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Keywords

watershed characteristics, rivers/streams, lakes/reservoirs, ground water, ecological status, water quality/water chemistry, discharge/flow, land use/land cover, population density, nutrient load, climate characteristics

Short description of the dataset/summary

The MARS spatial database (MARSgeoDB) supports analyses of European waters, providing common reference spatial layers and selected data on indicators of pressures, state and impacts of European waters. It is developed within the European research project MARS (Managing Aquatic ecosystems and water Resources under multiple Stress) in accordance with the WISE (Water Information System in Europe) concept. It is built on the ECRINS (European Catchments and Rivers Network System) spatial database (from the European Environment Agency), consisting of river segments, lakes and functional elementary catchments (FECs). It includes other available European spatial layers, such as River Basin Districts (RBDs), RBD sub-units, coastlines, regions, water bodies as reported under the WFD (Water Framework Directive) in 2010 and WISE SoE (State of Environment) locations.

For spatial objects representing waters in the MARSgeoDB we compiled indicators of pressure, state and impact: physical-chemical indicators, ecological quality ratio, ecological status, chemical status, hydromorphological status, land use, population, nitrogen and phosphorus diffuse pollution, Eurostat agricultural data, UWWTD (Urban Waste Water Treatment Directive) point sources of organic pollution, E-PRTR (The European Pollutant Release and Transfer Register) point sources of large emissions to water, hydro-morphological changes/naturalness of rivers, meteorological and hydrological characteristics. To calculate pressures acting on selected locations on waters we derived surface water receiving areas (polygons representing catchments/hinterlands). We assigned broad ecological types to rivers (20 types) and lakes (15 types) objects in the MARSgeoDB using abiotic criteria as proposed by EEA ETC/ICM (European Topic Centre on Inland, Coastal and Marine waters) in 2015. A corresponding water body code and national ecological types were assigned as well.

Spatial and associated attribute data were quality checked, unified when needed, harmonised and interlinked.

General information

dataset entry ID:	MARS_20
name of the dataset:	
full name of the dataset:	MARS spatial database
dataset short name:	MARSgeoDB
type of dataset:	environmental characteristics database
data type:	vector data (shape files)
science keywords according to GCMD:	
topic:	Agriculture, Biological Classification, Climate Indicators, Land Surface, Terrestrial Hydrosphere
keywords:	DPSIR, WFD, WISE SoE, watershed characteristics, rivers/streams, lakes/reservoirs, ground water, ecological status, water quality/water chemistry, discharge/flow, land use/land cover, population density, precipitation, air temperature, agriculture production
ISO topic category according to ISO 19115:	Farming, Boundaries, Climatology/Meteorology/Atmosphere, Elevation, Environment, Inland Waters

Technical and administrative specifications

data format:	Access
others/details:	ESRI geodatabase feature classes
operating system:	all Windows systems
data language:	English
current access level:	web (public)
web address (URL):	http://www.fgg.uni-lj.si/~/mars/MARSgeoDB/MARSgeoDB_v2.zip
currently available through GBIF:	no
exchange planned:	no
data in data repository:	no
Do you plan to publish the data on the Freshwater Biodiversity Data Portal:	no
update level:	completed
documentation:	
type:	manual
language:	English
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Intellectual property rights and citation

dataset creator (data compiler):

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contact email:	lidija.globevnik@fgg.uni-lj.si
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data contributors to/owners of this dataset:

citation of this dataset:

author(s):	Lidija Globevnik, Maja Koprivsek, Luka Snoj
title:	MARS spatial database - European data base for management of water resources under multiple stress
year:	2016
version:	2

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comments:	The use of the content for commercial or non-commercial purposes is permitted free of charge, provided that the source is acknowledged.

General data specifications

regional coverage of the dataset:

scale of the dataset:	continental
continents:	Europe

spatial extent (bounding coordinates):

southernmost latitude [°]:	33.727485
northernmost latitude [°]:	71.185599
westernmost longitude [°]:	-24.533308
easternmost longitude [°]:	42.642135
minimum altitude:	-10 metres
maximum altitude:	4442 metres
countries:	Europe: Åland Islands, Albania, Andorra, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Gibraltar, Greece, Guernsey, Hungary, Iceland, Ireland, Isle of Man, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Moldova, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Russia, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom, Vatican City, Kosovo
comments:	EU-28 + NO, IS, CH, LI, AD, RS, BA, AL, MK, ME and XK + Turkey (without Euphrates and Tigris River basins) + part of Syria and Lebanon (Asi River basin) + parts of Russia (Pregolya, Daugava, Neva, Oulujoki, Kovda and

Lotta River basins), Belarus (Daugava, Neman, Vistula River basins), Ukraine (Danube and Vistula River basins), Moldova (Danube River basin)
Some layers (feature classes) are not covering all the countries listed above.

world climatic regions according to Köppen:
Group B: dry (arid and semiarid) climates
Group C: temperate/mesothermal climates
Group D: continental/microthermal climate
Group E: polar climates
Group H: alpine climates

freshwater ecoregions of the world (FEOW) according to WWF:
Europe: Aegean Drainages, Barents Sea Drainages, Cantabric Coast - Languedoc, Central & Western Europe, Central Anatolia, Dalmatia, Dniester - Lower Danube, Eastern Iberia, Gulf of Venice Drainages, Iceland - Jan Mayen, Ionian Drainages, Italian Peninsula & Islands, Lake Onega - Lake Ladoga, Northern Anatolia, Northern Baltic Drainages, Northern British Isles, Norwegian Sea Drainages, Orontes, Southeastern Adriatic Drainages, Southern Anatolia, Southern Baltic Lowlands, Southern Iberia, Thrace, Upper Danube, Vardar, Western Anatolia, Western Iberia, Western Transcaucasia

European ecoregions according to Illies (WFD):
Iberic-Macaronesian Region (ER1), Pyrenees (ER2), Italy, Corsica and Malta (ER3), Alps (ER4), Dinaric Western Balkan (ER5), Hellenic Western Balkan (ER6), Eastern Balkan (ER7), Western Highlands (ER8), Central Highlands (ER9), The Carpathians (ER10), Hungarian Lowlands (ER11), Pontic Province (ER12), Western Plains (ER13), Central Plains (ER14), Baltic Province (ER15), Eastern Plains (ER16), Ireland and Northern Ireland (ER17), Great Britain (ER18), Iceland (ER19), Borealic Uplands (ER20), Tundra (ER21), Fenno-Scandian Shield (ER22), Taiga (ER23), The Caucasus (ER24)

ecosystem type: rivers, lakes/ponds, groundwater, coastal areas

comments: Different datasets are covered by different data frame. Most pressure and state data are for year 2010. Climatological data are from periods 1961-90, 1950-2000 and 2001-2010.

Site specifications

coordinate system/grid data: projected, others others: ETRS89_LAEA
datum (e.g. WGS84): D_ETRS_1989
grid data available: yes
resolution: 1
unit: km
comments: Grid data are available for climatological data, land cover data, altitude as well as slope, population density and population count. Data of different spatial resolutions are resampled on 1 km grid.

number of sites: >1000

comments: There are different numbers of sites in different layers (feature classes), for example: 16694 WISE SoE rivers quality stations, 26794 UWWTD discharge points, 5043 dams, 15016 E-PRTR facility report points. All compiled data have been linked to the ECRINS catchment and river network system when possible.

Climate and environmental data

climate related data:

spatial resolution of the data (if not catchment/site related):
1 km

others: Data are available per catchment (FEC and hinterland) and in grid (in different original resolutions depending on the source and resampled to 1 km grid).

available parameters per catchment:

mean annual temperature January, July
data source: WorldClim v1.4, JRC Agri4cast

minimal, maximal and mean winter and summer temperatures
data source: WorldClim v1.4, JRC Agri4cast

mean annual precipitation
data source: FAO, WorldClim v1.4,The British Atmospheric Data Centre, JRC Agri4cast

winter and summer precipitation
data source: GPCC,The British Atmospheric Data Centre, JRC Agri4cast

environmental data:

available parameters per catchment:

catchment size
data source: ECRINS v1.1

catchment geology
data source: BGR - IHME 1500_v11, JRC - SGDBE4, WFD reporting, WRc

catchment land cover/land use
data source: CLC2006 v17, CLC2000Greece, GlobCorine2009, EEA Copernicus land cover/land use

population density
data source: EEA, Population density disaggregated with CLC2000, SEDAC Gridded Population v3

presence of barriers/dams/reservoirs (fragmentation)
data source: ECRINS v1.1, ESRI basemap

hydrological regime/flow regime
data source: PCR-GLOBWB (DELTARES, NL)

available parameters per site:

catchment land use upstream of sampling site
data source: CLC2006 v17, CLC2000Greece, GlobCorine2009, EEA Copernicus land cover/land use

catchment land use along a buffer strip (100m width on both sides) upstream (10km) of the sampling site
data source: CLC2006 v17, CLC2000Greece, GlobCorine2009,EEA Copernicus land cover/land use

river length
data source: ECRINS v1.1

distance to source
data source: ECRINS v1.1

distance to mouth
data source: ECRINS v1.1

stream order (according to Strahler)
data source: ECRINS v1.1

slope
data source: EU DEM
altitude
data source: EU DEM
discharge
data source: GRDC - EWA

physico-chemistry data: total P, ortho P, nitrate, total N, ammonium, hardness, TOC (total organic carbon), oxygen content, BOD5 (biochemical oyxgen demand), water temperature, pH, conductivity, chlorophyll, Secci disc depth, suspended solids

other physico-chemical parameters:
chemical oxygen demand, dissolved organic carbon, dissolved oxygen, Kjeldahl nitrogen, silicate

availability of physico-chemical data, if there is more than one sample per site:
mean values per site

comments: These are yearly average data measured at WISE SoE quality stations. For catchments (FEC) we have calculated nitrogen and phosphorus inputs in tonne per year.

stressors influencing the sites:

reference sites available: no

stressor	restored sites available	data before/after restoration available	stressor gradient available	comments
eutrophication	no	no	no	TotP, total N, orthophoshate concentrations
hydromorphological degradation	no	no	no	alteration of natural riparian habitats
organic pollution	no	no	no	represented by BOD5, ammonium and nitrates
general degradation	no	no	no	EQR of invertebrates, EQR of macrophytes
hydrologic stress (e.g. impoundment, flow velocity reduction, hydropeaking, water abstraction, flow velocity increase)	no	no	no	flow alteration ratio (abstraction/no abstraction)

comments: Proxy stressors for eutrophicaton are also: 1) share of agricultural land in catchment (upstream drainage area), in local drainage area (FEC = functionally elementary catchment) and along the river (buffer/strip area), 2) level of urban waste water treatment, 3) population density and 4) data on agricultural activities such are total yearly input of N and P (tonnes/year).

Other specifications

GIS layers, shapes related to the dataset:

hydrological information (as HydroSHEDS)
catchments, river-sub-basins
land use

	dams/reservoirs/barriers protected areas population density environmental variables (freshwater or terrestrial) climatic variables (current and predictions) others/specify
others (specify):	polygons: EUROSTAT NUTS, country borders, coastal line, WFD ecoregions (Illies), biogeographical regions (EEA, Habitat Directive), broad hydroregions (IC fish), hydro ecoregions (Rebecca project), WWF hydro regions point objects: WFD surface water bodies (2010), WFD groundwater bodies (2010) WISE SoE stations, EFI+ stations
availability of photos:	no
availability of maps:	yes
quality control procedures:	
Were any quality control procedures applied to your dataset?	
	yes
quality control protocols and comments:	
	When linking point pressure/state data to ECRINS hydrological catchments and river network data, spatial quality checks were performed as well as attributive QA checks (river name check, (sub)catchment check).

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Appendix

Example layer from MARS spatial database

Figure below shows layer of FECs coloured by broad river type. Each FEC has been assigned one representative river broad type (delegated from a river segment that represents FEC outflow). Number in legend represents broad river type as defined by ETC/ICM (2015).