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Master Thesis Defense

Entitled

THE ECOLOGICAL IMPACTS OF CHANGING RAINFALL ON THE ARABIAN PENINSULA

by

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Date & Venue

3:00 PM

Monday, 15 June 2020

Link: <https://eu.bbcollab.com/guest/4869c1363a754b558d78150d91cd865e>

Abstract

The Arabian Peninsula is one of the hottest and driest regions in the world, and with climate change, not only is it getting hotter, it is also getting drier. It may be that the desert species here are well-adapted to dry conditions, in which case they may be able to withstand the changes, but it may be that desert species are already challenged by the extremely dry conditions. Here, I used data from 167 published studies to look at whether desert species were living below their optimum rainfall, and to compare the findings with species in other biomes. In all cases, the performance of desert species had a positive relationship with rainfall indicating that they were living below their optima. Across the other biomes studied, I also found that conditions were more commonly too dry than too wet, suggesting that organisms commonly face water shortage even in quite wet biomes. With deserts being the driest biome of all, species here could be especially vulnerable to climate change, but the vulnerability of species is determined not only by whether they are living below their optimum but also by whether the rainfall trend is taking them further from this optimum. In order to compare the vulnerability of species on the Arabian Peninsula with those in other regions, I therefore combined my findings with information on the relevant rainfall trends in different parts of the world. Even within biomes, I found regional heterogeneity in rainfall trends, with some regions getting wetter and some getting drier. The Middle East and North Africa hold the largest single patch of desert in the world, and unlike some of the other desert regions, rainfall is decreasing across this region. Given that desert species appear to be living far below their optimum, this declining rainfall may mean the biodiversity of the Arabian Peninsula and the wider MENA region is particularly vulnerable to changing climate.

Keywords: Climate change, Rainfall, Ecological impact, Desert, Arabian Peninsula.