

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, in DOPA Explorer, for each terrestrial protected area of size ≥ 25 km² and for the terrestrial parts of each coastal protected area of size ≥ 25 km² as well as their 10km unprotected buffer zone. We further show trends regarding the percentage of agricultural and arable 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 protected area of size $\geq 25 \text{ km}^2$ and its 10 km unprotected buffer zone we provide the map and coverage statistics by cropland (Figure 1). Trends on agricultural and arable land at the country level provided by the FAO are also displayed (Figure 2) in the country section.

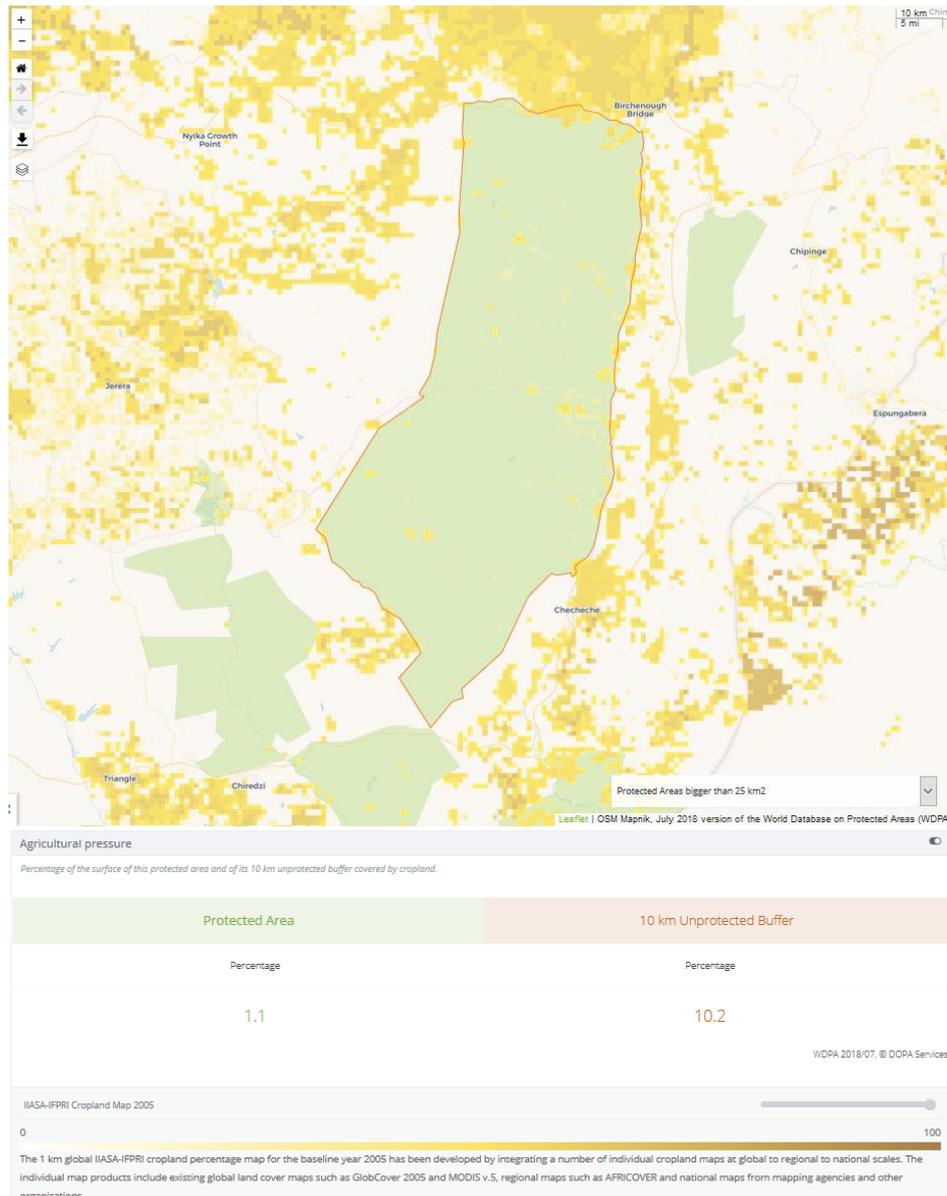


Figure 1. Cropland map and percentage of coverage inside and outside (10 km unprotected buffer zone) of a protected area as displayed in DOPA Explorer.



Figure 2. Temporal changes in agricultural and arable 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 the protected area.
- The cropland map used (see section below on methodology) has 2005 as the baseline year, but integrates a number of individual national or regional cropland maps developed in different dates, which should be considered when comparing the API values for protected areas in different countries or regions. On the other hand, croplands can be very dynamic in some areas, which means that the most recent situation may differ significantly from that reported by the cropland map for 2005. DOPA Explorer will be updated to include in the future more recent versions of this or similar global cropland maps as they are available.

Indicator status Operational indicator based on standard GIS analysis.

Available data and documentation

Data available API values are available for each protected area of size ≥ 25 km² 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 and arable land at the country level provided by the FAO are also displayed.

Data updates Planned with each update of DOPA.

Codes The python codes used to generate the API can be found 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 average percentage of cropland in 1 km raster cells within each protected area of size ≥ 25 km². 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 the global IIASA-IFPRI cropland percentage map for the baseline year 2005 (Fritz *et al.*, 2015) as inputs (Dubois *et al.*, 2016). The global IIASA-IFPRI cropland percentage map integrates a number of individual cropland maps at global to regional to national scales (hybrid or data fusion approach for map production), and has an overall accuracy of 82.4% (Fritz *et al.*, 2015). Trends regarding country coverage by agricultural and arable 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 July 2018 (UNEP-WCMC & IUCN, 2018).

- Latest version available from: www.protectedplanet.net

Agricultural Areas

- IIASA-IFPRI cropland map for the year 2005 (Fritz *et al.*, 2015)
 - Latest version available from: <https://www.geo-wiki.org/downloads/>
- 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>
 - Percentage of arable land is available from: <http://databank.worldbank.org/data/reports.aspx?source=2&type=metadata&series=AG.LND.ARBL.ZS>

References

Balmford, A., Green, R., & B. Phalan (2012). What conservationists need to know about farming. *Proc Biol Sci.*, 279(1739): 2714–2724. <http://dx.doi.org/10.1098/rspb.2012.0515>

Cai, M. & D. Pettenella (2013). Protecting biodiversity outside protected areas: can agricultural landscapes contribute to bird conservation on Natura 2000 in Italy? *Journal of Environmental Engineering and Landscape Management*, 21(1): 1-11. <https://doi.org/10.3846/16486897.2012.663089>

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

Fritz, S., *et al.* (2015). Mapping global cropland and field size. *Global Change Biology*, 21: 1980–1992. <http://dx.doi.org/10.1111/gcb.12838>

Green, R.E., *et al.* (2005). Farming and the fate of wild nature. *Science*, 307(5709): 550-555. <http://dx.doi.org/10.1126/science.1106049>

UNEP-WCMC & IUCN (2018). Protected Planet: The World Database on Protected Areas (WDPA) [On-line], [July/2018], Cambridge, UK: UNEP-WCMC and IUCN. www.protectedplanet.net

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