

Are Fog-Driven Ecosystems BEING DRIVEN OUT?

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Research involving the South African Environmental Network's (NRF-SAEON) Arid Lands Node indicate that climate change may adversely affect the fauna and flora of Namaqualand and Namib Desert

How will climate change affect fog along the west coast? How will it affect the fog-dependent ecosystems of Namaqualand and the rest of the Namib Desert?

The extraordinary biodiversity of this area, both in terms of numbers of endemics and in terms of unexpectedly high species numbers for such an arid region, could disappear along with the fog, leaving the land almost barren. Can this be?

West coast fog comes off the cold Benguela Current, which generates low-lying stratocumulus clouds that intercept objects at ground level on the adjacent land, where it deposits water droplets. Rain falls so rarely that the regularly occurring fog provides most of the moisture, most of the time for most of the creatures.

Fog and fauna

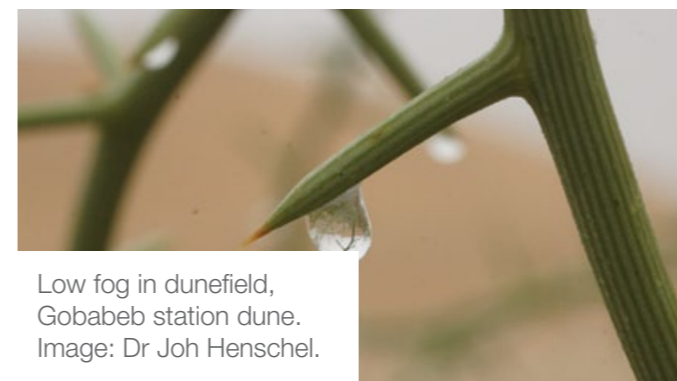
The connection between fog and fauna has fascinated scientists for over a century, giving rise to numerous studies in the Namib Desert that are

reviewed in a recent publication*. This publication is the culmination of many years of cooperation between the University of the Witwatersrand, Gobabeb Namib Research Institute, NRF-SAEON and the Namibian University of Science and Technology.

At least 48 animal species consume fog water, and quite a number of plants, too, although relatively few studies have examined this with plants, or, for that matter, with animals. Iconic are two species of fog-basking beetles and several other beetles that construct fog-collecting trenches from which they harvest water. Achieving this entails specialised fog-collecting behaviours, enabling these beetles to drink up to a third of their body weight of water during one fog incident, which was first highlighted 44 years ago in the journals *Nature* and *Science*.

Many other species get fog from droplets off their own bodies or vegetation, and spiders collect it from soaking wet silk on trapdoors — even mammals as large as elephant and giraffe benefit by ingesting

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Low fog in dune field, Gobabeb station dune. Image: Dr Joh Henschel.



fog-wetted vegetation. Fog-consuming species manage to sustain active adult populations during long intervals between rainfall events that boost their populations.

The general pattern is one of brief periods of boom, followed by long periods of not quite going bust, and it is fog that is largely responsible for keeping things “not quite” bust and thus keeping the desert alive.

Is there any indication that the fog is changing?

The long-term patterns of fog are complex, as is the underlying climatology in detail. Changes in fog could be due to changes in wind patterns and ocean temperatures or increasing elevation of warmer stratocumulus clouds reducing their interception of land.

At the Gobabeb Namib Research Institute, rainfall patterns have changed during the past 30 years. Astonishingly, the mean annual precipitation doubled across this period due to the occurrence of more extreme events, but the number of rainfall events decreased by almost a third. During long intervals between rainfalls, the occurrence of fog provides critical relief, but thirsty creatures will be left wanting if intervals between fog events were also to lengthen.

fog is only one of several moisture sources, also including dew that some animals can tap. Some small desert creatures even manage to get water from atmospheric vapour.

With fog, dew and vapour, arid lands are living



Fog-basking head-stander beetle (*Onymacris unguicularis*). Image Dr Joh Henschel.



deserts despite sparse rainfall. Global warming may affect all these moisture sources and could cause the most reliable water sources along the west coast to disappear.

Detecting this requires long-term research on land and ocean. NRF-SAEON can play a significant role in the case study on the west coast of southern Africa. This would benefit from international collaboration between South Africa, Namibia and Angola, as well as participation of the global scientific community. ■

* Mitchell, D., J. R. Henschel, R. S. Hetem, T. D. Wassenaar, W. M. Strauss, S. A. Hanrahan, and M. K. Seely. 2020. Fog and fauna of the Namib Desert: past and future. *Ecosphere* 11(1): e02996.10.1002/ecs2.2996