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wdpar: Interface to the World Database on Protected Areas

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Software

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Summary

The `wdpar` `R` package provides an interface to data available on Protected Planet (https://www.protectedplanet.net). It can be used to access the World Database on Protected Areas (WDPA) and the World Database on Other Effective Area-Based Conservation Measures (WDOECM). Additionally, it provides data cleaning procedures to prepare these databases for analysis. These data cleaning procedures are essential for ensuring correct results when using the databases. As a software package for the `R` statistical computing environment, it can easily be integrated into workflows and spatial analyses. The package has applications for conservation research. It has been used to assess performance of existing protected areas and account for such areas when identifying priority areas for conservation efforts.

Statement of need

Area-based conservation measures are crucial for safeguarding biodiversity (Dudley et al., 2018; Watson et al., 2014). Examples of such measures include protected areas, marine reserves, and other effective area-based conservation measures (OECMs). Protected Planet is a key resource for area-based conservation measures, providing the World Database on Protected Areas (WDPA) and the World Database on Other Effective Area-Based Conservation Measures (WDOECM) (UNEP-WCMC & IUCN, 2022). These publicly available databases contain standardized data for over 270,000 protected areas and over 700 OECMs worldwide (UNEP-WCMC & IUCN, 2022). By detailing the designation, establishment, management, and spatial boundaries of area-based conservation measures (UNEP-WCMC, 2019), these databases play a vital role in monitoring and prioritizing conservation efforts (Bingham et al., 2019; Butchart et al., 2015).

The WDPA and WDOECM require data cleaning procedures to prepare them for analysis (Butchart et al., 2015; Protected Planet, 2021). These procedures include repairing invalid geometries in spatial boundaries, excluding areas that have yet to be fully implemented, excluding areas that are no longer designated, excluding UNESCO Biosphere Reserves (Coetzer et al., 2014), buffering areas represented by point localities (Visconti et al., 2013), and removing spatial overlaps (Deguignet et al., 2017). These procedures are critical to ensure that assessments of area-based conservation measures do not overestimate the spatial extent of such measures and their ability to conserve biodiversity (Coetzer et al., 2014; Deguignet et al., 2017). Although these procedures are critical, they can be technically challenging to implement. The `wdpar` `R` package provides automated methods to complete these procedures following best practices (Butchart et al., 2015; Protected Planet, 2021). Using the package, data cleaning procedures can applied without specialized knowledge, customized to particular use cases, and across the entire WDPA and WDOECM. As such, the `wdpar` `R` package helps increase accessibility to the databases.

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Applications

The wdpar R package is designed to provide a reproducible tool for downloading and cleaning the WDPA and WDOECM. Indeed, the default settings for the data cleaning procedures follow Protected Planet guidelines (Protected Planet, 2021). Although these default settings will be useful for many applications – such as reporting national protected area coverage – they can be customized for other applications. For example, the data cleaning procedures can be customized to retain UNESCO Biosphere Reserves, retain protected areas with particular statuses, and increase the precision of spatial data processing procedures. These customized settings could be useful for reporting local-scale protected area coverage and monitoring protected area effectiveness.

The package has several applications for conservation research. For example, it has been used to assess the performance of existing protected areas in Colombia, Greece, and South Asia (Chowdhury et al., 2021; Gonzalez et al., 2022; Kougioumoutzis et al., 2021; Panitsa et al., 2021). It has also been used to examine the potential implications of climate change on conservation efforts (Kougioumoutzis et al., 2022; Mothes et al., 2020). Additionally, it has been used to account for existing protected areas when identifying priority areas for biodiversity conservation (Hanson et al., 2020). Furthermore, it has been used to help understand how protected area management by Indigenous Peoples can reduce deforestation (Sze et al., 2022).

Availability

The wdpar R package is implemented as a software package for R statistical computing environment (R Core Team, 2022). It is available on the Comprehensive R Archive Network (CRAN) (Hanson, 2021). Developmental versions are available on an online code repository (https://github.com/prioritizr/wdpar). Documentation for the package is also available online (https://prioritizr.github.io/wdpar).

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Conflict of interest

The author declares no conflict of interest.

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