Built-up areas pressure

Indicator name	**Built-up area pressure index (BUAPI)**
Indicator unit	The built-up area pressure index (BUAPI) assesses the surface covered by constructions per km^2 in a given area for the years 1975, 1990, 2000 and 2014.
Area of interest	The BUAPI has been calculated, in DOPA Explorer, for each terrestrial protected area of size ≥ 10 km^2 and for the terrestrial parts of each coastal protected area of size ≥ 10 km^2 as well as their 10 km unprotected buffer zone.

Related targets

Sustainable Development Goal 14 on life below water

Sustainable Development Goal 15 on life on land

Aichi Biodiversity Target 11 on protected areas

Aichi Biodiversity Target 12 on species

Policy question

How much potential impact may humans living in a protected area have on that protected area and on the habitats, species and ecological processes therein? How much land is lost to constructed areas? How fast is this impact increasing over time? By identifying protected areas with high percentages of built-up areas, it is possible to highlight locations that are most threatened by human activities. Built-up areas can also contribute to the assessment of physical barriers for species dispersion.

Use and interpretation

There are several reasons why a high population density inside a terrestrial or coastal protected area may be of concern and lead to negative outcomes for the conservation of the habitats, species and ecological processes therein (see e.g. Mcdonald *et al.*, 2009; Güneralp & Seto, 2013). To assess such pressure, in addition to information on road density (see Factsheet H2), on population density and population change (see Factsheet H3) and on land-cover change (see Factsheet G1) inside protected areas, the DOPA further provides estimates on built-up areas and their increase over the time period 1975-2014. The information is computed using the Global Human Settlement Layer which is derived from high resolution imagery (30 m resolution). It provides therefore a more detailed picture than the one proposed by the land cover maps. The evolution of built-up areas is an important indicator of the level of land consumption and of the potential fragmentation of our environment.

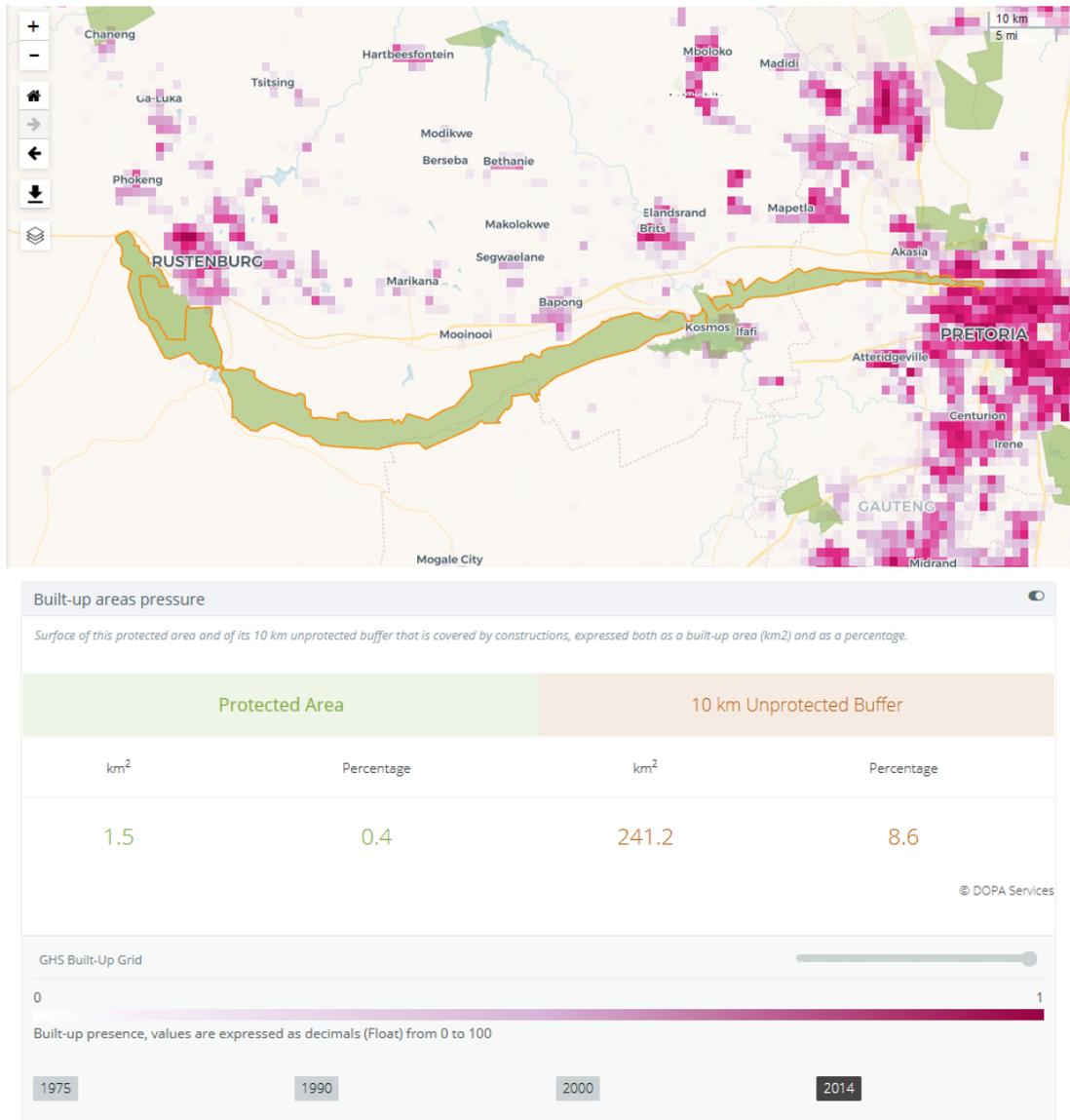# MAGALIESBERG PROTECTED NATURAL ENVIRONMENT

South Africa

Figure 1. Map of the Magaliesberg Biosphere Reserve (RSA) with current built-up areas (top) and quantitative estimates of the built-up areas (in km^2 and %) for the years 1975, 1990, 2000 and 2014 as displayed in DOPA Explorer (bottom).

Key caveats	• Built areas are derived from earth observations and associated uncertainties and accuracy will vary in space and time. Clouds are often obstructing observations in tropical regions and coastal areas, and vary a lot from year to year.
	• There is little imagery that is freely available for 1975 and information obtained for this year should be interpreted with great care.
	• While the information can be used as a proxy to assess the potential impact of human activities on the marine environment in coastal areas, the information from the GHSL covers most of the global terrestrial surface and might be missing smaller isolated islands.

We refer to Pesaresi *et al.*, (2015) and Freire *et al.* (2016) for more details regarding the use of the product.

Indicator status — Submitted for publication (June 2019).

Available data and resources

Data available — BUAPI values are available for each protected area of size ≥ 10 km^2 and its associated 10 km unprotected buffer zone. The values and can also be compared at country and ecoregion levels, on the DOPA Explorer website: http://dopa-explorer.jrc.ec.europa.eu/dopa_explorer/.

Data updates — Planned with each update of DOPA.

Codes — Standard GIS operation applied to raster data.

Methodology

Methodology — The GHSL data contain a multitemporal information layer on built-up presence derived from Landsat image collections (GLS1975, GLS1990, GLS2000, and ad-hoc Landsat 8 collection 2013/2014). Provided with a resolution of 30 m, the GHSL data were overlaid with the boundaries of each protected area of size ≥ 10 km^2 to calculate the absolute (km^2) and relative surface (%) of the area covered by the built-up areas. UNESCO Biosphere Reserves were discarded as well as protected areas with known areas but undefined boundaries.

Input datasets — The indicator uses the following input datasets:

Protected Areas
• WDPA of May 2019 (UNEP-WCMC & IUCN, 2019).

    o Latest version available from: www.protectedplanet.net

Global Human Settlements
• GHS built-up grid for the years 1975, 1990, 2000, 2014.

    o Available from: http://ghsl.jrc.ec.europa.eu/datasets.php

References

Freire S., *et al.* (2016). Development of new open and free multi-temporal global population grids at 250m resolution. In: *Proc. of the 19th AGILE Conference on Geographic Information Science*. June 14-17, Helsinki, Finland, 2016. [Download]

Güneralp, B. & K. C. Seto (2013). Futures of global urban expansion: Uncertainties and implications for biodiversity conservation. *Environmental Research Letters*, 8, 1, 014025. http://dx.doi.org/10.1088/1748-9326/8/1/014025

McDonald, R. I., *et al.* (2009). Urban effects, distance, and protected areas in an urbanizing world. *Landscape and Urban Planning*, 93, 1: 63-75. https://doi.org/10.1016/j.landurbplan.2009.06.002

Pesaresi, M., *et al.* (2015). GHS built-up grid, derived from Landsat, multitemporal (1975, 1990, 2000, 2014). European Commission, Joint Research Centre (JRC) [Dataset] PID: http://data.europa.eu/89h/jrc-ghsl-ghs_built_ldsmt_globe_r2015b

UNEP-WCMC & IUCN (2019). Protected Planet: The World Database on Protected Areas (WDPA) [On-line], [May/2019], Cambridge, UK: UNEP-WCMC and IUCN. www.protectedplanet.net

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