Agricultural pressure

Indicator name **Agricultural Pressure Indicator (API).**

Indicator unit The API assesses the percentage of the surface of a protected area that is covered by cropland.

Area of interest API has been calculated for all protected areas, countries and terrestrial ecoregions and is reported in DOPA Explorer for each terrestrial protected area of size ≥ 1 km^2 and for the terrestrial parts of each coastal protected area of size ≥ 1 km^2 as well as their 10 km unprotected buffer zone. We further show trends regarding the percentage of agricultural land at the country level.

Related targets

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 agriculture land use in a protected area have on the habitats, species and ecological processes therein? By identifying protected areas with low pressure from agriculture, it is possible to highlight locations that are likely to better conserve the ecosystems, species and ecological processes that are associated to more pristine conditions and that are more sensitive to the direct and indirect impacts from this form of human land use. On the other hand, by identifying protected areas with a relatively high percentage of cropland, it is possible to suggest in which locations it is a priority to implement measures that enhance the compatibility of crop production with biodiversity conservation. These measures may include promoting less intensive agricultural practices or retaining natural vegetation remnants within and between crops, which may contribute to provide habitat resources and to facilitate the movement of species across otherwise impermeable landscapes.

Use and interpretation API can be used to assess the potential impact that agriculture may have on the biodiversity and ecological integrity of a protected area. There are several reasons why agricultural land use in a protected area may be of concern and lead to negative outcomes for the conservation of many of the habitats, species and ecological processes therein (see e.g. Green *et al.*, 2005; Balmford, Green & Phalan, 2012; Cai & Pettenella, 2013). First, agriculture expansion is one of the main drivers of deforestation and habitat loss worldwide. Second, the input of pesticides and fertilizers may decrease habitat quality and cause declines in population sizes for many species, even at significant distances from the croplands. Third, agricultural activities such as tillage may affect soil structure and biodiversity. Fourth, agricultural land use can favor the abundance of more generalist, cosmopolitan species in detriment of the specialist species that are associated to largely undisturbed habitats, which are usually those species of

higher conservation concern, as well as promote the spread of invasive alien species. Although the API does not separately evaluate each of these pressures or potential effects, it provides a general assessment of the potential combined magnitude of all these impacts that may be associated to agricultural land use in a protected area.

In DOPA Explorer, for each terrestrial and coastal protected area of size ≥ 1 km^2 and their 10 km unprotected buffer zone we provide the map and coverage statistics by cropland (Figure 1). Trends on agricultural land at the country level provided by the FAO are also displayed (Figure 2) in the country section.

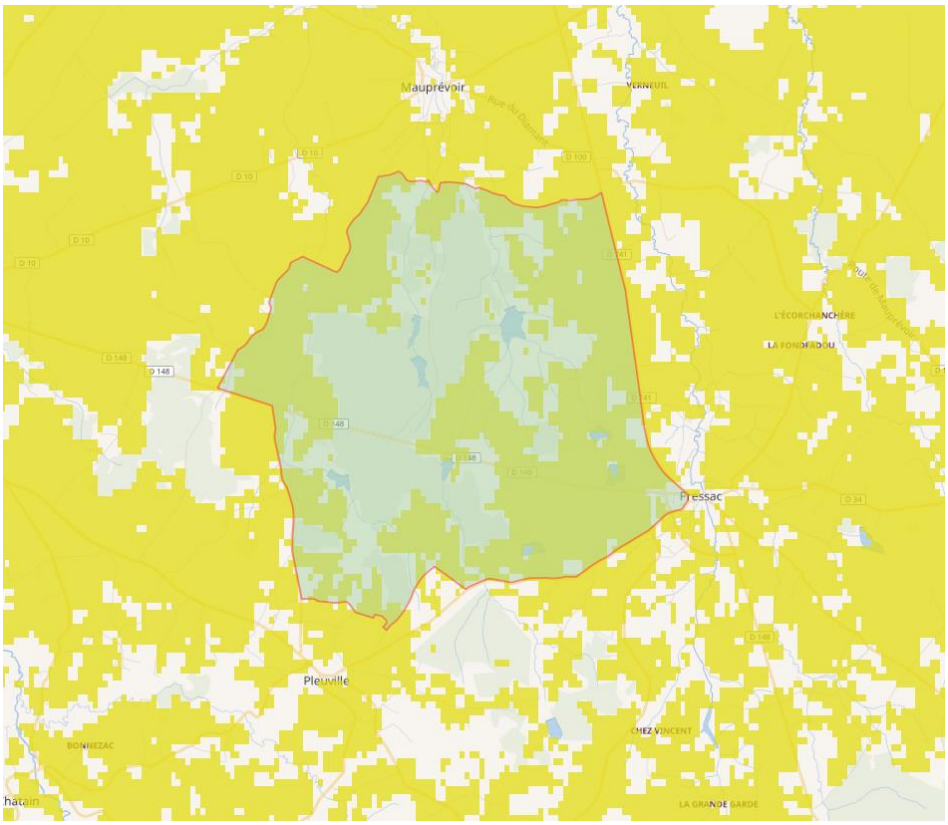

Figure 1. Cropland map and percentage of coverage inside and outside (10 km unprotected buffer zone) of a protected area.

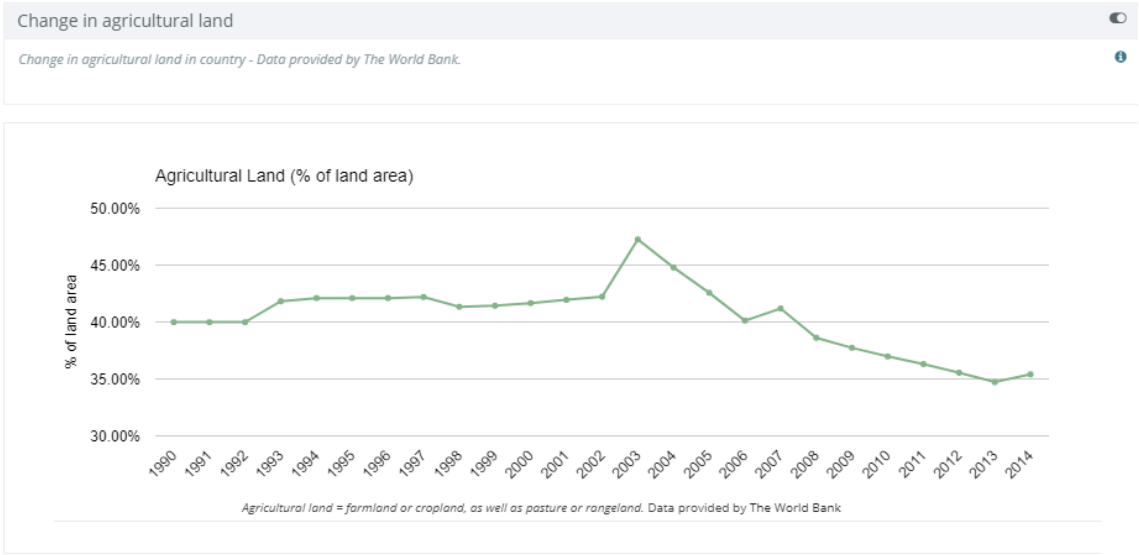

Figure 2. Temporal changes in agricultural land in the country as displayed in DOPA Explorer.

Key caveats

- Not all agricultural activities are detrimental, or not all are equally detrimental, for biodiversity conservation. In particular, traditional and low-intensity agricultural land use may be compatible with the conservation values for which a protected area is declared. The magnitude of the effects of agriculture is variable across species, although in general these effects will be larger and more detrimental for those species specialized in relatively pristine and undisturbed habitats, which are in many cases those most endangered and in need of more conservation efforts. In some cases, however, certain types of agricultural land use are necessary to conserve the species for which protected areas are declared, particularly in those areas where biodiversity has coexisted with low-intensity agriculture for long periods, such as in some European landscapes. For example, some species like steppe birds living in farmland habitats are declining in Europe mainly because of agricultural intensification and, to a lower extent, because of the loss of cropland area by woodland expansion after rural land abandonment. The different types of croplands in the protected areas (e.g. tree or herbaceous, irrigated or not, high-intensity or low-intensity, with or without natural vegetation remnants, etc.), and their different impacts for conservation in general or for certain species in particular, are not separately disclosed by the API. There is however clear evidence that a high pressure from agricultural land use is in general correlated with clearly negative impacts on many habitats, species and ecosystem processes.
- A significant pressure from agriculture on protected areas may come from croplands outside a protected area (even if near it), such as the effects of pesticides or the proliferation of edge-affiliated, cosmopolitan species. The current API has therefore been also computed for a 10 km unprotected buffer zone around protected areas.
- The dataset used for the computation of the API is the Copernicus Global 100m Land Cover map (see section below on methodology), that has 2019 as the baseline year, with a planned timeliness of yearly updates, which will

enable DOPA to monitor over time the agricultural pressure in protected areas. Furthermore, the consistency of such layer at global scale ensures the reliability of comparisons of the API values for protected areas in different countries or regions.

Indicator status Operational indicator based on standard GIS analysis.

Available data and documentation

Data available API values are available in DOPA Explorer for each terrestrial and coastal protected area of size ≥ 1 km^2 and its 10 km unprotected buffer zone. The values computed can be further compared at country and ecoregion levels, on the DOPA Explorer website: http://dopa-explorer.jrc.ec.europa.eu/. Trends on agricultural land at the country level provided by the FAO are also displayed.

Data updates Planned with each update of DOPA.

Codes The processing of the API has been done using GRASS. More details are provided in the Documentation section of the DOPA web site, see http://dopa.jrc.ec.europa.eu/

Methodology

Methodology The API is calculated for DOPA Explorer as the percentage area of class 40 ("Cultivated and managed vegetation/agriculture (cropland)") of the Land Cover map within each protected area. UNESCO Biosphere Reserves were discarded as well as protected areas with known areas but undefined boundaries. The API uses the World Database on Protected Areas (WDPA) and Copernicus Global 100m Land Cover map for the baseline year 2019 (Buchhorn, M., *et al* 2020) as inputs. The Copernicus Global 100m Land Cover map provides land cover data according to a LLCS based legend with 23 classes and with an overall accuracy of 80% (Buchhorn, M., *et al* 2020). Trends regarding country coverage by agricultural land are provided directly by a web service from the World Bank.

Input datasets The indicator uses the following input datasets:

Protected Areas

- WDPA of February 2023 (UNEP-WCMC & IUCN, 2023).
    - Latest version available from: 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).

- Global Administrative Unit Layers (GAUL), revision 2015.
    - Latest version available online: 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

Terrestrial Ecoregions of the World

- TEOW (Olson *et al.*, 2001)
  - Latest version available from: https://www.worldwildlife.org/publications/terrestrial-ecoregions-of-the-world

Agricultural Areas

- Copernicus Global Land Operations , Global 100m Land Cover map for the year 2019 (Buchhorn, M., *et al* 2020)
  - Latest version available from: https://land.copernicus.eu/global/products/lc
- Country temporal trends from the FAO provided by the World Bank:
  - Percentage of agricultural land is available from: http://databank.worldbank.org/data/reports.aspx?source=2&type=metadata&series=AG.LND.AGRI.K2

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Olson, D. M., *et al.* (2001). Terrestrial ecoregions of the world: A new map of life on Earth. *Bioscience*, 51: 933–938. https://doi.org/10.1641/0006-3568(2001)051[0933:TEOTWA]2.0.CO;2

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