EEA geospatial data catalogue

Concentrations of nitrogen and phosphorus in European agricultural soils, Oct. 2020

This data set contains current nitrogen (N) and critical phosphorus (P) concentrations and their exceedances of the current and required Nitrogen Use Efficiencies (NUE) in Europe. This data set has been compiled by the European Topic Centre on Urban, Land and Soil Systems (ETC/ULS) in the context of a study on metal and nutrient dynamics where the fate and dynamics of the most abundant heavy metals and nutrients in agricultural soils were investigated. The purpose of this study was to investigate the impacts of agricultural intensification in Europe, and to understand its environmental impact.

Simple

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Point of contact	**Organisation name** / **Individual name** / **Electronic mail address** / **Website** / **Role** European Environment Agency / / sdi@eea.europa.eu / http://www.eea.europa.eu / Point of contact European Environment Agency / / sdi@eea.europa.eu / / Custodian
Maintenance and update frequency	Irregular
GEMET - INSPIRE themes, version 1.0	• Soil • Land use
Keywords	
Keywords	
GEMET	• nitrogen • ammonia • nutrient • concentration (value) • soil pollution • phosphorus • ecosystem degradation • land use • agricultural land • soil degradation • agriculture • environmental pressure • soil
Continents, countries, sea regions of the world.	• United Kingdom • Ireland • Portugal

	• Lithuania • Italy • France • Greece • Austria • Denmark • Czechia • Poland • Finland • Slovenia • Hungary • Spain • Belgium • Netherlands • Slovakia • Luxembourg • Sweden • Latvia • Estonia • Bulgaria • Romania • Germany
Spatial scope	• European
EEA topics	• Soil • Land use
Use limitation	no limitations to public access
Access constraints	Other restrictions
Other constraints	no limitations to public access
Use constraints	Other restrictions
Other constraints	EEA standard re-use policy: unless otherwise indicated, re-use of content on the EEA website for commercial or non-commercial purposes is permitted free of charge, provided that the source is acknowledged (http://www.eea.europa.eu/legal/copyright). Copyright holder: European Environment Agency (EEA)
Spatial representation type	Vector
Distance	1 km
Language of dataset	English
Topic category	• Environment • Farming
Begin date	2008-01-01
End date	2019-12-31

70.08	N	27.64	S	31.57	E	-31.28	W

Additional Information	Agriculture is vital to Europe's prosperity. However, the intensification of livestock and crop production, associated with an increased use of fertilizers and manure has caused enhanced soil accumulation and losses of nitrogen, phosphorus and metals to air (nitrogen compounds only) and water. This has caused enhanced atmospheric ammonia deposition, leading to eutrophication and acidification of terrestrial ecosystems, pollution of groundwater, affecting drinking water, particularly by nitrate, and increased concentrations of total nitrogen in surface water, leading to eutrophication of aquatic ecosystems, respectively. In this study, first the N and P fluxes were determined in a soil balance approach. N and P budgets based on spatially explicit input and output data were calculated using the INTEGRATOR model; approximately 40,000 so-called NCUs as unique combinations of soil type, administrative region, slope class and altitude class were used. As inputs, Eurostat 2010 statistics on the use of fertilizers, manure, and biosolids (compost and sludge) were used, as well as EMEP N deposition data. The N and P surplus were calculated as the difference between N or P input and crop N or P removal. The biological processes related to the fate of the N surplus, i.e. emissions to air and losses to ground water and surface water were determined using the INTEGRATOR model. Next, by combining soil data and climate data with environmental protection targets (thresholds critical N input levels were derived (i.e. the input that is possible without harm to the environment). The following thresholds were used: (i) critical N deposition on natural ecosystems, (ii) critical nitrate (NO3) concentration in leachate to groundwater and (iii) critical N concentrations in runoff to surface water. Matching nitrogen inputs with critical inputs, to minimize nutrient losses from soils to acceptable levels, will reduce crop yields unless the efficiency of nitrogen application is increased. In order to advice policy and management, it is important to know the required increase in N use efficiencies (NUE) to optimize nutrient provision and availability to crops, to combine target crop yields with acceptable N losses to air and water. For that, the spatial variation in required NUEs were determined and compared with the current NUEs. Any gap between actual NUE and an attainable (or target) NUE indicates the potential for meaningful management response. If the required NUE is still higher, the production level needs to be reduced when full protection of the environment is required. The results allow for the first time to both identify spatial hot spots for critical environmental impacts of N and P inputs, and the possibility to protect the environment by improved management as compared to reduced production levels. The work is methodologically novel, as it applies endpoint risk to assess critical inputs and it informs policy processes important for planning and guiding sustainable nutrient management, such as the farm to fork strategy. The description of the spatial data sets provided on N and P dynamics in Europe and the reference report is provided under "lineage". The data set is provided as SHP and also in a GDB, the latter including as well the heavy metal concentrations. An Excel file "Metadata heavy metals nutrients.xlsx" with the attribute metadata is provided with the data set.
Coordinate reference system identifier	EPSG:3035
Distribution format	• SHP ( )

OnLine resource

Protocol	Linkage	Name
EEA:FOLDERPATH	https://sdi.eea.europa.eu/webdav/datastore/public/eea_v_3035_1_km_n-p-agri-soil_p_2008-2019_v01_r00/SHP/	
EEA:FOLDERPATH	https://sdi.eea.europa.eu/webdav/datastore/public/eea_v_3035_1_km_n-p-agri-soil_p_2008-2019_v01_r00/GDB/	
WWW:URL	https://sdi.eea.europa.eu/data/044814bf-0a21-41f7-83bd-596f3afb364d	Direct download
ESRI:REST	https://land.discomap.eea.europa.eu/arcgis/rest/services/Agriculture/concentrations_of_nitrogen_phosphorus_in_EU_agricultural_soils/MapServer	

	OGC:WMS	https://land.discomap.eea.europa.eu/arcgis/services/Agriculture/concentrations_of_nitrogen_phosphorus_in_EU_agricultural_soils/MapServer/WMSServer?request=GetCapabilities&service=WMS
Hierarchy level	Dataset	

Conformance result

Title	Commission Regulation (EU) No 1089/2010 of 23 November 2010 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards interoperability of spatial data sets and services
Date (Publication)	2010-12-08
Explanation	See the referenced specification

Statement

ETC/ULS, 2016, 'Assessment of critical load exceedances of nitrogen, phosphorus and cadmium in view of food, soil and water quality', Deliverable 1.8.2.3 KD2, European Topic Centre on Urban, Land and Soil Systems, unpublished report available upon request.

Description of the spatial data sets provided on N and P dynamics in Europe:

Field \\\\\ Unit \\\\\ Description

Nsurp \\\\\ kg N/ha/yr \\\\\ N surplus a for the year 2010 in EU27

Psurp \\\\\ kg P/ha/yr \\\\\ P surplus a for the year 2010 in EU27

NUE \\\\\ kg N/kg N \\\\\ N use efficiency (NUE)

PUE \\\\\ kg P/kg P \\\\\ P use efficiency (PUE)

NH3em \\\\\ kg N/ha/yr \\\\\ Ammonia (NH3-N) emissions to the atmosphere for the year 2010 in EU27

N2Oem \\\\\ kg N/ha/yr \\\\\ Nitrous oxide (N2O-N) emissions to the atmosphere for the year 2010 in EU27

Nlegw \\\\\ kg N/ha/yr \\\\\ N leaching to groundwater for the year 2010 in EU27

Nlesw \\\\\ kg N/ha/yr \\\\\ N runoff to surface water for the year 2010 in EU27

Pacc \\\\\ kg P/ha/yr \\\\\ P accumulation in soil for the year 2010 in EU27

Ple \\\\\ kg P/ha/yr \\\\\ P leaching and runoff for the year 2010 in EU27

PSD1975 \\\\\ kg P/kg P \\\\\ P Saturation degree (PSD) in 1975 in EU27

PSD2010 \\\\\ kg P/kg P \\\\\ P Saturation degree (PSD) in 2010 in EU27

NH3emcr \\\\\ kg N/ha/yr \\\\\ Critical ammonia (NH3-N) emissions to the atmosphere, in EU27

ExNH3emcr \\\\\ kg N/ha/yr \\\\\ Exceedance of critical ammonia, NH3-H, emissions for the year 2010 in EU27

Nlegwcr \\\\\ kg N/ha/yr \\\\\ Critical leaching to groundwater of nitrate, NO3-N in EU27

ExNlegwcr \\\\\ kg N/ha/yr \\\\\ Exceedance of critical nitrate (NO3-N) leaching to groundwater for the year 2010 in EU27

Nleswcr \\\\\ kg N/ha/yr \\\\\ Critical N runoff to surface water in EU27

ExNleswcr \\\\\ kg N/ha/yr \\\\\ Exceedance of critical N runoff to surface water for the year 2010 in EU27

NincrNH3 \\\\\ kg N/ha/yr \\\\\ Critical N inputs in view of eutrophication of terrestrial ecosystem induced by ammonia emissions in EU27

ExNinNH3 \\\\\ kg N/ha/yr \\\\\ Exceedance of critical N input in view of ammonia emissions for the year 2010 in EU27

Nincrsw \\\\\ kg N/ha/yr \\\\\ Critical N inputs in view of eutrophication of surface water in EU27

ExNinsw \\\\\ kg N/ha/yr \\\\\ Exceedance of critical N input in view of eutrophication of surface water for the year 2010 in EU27

DNUEact \\\\\ kg N/kg N \\\\\ Difference between the NUE in 2010 and the required NUE to attain the crop yield for the year 2010, while nitrogen losses to surface water and nitrate losses to groundwater are acceptable in EU27

DNUEtar \\\\\ kg N/kg N \\\\\ Difference between the NUE in 2010 and the required NUE to attain the target crop yield, while nitrogen losses to surface water and nitrate losses to groundwater are acceptable in EU27

Pincr \\\\\ kg P/ha/yr \\\\\ Critical P inputs in view of target crop yields in EU27

ExPincr \\\\\ kg P/ha/yr \\\\\ Exceedance of P inputs in 2010 in view of not limiting crop growth in EU27

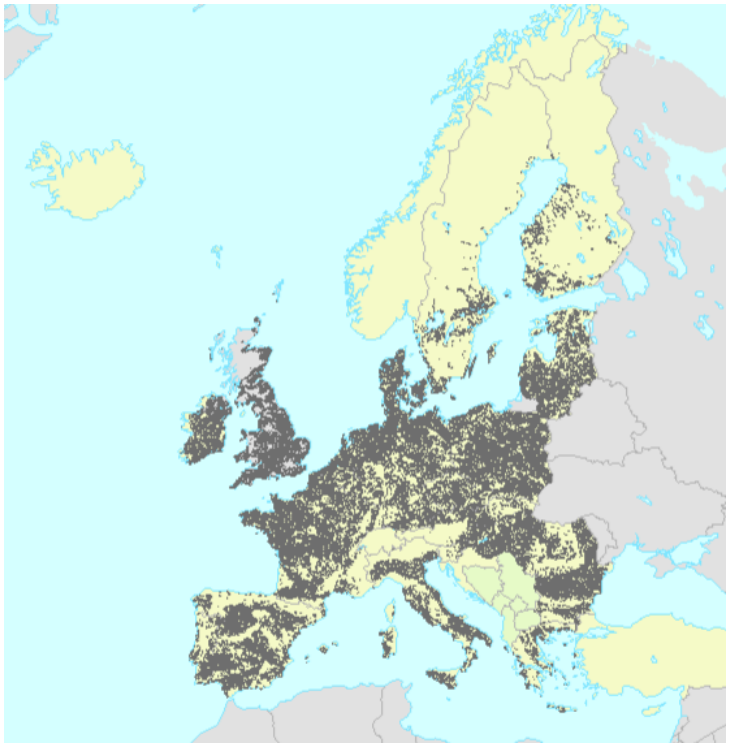
DPUE \\\\\ kg P/kg P \\\\\ Difference between the required PUE of 1 and the PUE in 2010 in EU27

Metadata

File identifier	044814bf-0a21-41f7-83bd-596f3afb364d XML
Metadata language	English
Character set	UTF8
Hierarchy level	Dataset
Date stamp	2023-08-04T09:35:43.816Z
Metadata standard name	ISO 19115/19139
Metadata standard version	1.0
Metadata author	

Organisation name	Individual name	Electronic mail address	Website	Role
European Environment Agency		sdi@eea.europa.eu		Point of contact

Overviews



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