



## **Climate based suitability indices as a mean to improve revegetation success**

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In arid and semi-arid environments, availability of water for successful revegetation of disturbed land, e.g. through mining, plays a major role. This refers to availability of water prior or during the time of seed dormancy, germination and growth of seedlings. The success and in consequence the type of vegetation community is controlled in general by climatic conditions but also by the specific conditions at the time of germination.

Generalised climatic data and classifications have proven to be not well suited for the prediction of type of vegetation community or germination success in climatic conditions, which are highly variable. For example this is the case in the semi-arid and arid environments of northern Australia where rainfall is very variable and the occurrence of rainfall can be very erratic.

For further investigation of this characteristic, a set of indices has been developed, which are deemed to better describe the suitability of the climatic conditions for rehabilitation. In total nine locations across Queensland, Australia, ranging from the north to the south over a distance of approximately 2000 km have been analysed using this approach. The calculations showed that regular rainfall and relatively short periods of water-deficit are key characteristics of climate suitability. The comparison of the investigated locations allowed the separation in suitable and susceptible locations regarding the availability of water, amount of rain and duration of drought between rain events.

The suitability indices were compared with natural vegetation patterns expressed through biomass and by averaging NDVI values during pronounced dry and wet periods (El Nino, La Nina).

Specific estimates of climate suitability are rarely considered in assessments of re-vegetation of degraded or otherwise disturbed land (e.g. mining). However, it can be assumed that the regional intensity, seasonality, and extremity of climate should represent an overarching component of landscape complexity, which critically influences the development of post-disturbance ecosystems. The presented work includes the outcome of the climatological analysis paired with the development of suitability indices. A conceptual framework is also presented explaining the suitability matrix and its incorporation as a prognosis tool to achieve greater certainty for success of revegetation.