

## Marine coverage statistics by protected areas

**Indicator name** Marine protected area coverage

**Indicator unit** Percentage or surface (km<sup>2</sup>) of a marine area covered by protected areas

**Area of interest** The indicator is available in DOPA at the country and ecoregion levels.

**Related targets**



[Sustainable Development Goal 14 on life below water](#)



[Aichi Biodiversity Target 11 on protected areas](#)

**Policy question** How much are marine areas covered by protected areas at the country and ecoregion level? This is a key question for measuring progress on the coverage element of Aichi Target 11 of the Convention on Biological Diversity (CBD).

**Use and interpretation** The indicator can be used to assess how far countries or ecoregions are from the Aichi Target 11 of having 10% of coastal and marine areas covered by well-connected systems of protected areas. Inversely, the information highlights where on the globe additional efforts are most needed in expanding or reinforcing the coverage by protected areas.

We look here both at coastal and continental shelf waters and at surface pelagic waters. In the first case, we use the 232 boundaries provided by the Marine Ecoregions of the World (MEoW) dataset (Spalding *et al.*, 2007). These ecoregions are extending from the coast (intertidal zone) to the 200 m depth contour (extended beyond these waters out by a 5 km buffer). We also use the 37 pelagic provinces of the world (PPOW) developed by Spalding *et al.* (2012) which go beyond the 200 m depth. These biogeographic classification systems can help ensure that the full range of ecosystems is represented in global and regional conservation and development strategies.

**Key caveats** Country boundaries and exclusive economic zones (EEZ) include disputed territories which may contain protected areas. In such cases, protected areas are assigned to all the countries claiming this territory. Note that the designations employed and the materials and maps produced in DOPA do not imply the expression of any opinion whatsoever on the part of the European Commission concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Protected areas with a reported area and a point but no boundaries are artificially generated using buffers. This approach can underestimate or overestimate the level of protection of an ecoregion as well inaccurate estimates of the elements that are marine or terrestrial when buffered points cover coastal areas. See Visconti *et al.* (2013) for further discussions.

**Indicator status** Standard indicators of the Biodiversity Indicators Partnership (BIP) as an indicator to measure PA coverage under Aichi Target 11. Published in UNEP-WCMC & IUCN (2016).

## **Available data and resources**

**Data available** DOPA Explorer 2.0 (<http://dopa-explorer.jrc.ec.europa.eu/>) provides typical metrics such as the amount of protection for each marine ecoregion within a country; the relative contribution that a country is making to the protection of a marine ecoregion worldwide; and the number of different marine ecoregions which fall within a particular protected area.

**Data updates** Planned with each update of DOPA.

**Codes** The complex procedure, which currently involves the use of a wide range of software to handle the different steps, is documented in Bastin *et al.* (2017) and in our Wiki at <http://dopa.wikispaces.com/WDPA+protected+Area+boundaries>

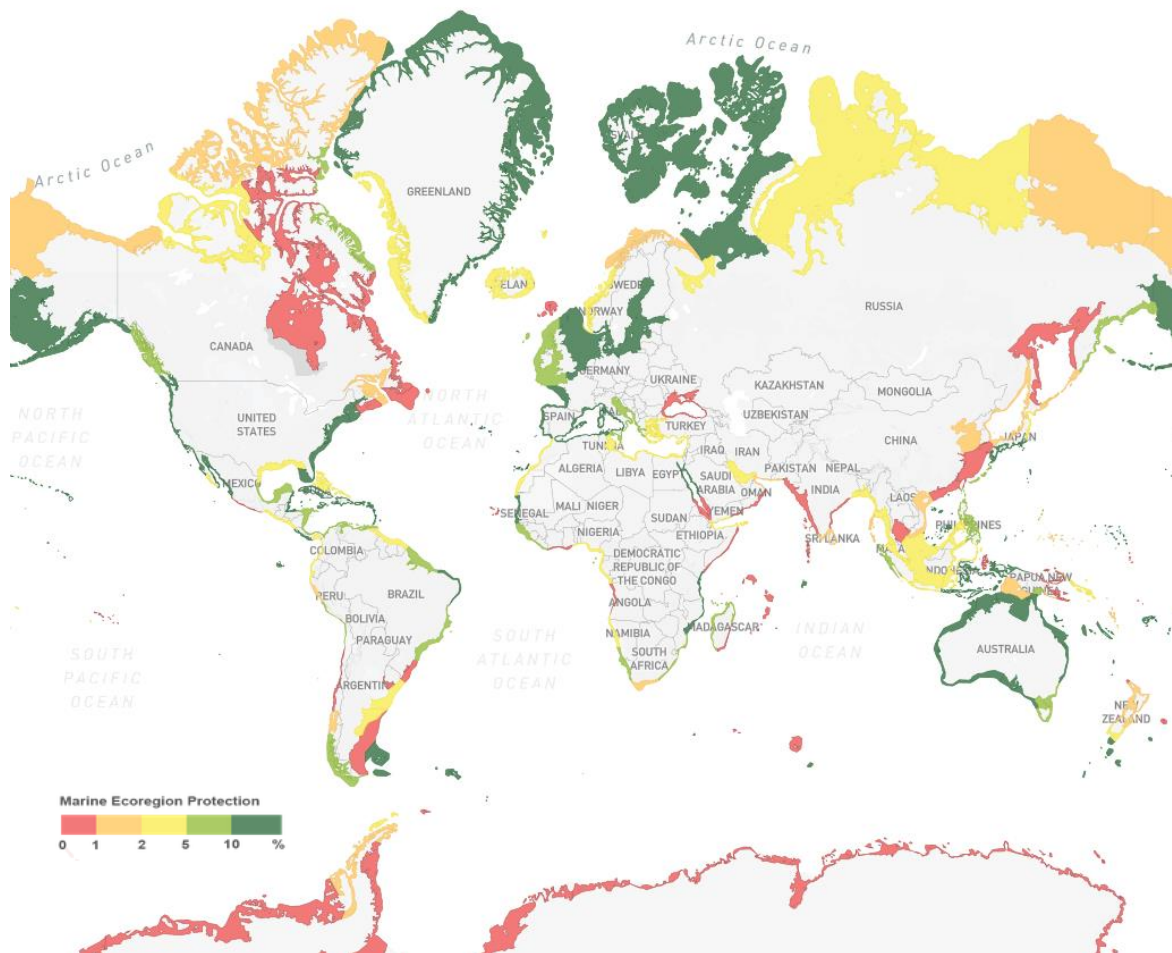
Additional guidance from the curators of the World Database on Protected Areas can be found at <https://www.protectedplanet.net/c/calculating-protected-area-coverage>

## **Methodology**

**Methodology** The DOPA uses the Global Administrative Unit Layers (GAUL) to compute protected area coverage of countries. PA coverage statistics are also calculated for marine ecoregions because these represent more meaningful entities within which to analyze the ecological representativeness of the global protected area network (Figure 1). The boundaries of the 232 marine ecoregions and 37 pelagic provinces are defined by Spalding *et al.*, 2007, 2012.

Following current practice, the UNESCO Man and Biosphere Reserves are not included in the calculations, as many of their buffer areas do not meet the IUCN's protected area definition (Watson *et al.*, 2014; UNEP-WCMC & IUCN, 2016). PAs that are proposed (but not yet fully designated or established) and PAs recorded as points without a reported area are also excluded. In addition, all overlaps between different PA records are removed from the calculations to avoid double counting.

A GIS analysis is used to calculate marine protection. For this a global protected area layer is created by buffering the points recorded in the WDPA based on their reported areas and combining them with the polygons recorded in the WDPA. This layer is overlaid with country boundaries and marine ecoregions to obtain the absolute and relative coverage of protected areas at national, regional and global scales.



**Figure 1.** Example of a global assessment: Protected marine area (% of ecoregion area) for the world's marine ecoregions as of April 2016 produced by the DOPA for the Protected Planet Report 2016.

**Input datasets** The indicator uses the following input datasets:

Protected Areas

- WDPA of October 2017 (UNEP-WCMC & IUCN, 2017).
  - Latest version available from: [www.protectedplanet.net](http://www.protectedplanet.net)

### Country boundaries

Country boundaries are built from a combination of GAUL country boundaries and EEZ exclusive economic zones (see Bastin *et al.*, 2017) for more details.

- Global Administrative Unit Layers (GAUL), revision 2015.
  - Latest version available from:  
<http://www.fao.org/geonetwork/srv/en/metadata.show?id=12691>
- Exclusive Economic Zones (EEZ) v9 (2016-10-21)
  - Latest version available from :  
<http://www.marineregions.org/downloads.php>

### Marine Ecoregions of the World

The marine ecoregions are the Marine Ecoregions Of the World (MEOW) and the Pelagic provinces of the world (PPOW)

- MEOW (Spalding *et al.*, 2007)
  - Latest version available from:  
<https://www.worldwildlife.org/publications/marine-ecoregions-of-the-world-a-bioregionalization-of-coastal-and-shelf-areas>
- PPOW (Spalding *et al.*, 2012)
  - Latest version available from: <http://data.unep-wcmc.org/datasets/38>

## References

Bastin, L., *et al.* (2017). Processing conservation indicators with Open Source tools: Lessons learned from the Digital Observatory for Protected Areas. In: *Free and Open Source Software for Geospatial (FOSS4G) Conference Proceedings: Vol 17, Article 14*. August 14-19, 2017, Boston, MA, USA. <http://scholarworks.umass.edu/foss4g/vol17/iss1/14>

Dubois, G., *et al.* (2016). Integrating multiple spatial datasets to assess protected areas: Lessons learnt from the Digital Observatory for Protected Area (DOPA). *International Journal of Geo-Information*, 5(12), 242. <http://dx.doi.org/10.3390/ijgi5120242>

Spalding, M. D., *et al.* (2007). Marine Ecoregions of the World: A bioregionalization of coastal and shelf seas. *Bioscience*, 57, 573–583. <https://doi.org/10.1641/B570707>

Spalding, M. D., *et al.* (2012). Pelagic provinces of the world: a biogeographic classification of the world's surface pelagic waters. *Ocean and Coastal Management* 60: 19-30. <http://dx.doi.org/10.1016/j.ocecoaman.2011.12.016>

UNEP-WCMC & IUCN (2016). *Protected Planet Report 2016*; UNEP-WCMC: Cambridge, UK; IUCN: Gland, Switzerland, 2016. [Protected Planet Report 2016](#)

UNEP-WCMC & IUCN (2017). *Protected Planet: The World Database on Protected Areas (WDPA)* [On-line], [October/2017], Cambridge, UK: UNEP-WCMC and IUCN. [www.protectedplanet.net](http://www.protectedplanet.net)

Visconti, P., *et al.* (2013). Effects of errors and gaps in spatial data sets on assessment of conservation progress. *Conservation Biology*, 27, 5: 1000-1010. <http://dx.doi.org/10.1111/cobi.12095>

Watson, J. E. M., *et al.* (2014). The performance and potential of protected areas. *Nature*, 515: 67–73. <http://dx.doi.org/10.1038/nature13947>

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