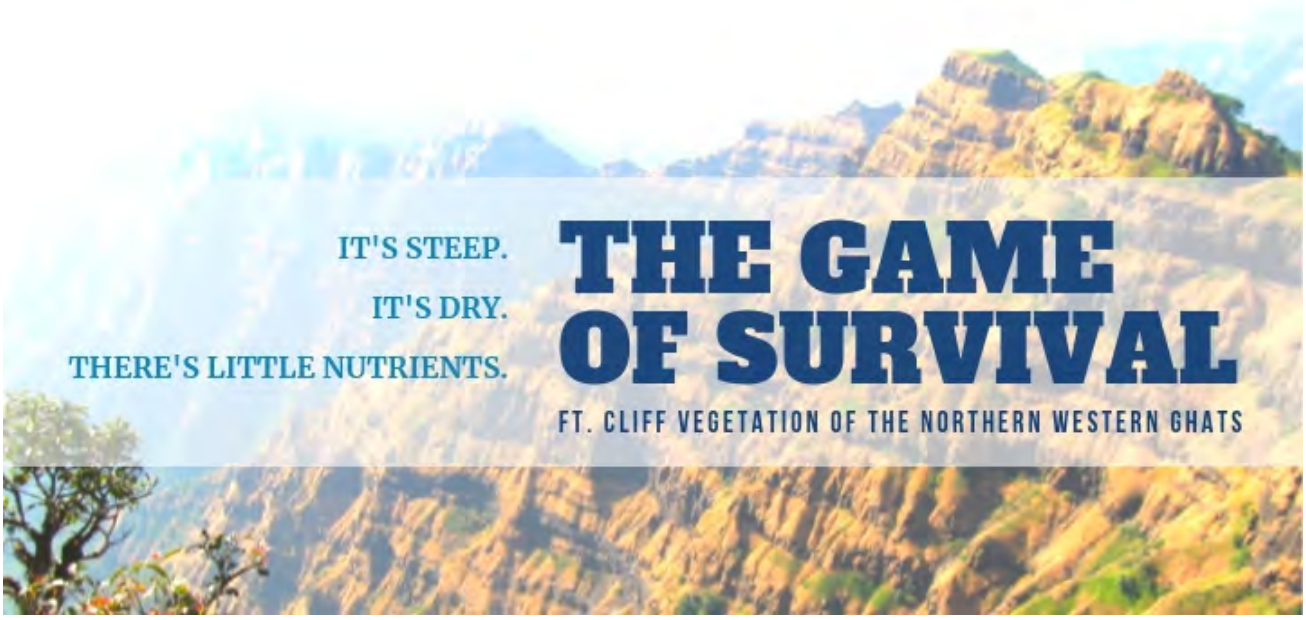
These plants are thriving in extreme cliff conditions – here's how

By Vidya Mary George. Published in Jottings on 06 April 2019



It's steep, it's dry, and there's little nutrients, yet a great number of endemic and threatened plants call the cliff habitats of the northern Western Ghats in India their home.

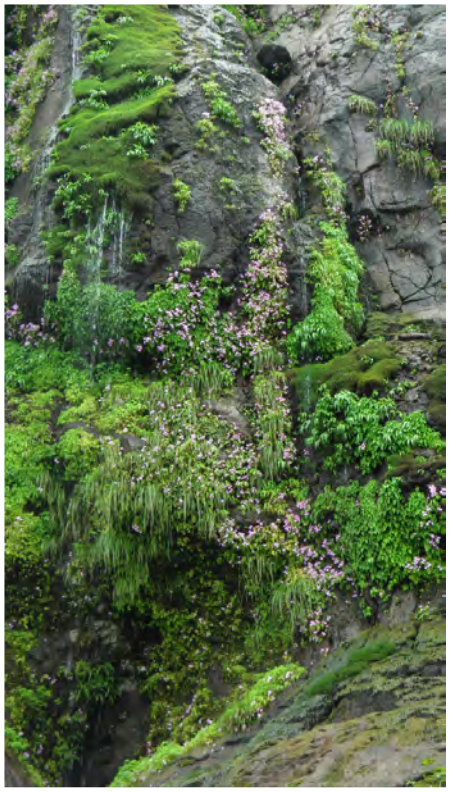
Hostile habitats

India's northern Western Ghats, probably the largest rocky surface area on Earth, is also one of the most unforgiving habitats on the planet. With steep vertical surfaces, an eight-month-long dry season, and scarcity of nutrients, life on the cliffs of the northern Western Ghats is extremely hard even for the hardiest species. Among other factors, the extreme environments and inaccessible terrain have severely restricted our knowledge of the species in the area—to the extent that there are almost no studies available concerning its floristic richness, which in turn hampers conservation efforts.

The wild game of survival

To understand how plants have adapted to the harsh cliff environments, two scientists from Maharashtra dared the elements to survey various microhabitats of the northern Western Ghats between 2008 and 2016. Their field studies revealed a whopping 102 species of plants in the area, of which 55 were endemic and 27 grew exclusively on cliffs. Curiously, the unique characteristics of the ecosystem were reflected in the diversity and life strategies of its species, which were particularly tailored to cope with the seasonal dryness and nutrient scarcity experienced in their habitat.

The classic adaptation shown by most cliff species to seasonal climate was an ability to limit their growing and reproductive phases to the monsoon season. This feature, known as geophytism, enabled the species to remain underground as tubers, bulbs, or rhizomes until the next monsoon.



To survive periodic water stress, some species opted to lose water from their tissues to become dry and shrivelled at the beginning of a dry spell, only to 'resurrect' and resume normal growth at the availability of the smallest amount of water. This unique and highly specialized adaptation known as poikilohydry helped these plants to not only tolerate the dry period but also become the dominant colonizers of their habitat.

Other cliff-dwelling species figured out how to survive by adopting features such as growing specialized organs in the form of dry cottony balls next to the soil surface at the base of the stem, succulence, and even carnivory.

The human havoc

Although the landscape may be harsh and the weather may be extreme, these are not the only threats to the cliff species. Though the cliffs themselves are less intensively used by humans, the hill slopes are used for grazing livestock. Another major threat comes in the form of manmade fires, lit for developing scrub grasslands or for cultivation—but which often escape to burn down surrounding habitats and the accumulated humus on which the cliff species depend heavily. Landslides and habitat loss due to the expansion of roads and railway tracks are making it even tougher for the established cliff vegetation to hold on in the hostile habitat they call home.

» More research is needed on floristic, ecological, and ecosystem processes and services to take the necessary steps for conservation.
» More studied need to be conducted to understand if adaptations related to wind velocity, radiation, or any other factors are also present in the cliff habitats.

Reference

Datar, M.N. & A.V. Watve (2018). Vascular plant assemblage of cliffs in northern Western Ghats, India. *Journal of Threatened Taxa* 10(2): 11271–11284. https://doi.org/10.11609/jott.3611.10.2.11271-11284

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