Safe havens revealed for biodiversity in a changed climate

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Associate Professor Grant Wardell-Johnson

Researchers have found a way to project future habitat locations under climate change, identifying potential safe havens for threatened biodiversity.

Associate Professor Grant Wardell-Johnson and Dr Gunnar Keppel from the Curtin University Institute for Biodiversity and Climate, along with lead researcher and former Curtin scientist Dr Tom Schut, now at Wageningen University in the Netherlands, developed an approach to identify potential refugia in declining rainfall environments.

For the first time, their novel approach, recently published in *PLOS One* and involving Light Detection And Ranging (LiDAR) instruments, is able to translate a traditional plot observation to the entire landscape.

Dr Wardell-Johnson said this enabled the team to apply expected future changes in rainfall to landscape-scale vegetation and find potential refugial sites, essential for conservation efforts.

"Global warming is a particular issue in Mediterranean-climate regions. It is especially so in the flat landscapes of south-western Australia – home to a global biodiversity hotspot," Dr Wardell-Johnson said.

"South-western Australians have been living through the impacts of a drying climate for more than 40 years and are bracing for a continuing drier and warmer trend.

"Understanding where refugia will be is of particular importance in light of human-caused global warming, to offer the best chances for our precious flora and fauna in times of transformative change."

By using 4-metre x 4-metre plot-based data of vegetation profiles on and around granite outcrops across south-western Australia, the team were able to relate vegetation types to soil depth and rainfall. They found a very strong relationship between all three.

This finding meant the team could compare current climate and future climate under a continuing trend of reduced rainfall in the region.

Dr Wardell-Johnson said that very large shifts in vegetation structure were predicted and able to be mapped for future climates, with greatest changes expected to happen in the highest rainfall areas.

"We found it very likely that some refugia will be found in sites

receiving greatest water run-off below granite outcrops, as well as areas where a reduction in rainfall is offset by deeper soil," Dr Wardell-Johnson said.

More information: Rapid characterisation of vegetation structure to predict refugia and climate change impacts across a global biodiversity hotspot.
www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0082778

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