An introduction to DOPA Explorer 4.0

Introduction

The DOPA (Digital Observatory for Protected Areas) Explorer 4.0 is a web based tool developed by the [Joint Research Centre of the European Commission](#) (EC JRC) to support the European Union's efforts *"to substantially strengthen the effectiveness of international governance for biodiversity and ecosystem services[1]"* and more generally for *"strengthening the capacity to mobilize and use biodiversity data, information and forecasts so that they are readily accessible to policymakers, managers, experts and other users[2]"*.

In particular, DOPA aims to provide the best available material (data, indicators and models) made available by a few institutions (*i.e.* the EC-JRC, the UN Environment - World Conservation Monitoring Centre, the International Union for the Conservation of Nature, BirdLife International, GBIF, FAO and others) which can serve for establishing baselines for research and reporting.

DOPA Explorer provides a simple means to explore terrestrial, marine and mixed protected areas, identify those with the most unique ecosystems and species, and assess the pressures they are exposed to because of human development.

The latest version DOPA Explorer is available at http://dopa.jrc.ec.europa.eu/explorer/

Area of interest

Using the May 2019 version of the World Database on Protected Areas (WDPA) (UNEP-WCMC & IUCN, 2019) and the 2019 version of the IUCN Red List of Threatened Species[TM] (IUCN, 2019), DOPA Explorer 4.0 provides summary indicators and statistics at the country and ecoregion levels.

The indicator can be used to assess how far countries or ecoregions are from the Aichi Target 11 of having 17% of the land and 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.

More detailed assessments regarding species, climate, land cover change and pressures have been computed for all protected areas ≥ 10 km^2 (more than 42,000 protected areas covering more than 95% of the global protected surface). Table 1 provides a summary of the core indicators and statistics proposed in DOPA Explorer. Note that information on EU funding for biodiversity conservation, currently available in a specific tool, eConservation (see http://econservation.jrc.ec.europa.eu/), will be added to DOPA Explorer at a later stage.

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[1] EC/COM/2006/0216 final
[2] UNEP/CBD/COP/10/27

Key Indicators	Country	Ecoregions	Site level (10 km²)
Coverage by protected areas	√	√	NA
Connectivity of protected areas	√	√	NA
Land cover & changes	√	√	√
Forest cover & changes	√	√	√
Surface water & changes	√	√	√
Terrestrial Habitat Diversity	-	-	√
Marine Habitat Diversity	-	-	√
Threatened species counts	√	√	√
Threatened species lists	-	-	√
Agricultural pressure	√	-	√
Population pressure	√	-	√
Built-up areas pressure	-	-	√
Road pressure	-	-	√
Livestock pressure	-	-	√
Monthly climate	NA	NA	√
Soil organic C	√	√	√
Above ground C	√	√	√
Below ground C	√	√	√
Land degradation	√	√	√
Land fragmentation	√	√	√
Funding	√	-	√

Table 1. Summary table of the core indicators and statistics proposed in DOPA Explorer 4.0. (NA = Not Applicable)

Policy targets

Biodiversity loss has continued largely unabated despite increased efforts by the international community and several conservation successes (Butchart *et al.*, 2010; Hoffmann *et al.*, 2010). The 10th meeting of the UN Convention on Biological Diversity (CBD) thus adopted in 2010 an ambitious Strategic Plan for Biodiversity, including the 20 Aichi Biodiversity Targets, for the 2011 – 2020 period. Among the targets, Target 11 states "*By 2020, at least 17 per cent of terrestrial and inland water areas and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.*" The EU has pledged to meet the international biodiversity targets agreed under the CBD by 2020.

Because PAs play a key role in biodiversity conservation and the sustainable use of natural resources (Watson *et al.*, 2014; UNEP-WCMC & IUCN, 2016), these are at the heart of many conservation initiatives such as Natura 2000. This network of PAs is designed to ensure the long-term survival of Europe's most valuable and threatened species and habitats, listed under the Birds Directive and the Habitats Directive (Beresford *et al.*, 2016). Target 6 of the EU Biodiversity Strategy addresses the EU contribution to global conservation and requires that, by 2020, the EU steps up its contribution to avert global

biodiversity loss by greening its economy and endeavoring to reduce its pressure on global biodiversity. The 11th meeting of the CBD in Hyderabad, India (2012) further saw The Parties of the CBD agreeing on an overall substantial increase of total biodiversity-related funding for the implementation of the Strategic Plan. The objectives of the Hyderabad commitment included the setting of a preliminary target of doubling total biodiversity-related international financial resource flows to developing countries by 2015 and at least maintaining this level by 2020. This is a substantial effort for the EU considering that EuropeAid, the European Commission's Directorate for International Cooperation and Development, invested alone already around 1.3 billion in biodiversity-related projects between 2007 and 2013 to support developing countries to meet their targets (EuropeAid, 2016).

Approaching fast 2020, a new global strategy has already been put in place by the United Nations. In January 2016, a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030 was adopted and is articulated around 17 SDGs (Sustainable Development Golas) and 169 associated targets.

We hope the DOPA will contribute to the SDGs 13, 15, 16 and 17 and we will futher focus on Aichi Targets 5, 11, 12, 15 and 20 until 2020.

Sustainable Development Goal 13 on climate change

Sustainable Development Goal 14 on life below water

Sustainable Development Goal 15 on life on land

Sustainable Development Goal 17 on partnerships for the goals

Aichi Biodiversity Target 5 on natural habitats

Aichi Biodiversity Target 11 on protected areas

Aichi Biodiversity Target 12 on species

Aichi Biodiversity Target 15 on carbon stocks

Aichi Biodiversity Target 20 on financial resources

Key caveats   Although global datasets allow for the development of comparable indicators across countries and regions, these also often suffer from higher local

uncertainties when compared to national or regional datasets. The current information presented in the various applications of the DOPA need therefore to be used with care when it comes to site-level assessments. In other words, applications such as the DOPA Explorer should be seen as a compass rather than a GPS to help decision makers navigate large amounts of biodiversity information that is otherwise difficult to access and manage. Earth observations, on the other hand, become increasingly freely available and portray the world every day with an increasing resolution and frequency. This wealth of additional information that is essential to biodiversity conservation also stresses the need to capture information about PAs directly on the ground, if only to validate the global products. Information that cannot be captured through remote-sensing techniques such as the presence of key species, threats, conservation projects, infrastructure, many land cover types, etc. are critical to assess protected areas and their effectiveness and need to be captured regularly as well.

Country boundaries 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.

System status   DOPA Explorer 4.0 has been released in September 2019. Its underlying infrastructure has been documented in Dubois *et al.* (2016). For further technical details regarding the data processing we refer to Bastin *et al.* (2017).

Available data and resources

Data available   The data proposed in DOPA are made available in the DOPA Explorer 4.0 which is available at http://dopa-explorer.jrc.ec.europa.eu/ but also directly via our web services. See http://dopa-services.jrc.ec.europa.eu/services/ (registration is required, data distribution depending on the license agreements of the data providers). We also provide in a downloadable file, in a tabular format, most of the quantitative results proposed.

Data updates   We expect the core indicators of the DOPA to be updated regularly (2 times / year), targeting more frequent updates to align with the monthly releases of the World Database on Protected Areas by the UNEP-WCMC & IUCN. However, a number of indicators require extensive computational efforts and these will be updated only once a year for the time being. This is the case for the connectivity indicators.

Codes	We started sharing and documenting our codes in the documentation section of the DOPA website at http://dopa.jrc.ec.europa.eu/. This effort is still in progress.

Methodology

Methodology	Assessing protected areas for biodiversity conservation at national, regional and international scales implies that methods and tools are in place to evaluate characteristics such as the protected areas' connectivity, their species assemblages (including the presence of threatened species), the uniqueness of their ecosystems, and the threats these areas are exposed to. Typical requirements for such analyses are data on protected areas, information on species distributions and threat status, and information on ecosystem distributions. By integrating all these global data consistently in metrics and indicators, the DOPA provides the means to allow end-users to evaluate protected areas individually but also to compare protected areas at the country and ecoregion level to, for example, identify potential priorities for further conservation research, action and funding.
	We refer to Dubois *et al.*, 2016 and Bastin *et al.*, 2017 for detailed discussions on the methods used. Note that our key indicators are further documented in specific factsheets which can be downloaded in English, French and Spanish in the Documentation section of our homepage, at http://dopa.jrc.ec.europa.eu/en/documentation

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