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Assessing Ecological Health Of Dry Phase Intermittent Rivers And Ephemeral Streams

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Abstract

As perennial river systems become increasingly intermittent worldwide, there is a growing need to focus attention on the dry phase of intermittent rivers and ephemeral streams (IRES) and develop tools to assess their ecological health in the absence of water. We explored the feasibility of dry phase bioassessment by testing a suite of metrics developed to indicate disturbance in dry streambeds of IRES, an area of study that has been limited until recently. We sampled bryophytes and terrestrial arthropods at thirty-nine sites in the San Diego region across environmental and disturbance gradients as potential biological indicators during dry periods. We collected bryophytes within the channel and surrounding riparian zone using a microhabitat-based sampling protocol and arthropods using ramped pitfall traps within the channel. We used random forest models to adjust 148 arthropod and bryophyte metrics to account for natural variability in metric scores. Several metrics, including multiple spider and bryophyte richness metrics differ significantly ($p < 0.05$) between reference and degraded sites and are related to anthropogenic stressors. These results suggest that multi-metric indices based on terrestrial arthropods and bryophytes may be used to assess IRES ecological condition when dry.