Modelling best management practices for reducing nutrient losses from agricultural catchments under different climate trajectories.

Download data

Geospatial information.zip *(96.67 MB)*

HYPE_model.zip *(27.92 MB)*

outputs_and_data_analysis.zip *(373.56 KB)*

Associated documentation

Documentation_dataset.pdf *(270.34 KB)*

Download all files

2023-105-1-1.zip *(~125.22 MB)*

Citation

Wynants, M. (2024) Modelling best management practices for reducing nutrient losses from agricultural catchments under different climate trajectories (Version 1) [Data set]. Swedish University of Agricultural Sciences. Available at: https://doi.org/10.5878/3j5c-yh37

Alternative title

How to achieve a 50% reduction in nutrient losses from agricultural catchments under different climate trajectories?

Creator/Principal investigator(s)

Maarten Wynants - Swedish University of Agricultural Sciences, Department of Soil and Environment

Research principal

Swedish University of Agricultural Sciences - Department of Soil and Environment

Principal's reference number

SLU.mark.2023.4.4.IÄ-1

Description

This dataset contains all the geospatial information and HYPE inputs and outputs related to the publication of "How to achieve a 50% reduction in nutrient losses from agricultural catchments under different climate trajectories?".

In this study, we build high-resolution geospatial data to build a semi-distributed water quantity and water quality model for two Swedish Agricultural Catchments in Hydrological Predictions of the Environment (HYPE). We calibrated and validated the model using discharge and water quality monitoring data from the streams in our study sites.
We subsequently used the calibrated model to forecast the impacts of climate change on nutrient

(Inorganic Nitrogen and Total Phosphorus) loads under three relative concentration pathways (RCP2.6, RCP4.5, and RCP 8.5) and three periods (2022-2035, 2050-2065, and 2085-2100). Finally, we backcasted a 50% reduction in nutrient loads using catchment mitigation scenarios (20% reduction in fertilisation, increasing in floodplain area, implementation of cover crops). This dataset contains all the monitoring data, model inputs (including parameterisation), and the model outputs. Moreover, it contains the R scripts with summary statistics and plotting and the summarised outputs of all model runs in csv files.

The dataset contains three folders.
1. The Geopatial Information folder contains all the geospatial data for both study catchments. These include land cover, soil, DEM, and finally the Soil Land Cover maps, which were used to build the HYPE models. The coding of the geospatial shapefiles and raster files can be found in the Readme document.
2. The HYPE_model folder contains all of the HYPE model building blocks necessary to run the calibrated model for Hestadbäcken and Tullstorpån in seperate folders. It also contains the goodness-of-fit outcomes for both the calibrated model and the validation period. This folder also contains the future climate forecasts and the different mitigation scenario testing outcomes.
3. The outputs_and_data_analysis folder contains csv files with all of the model outcomes for IN, TP, and Q in both catchments for all combinations of RCP, period, and climate models. It also contains R scripts used to calculate trends, summary statistics, t-tests, and plot the figures. Moreover, it contains the outcomes of the percentages of change, correlation tests, and t-tests.

Data contains personal data

No

Language

English

Time period(s) investigated

2010 – 2099

Data format / data structure

Numeric

Text

Geospatial

Data collection 1

- Description of the mode of collection: Water quality modelling
- Time period(s) for data collection: 2010 – 2099
- Temporal resolution: 1 day

Geographic spread

Geographic location: Östergötland County, Skåne County

Geographic description: Hestadbäcken catchment is located in central east Sweden (Östergotland), and Tullstorpsån catchment is located in south Sweden (Skåne). Both study catchments are agriculturally-dominated, but differ in size, cropping regimes, rainfall, and soil type. Tullstorpån is larger overall, but also has a higher percentage of cropland with significant amounts of root crops and spring crops besides its dominant autumn crops. The soils are mostly loamy, with smaller pockets of

moraine. Hestadbäcken is smaller and is dominated by autumn crops cultivated on clay soils. It also has larger areas of forest and pasture, which are mostly developed on the moraine soils. Tullstorpån is on average wetter and warmer compared to Hestadbäcken, which has less rainfall and a larger temperature range.

Responsible department/unit

Department of Soil and Environment

Other research principals

SMHI - Swedish Meteorological and Hydrological Institute

Contributor(s)

John Livsey - Swedish University of Agricultural Sciences, Department of Soil and Environment

Magdalena Bieroza - Swedish University of Agricultural Sciences, Department of Soil and Environment

Lukas Hallberg - Swedish University of Agricultural Sciences, Department of Soil and Environment

Funding 1

- Funding agency: Swedish Research Council for Environment Agricultural Sciences and Spatial Planning
- Funding agency's reference number: 2018-00890
- Project name on the application: Two-stage ditches in Sweden – from improved process understanding to reducing eutrophication

Funding 2

- Funding agency: Stiftelsen Oscar och Lili Lamms Minne
- Funding agency's reference number: DO2019-0021
- Project name on the application: Why eutrophication mitigation measures show mixed success in reducing nutrient and sediment losses?

Funding 3

- Funding agency: Baltic Waters
- Project name on the application: Långsiktig och högfrekvent vattenkvalitetsövervakning

Funding 4

- Funding agency: Swedish Farmers' Foundation for Agricultural Research
- Funding agency's reference number: O-21-23-617
- Project name on the application: Åtgärder i jordbruksdiken i Sverige: utvärdering av ekologisk och kemisk status och vattenkvalitet på avrinningområdesnivå i nuvarande och framtida klimat

Research area

Environmental sciences (Standard för svensk indelning av forskningsämnen 2011)

Physical geography (Standard för svensk indelning av forskningsämnen 2011)

Oceanography, hydrology and water resources (Standard för svensk indelning av forskningsämnen 2011)

Soil science (Standard för svensk indelning av forskningsämnen 2011)

Farming (INSPIRE topic categories)

Environment (INSPIRE topic categories)

Keywords

[Water quality](#), [Forecasting](#), [Modelling](#), [Environmental monitoring facilities](#), [Hydrography](#), [Land cover](#), [Land use](#), [Soil](#), [Hydrological predictions of the environment](#), [Backcasting](#), [European green deal](#), [Diffuse nutrient pollution](#), [Catchment mitigation](#)

Publications

Maarten Wynants, Johan Strömqvist, Lukas Hallberg, John Livsey, Göran Lindström, Magdalena Bieroza. 2023. How to Achieve a 50% Reduction in Nutrient Loads from Agricultural Catchments under Different Climate Trajectories? ESS Open Archive . In Review.
DOI: https://doi.org/10.22541/essoar.168748397.79326603/v1

If you have published anything based on these data, [please notify us](#) with a reference to your publication(s). If you are responsible for the catalogue entry, you can update the metadata/data description in DORIS.

Point (Lon/Lat)

13.312268999987, 55.450292

Point (Lon/Lat)

13.40982099995, 55.385913

Point (Lon/Lat)

13.445678999997, 55.384086

Point (Lon/Lat)

15.992883999948, 58.487729

Accessibility level

Access to data through SND
Data are freely accessible

Use of data

[Things to consider when using data shared through SND](#)

License

[CC BY-NC 4.0](#)

Versions

Version 1. 2024-04-11

Contact for questions about the data

Maarten Wynants

maarten.wynants@slu.se

Download metadata

[DataCite](#)

[DDI 2.5](#)

[DDI 3.3](#)

[DCAT-AP-SE 2.0](#)

[JSON-LD](#)

[PDF](#)

[Citation (CSL)](#)

[File overview (CSV)](#)

Published: 2024-04-11