

TRANS4NUM HACKATHON · AARHUS · 22-23 OCTOBER 2026

Ask Jackdaw



Jackdaw in one picture



Chat

Ask in plain language.
Get numbers, tables
and files back.



Map

Draw your area. See
results as layers you
can style.



Data

Fields, crops, soils,
nitrogen retention,
peat, nature value,
water bodies.



Documents

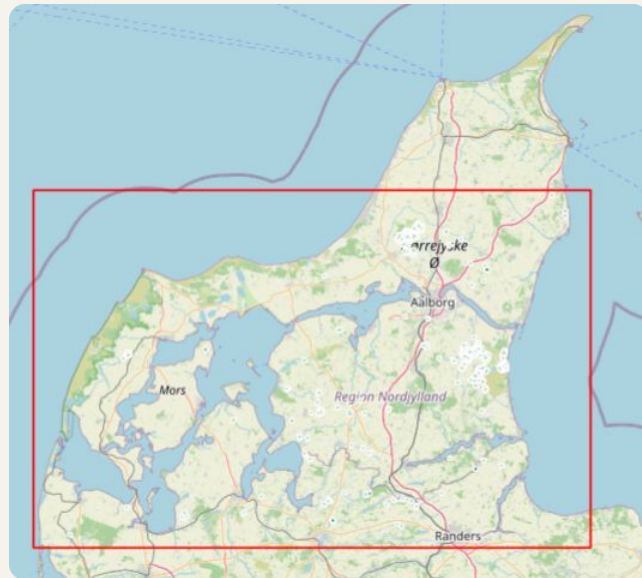
Project reports the
assistant can read and
quote.

On top: ready-made analysis for the nitrogen task
...and some more knowledge sources just in case

How to start

1. Draw an area on the map
2. Ask a question in the chat
3. Read the answer, press Show on map
4. Change a value in the form, press Run

Tip: one box around the whole fjord gives results for the whole Limfjord.



Find out what is out there



In this area

Datasets and documents available in the area you drew.



Explore datasets

A short form that turns a search into a question for the assistant.



Datasets

The datasets used in this conversation, ready for analysis.

Buttons under the chat box. Draw an area first.

🕒 Conversation history 18 + New chat



Area selected

Ask a question in the box below.

Try an example:

NbS field classes

Grass-clover scenario

N-reduction mix

Retention data cube

Map low-retention fields

Ask a question about this area.



Press Enter to send, Shift+Enter for a new line

 **In this area**  Connect MCP Server

Available in this area 17

Vector datasets 6

 **Limfjord crop rotations**
Limfjord Denmark crop
+3

 **Kystvandoplande_catchments**

 **Agricultural fields of Denmar...**
2020-01-01 - 2020-12-31

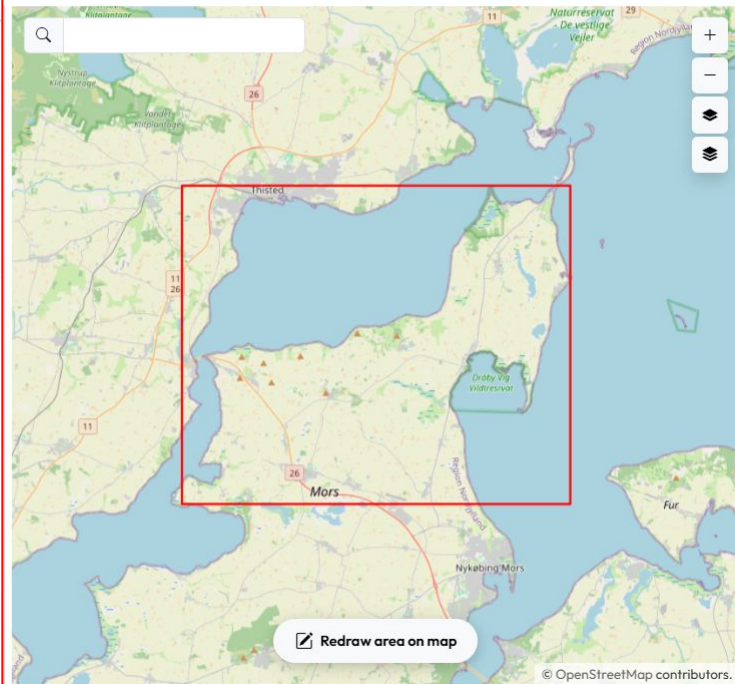
 **Agricultural fields of Denmar...**
2022-01-01 - 2022-12-31
fields crops agriculture
+1

 **Agricultural fields of Denmar...**
2024-01-01 - 2024-12-31

 **Agricultural fields of Denmar...**
2026-01-01 - 2026-12-31
fields crops agriculture
+1

Raster datasets 1

 **CORINE Land Cover 2018 (CL...**
1 band



Vector datasets 6

 **Limfjord crop rotations** 
Limfjord Denmark crop
+3

 **Kystvandoplande_catchments** 

 **Agricultural fields of Denmar...** 
2020-01-01 - 2020-12-31

 **Agricultural fields of Denmar...** 
2022-01-01 - 2022-12-31
fields crops agriculture
+1

 **Agricultural fields of Denmar...** 
2024-01-01 - 2024-12-31

 **Agricultural fields of Denmar...** 
2026-01-01 - 2026-12-31
fields crops agriculture
+1

Raster datasets 1

 **CORINE Land Cover 2018 (CL...** 
1 band

Document collections 10

 **Assessment of Decision Suppo...** 

2026-01-01 - 2026-12-31

fields crops agriculture

+1

Contains Danish agricultural fields (Marker) notified to the Danish Agency for Agriculture for the 2026 application year. It covers crop type, declared area...

Show more

MULTIPOLYGON · 98022 features

afgkode afgroede gb gbanmeldt hmv_pct5 imk_areal jb_kode jordtype kan_soges kystvandid kystvandna kystvandso marknr peat_fid 

Share (%) of the field on peaty lowland with more than 12% soil carbon (Toerverig lavbund 2024, Landbrugsstyrelsen)

src_fid 

+ New chat

Deliverable D3.3 DST. Report on the assessment of Decision...
1 document

 **Turning nutrient challenges int...** 
Insights from the second year of practice testing circular crop...
1 document

 **trans4num practice abstracts** 
Project factsheets and short notes on nature-based solution...
8 documents

 **CIRKULÆR agricultural flow m...** 
Peer-reviewed results from the CIRKULÆR static flow model fo...
1 document

Remote sensing for agricultura... 
Review of satellite and remote-sensing uses for a shift to more...
1 document

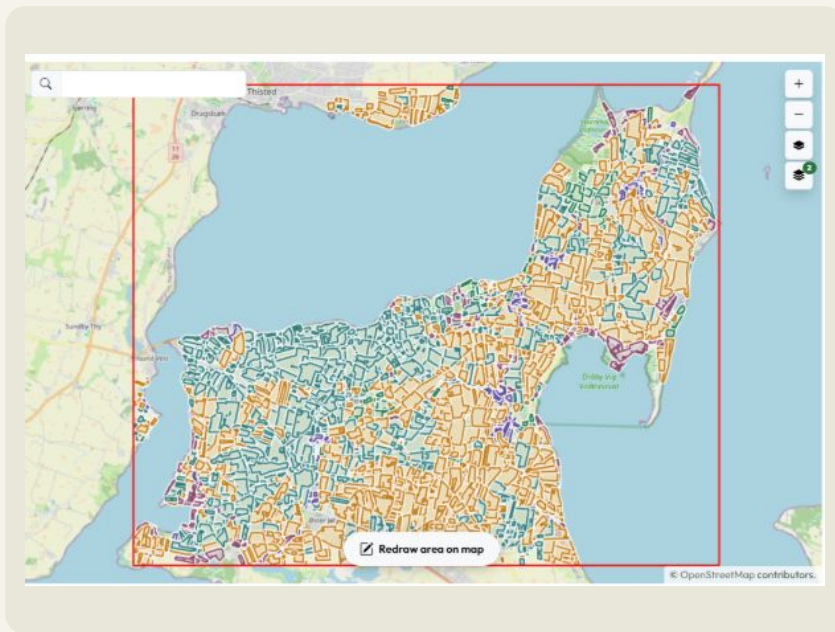
Nitrogen responsibility beyond... 
Two papers on nitrogen responsibility outside the field...
2 documents

 **AKIS and value chains for nutri...** 
Deliverable D2.4 on how Agricultural Knowledge and...

Review of satellite and remote-sensing uses for a shift to more sustainable farming and nature-based solutions. Use for what the literature says remote sensing can monitor: nutrient management, nitrogen leaching, crop and land-cover mapping, environmental impacts of production, and food security, and for the stated limits of accuracy, data integration, and scale. This is a methods review, not a measurement for the current map area and not the project satellite-monitoring factsheet.

Explore the data

- Ask for counts, averages or lists in your area
- Fields: crops, soil, nitrogen retention, nature value, peat
- Build a data cube: gridded layers for your area to filter and summarise
- Results come as a table, a map layer and a CSV download



ME:

Can you check how median retention changed for each soil type in between year 2024 and 2026

JACKDAW:

Median retention changed as follows in the current Morsø map area:

Soil type	2024 median	2026 median	Change
Fin sandblandet lerjord	66.3	65.4	-0.9 percentage points
Lerjord	62.8	65.4	+2.6 pp
Grov sandblandet lerjord	62.8	66.6	+3.8 pp
Humusjord	55.4	65.4	+10.0 pp
Grov lerblandet sandjord	66.3	73.0	+6.7 pp
Fin lerblandet sandjord	55.4	66.6	+11.2 pp

Main finding: median retention increased for five of the six soil types. The only decrease was for

Ask a question about this area...

Press Enter to send, Shift+Enter for a new line

In this area Connect MCP

Agricultural fields of Denmark 2024

Single colorCategoriesNatural breaksColor range

Style bynitrogen_retention

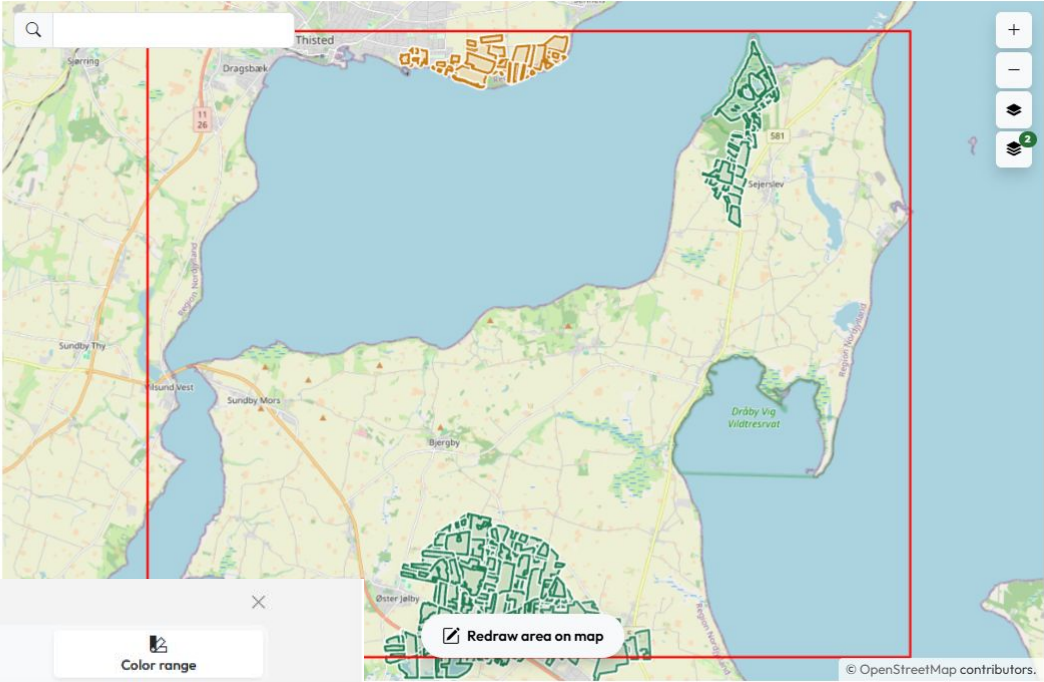
74,4485,2

Agricultural fields of Denmark 2026

Single colorCategoriesNatural breaksColor range

Style bynitrogen_retention_pct

75,8585,5



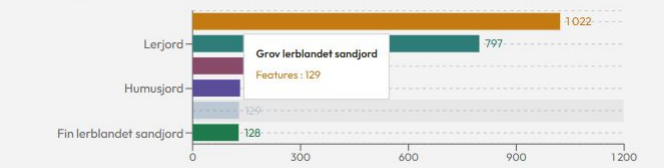
Download result (CSV)

Agricultural fields of Denmark 2024

Single color Categories Natural breaks Color range

Style by soil_type Chart

Bars Number of features



Click a bar to hide or show it on the map.

Fin lerblandet sandjord Fin sandblandet lerjord Grov lerblandet sandjord

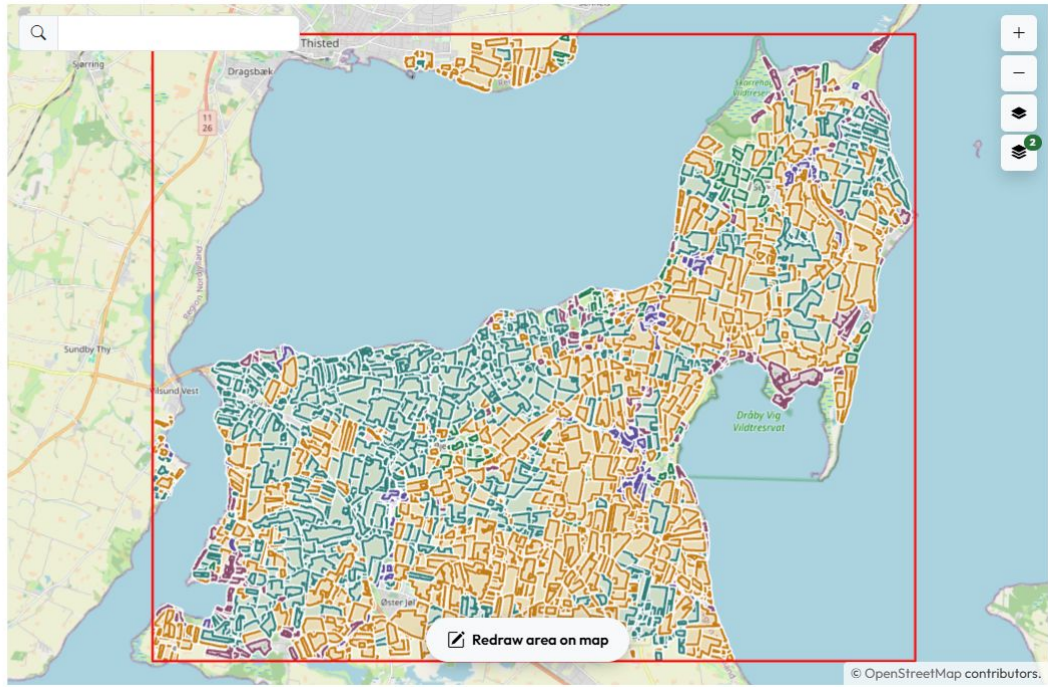


Ask a question about this area...



Press Enter to send, Shift+Enter for a new line

In this area Connect MCP Server



Limfjord – what you can ask

You ask	You get
What are my options here?	Which fields suit which measure, and how much land it is
What happens if we do this?	Hectares, nitrogen kept from the sea, cost and where
How do we reach our goal?	A cheap combination of measures and what it costs
Where does it work best?	Maps and charts by measure and water body
What does the research say?	Answers quoted from the project reports

Just ask in plain language. You do not need to pick a tool.

Ask the documents

- The assistant searches project reports and answers with what they say
- Good for evidence: payments, value chains, trade-offs
- Numbers for your area come from the tools, not from the documents

“What does the ADAPtES study say about the area payment?”

ADAPtES: grass-clover value chains

Scenario results and a policy brief for the Limfjord.

trans4num D3.3: DST assessment

How the Decision Support Tool works in nature-based solution sites.

Three ways in

Explore

I wonder what is possible

Ask for the options. You get the measures, the area and the nitrogen each could give.

Test

I have an idea

Describe one measure and which fields. You get hectares, nitrogen, cost and where.

Plan

I have a goal

Give tonnes or a budget. You get a cheap combination of measures and where they apply.

Each answer can be shown on the map, and you can change the settings and run it again.

What are my options?

“What are my options for cutting nitrogen losses from farmland in this area?”

Catch crops on sandy soil

1,088 t

nitrogen per year

140,800 ha with high retention

Catch crops on clay soil

389 t

nitrogen per year

51,000 ha

Perennial grass, sandy low-retention fields

178 t

nitrogen per year

7,200 ha

Rewetting peat soils

25 t

nitrogen per year

1,500 ha, also helps climate and nature

If every matching field were converted. A first overview, before costs and what farmers will do.

Figures from the test data, estimates

Test an idea

“What happens if we convert sandy, low-retention fields to perennial grass?”

7,183

hectares affected

178 t

nitrogen kept from
the sea per year

€3.1 M

cost per year

And where: Løgstør Bredning 51 %, Nibe Bredning 34 %, Hjarbæk Fjord 14 %

Not happy? Change a setting in the form and press Run.

▼  Adjust the scenario

New land use

Wetland / rewetting

Crops to convert

☒ Spring cereals ☒ Winter cereals ☒ Rapeseed ☒ Maize ☒ Potato ☒ Pulses

Maximum retention 100 %

Soil classes (none = all)

☐ JB 1 ☐ JB 2 ☐ JB 3 ☐ JB 4 ☐ JB 5 ☐ JB 6 ☐ JB 7 ☐ JB 8 ☒ JB 11 (humus)

Maximum share of field with high nature value (HNV above 5) 100 %

Hectare cap (lowest retention first) (ha)

not set

Cost per hectare (overrides margin loss) (EUR/ha)

not set

 Run with these settings

Find a plan for a goal

- Set a goal: tonnes of nitrogen per year, or a budget
- Add your rules: a minimum payment, avoid nature-value fields, which measures may be used
- You get a cheap combination of measures, where it applies and what it costs

“Cut 1,500 tonnes of nitrogen a year, avoiding high nature value fields, with at least 200 euro per hectare.”

54,000 ha

mostly reduced-input grass

€11.5 M

cost per year, about €7.6 per kg of
nitrogen

1,500 t

nitrogen kept from the sea per year

“What happens if we do this?”

Every number comes from four steps

1 Group the fields

Fields in the area are grouped by water body, crop and soil class. For each group: hectares, average retention, number of fields.

2 Look up leaching

DST tables: kg N leaching from the root zone per ha and year, for the old crop and for the new land use.

3 Nitrogen to the sea

$(\text{leaching before} - \text{after}) \times (1 - \text{retention} \div 100)$. Retention is the share the soil removes on its own.

4 Cost per hectare

Gross-margin loss from the DST margin table ($\text{DKK} \div 7.46 = \text{EUR}$), never below zero. A payment floor can raise it.

Example: winter cereal on sand, retention 37 %. Leaching 62 → 30 kg, saves $32 \times 0.63 = 20$ kg N/ha. Margin $10,500 - 6,300 = 4,200$ DKK = 563 EUR/ha → about 28 EUR per kg N.

the DST tables

Values per hectare and year, crop X after crop X (the diagonal of the DST transition tables)

Crop or land use	Leaching sand	Leaching clay	Margin sand	Margin clay
Winter cereal	62	52	10,500	11,800
Spring cereal	60	55	8,300	9,200
Rapeseed	74	59	9,600	9,700
Maize	93	68	7,800	8,200
Potato	94	69	13,300	13,600
Pulses	55	54	6,600	6,700
→ Perennial grass	30	5	6,300	6,700
→ Reduced-input grass	8	5	7,900	8,000
→ Extensive fallow	20	6	2,500	2,500
→ Winter cereal + catch crop	35	28	10,000	10,400
→ Spring cereal + catch crop	39	29	8,600	8,600

How to read it

Leaching: kg N per ha and year.
Margin: DKK per ha and year.

Sand = soil classes JB 1–4, clay = JB 5–8. The DST has no peat class, so peat and humus soils use clay values.

Cost of a change = margin before – margin after, in EUR.

Catch crops on other crops use the average cereal reduction (about 39 % on sand, 47 % on clay).

"How do we reach our goal?"

Filling the basket with the cheapest nitrogen first

1

Make the offers

Fields are grouped by crop, soil, water body and retention band. For each group and each allowed land use: kg N saved and cost per ha, as on the previous slide.

2

Price every offer

Cost per kg N = cost per ha ÷ kg N saved per ha. The payment floor (for example 200 EUR/ha) is the lowest cost per ha.

3

Take the cheapest first

Offers are sorted by EUR per kg N. Each group is used once, with one land use. The last group is taken only in part.

4

Stop at the goal

The plan stops at the target (t N per year) or the budget, whichever comes first, and reports what it reached.

The result is a targeting rule (what kind of fields get which measure), not a list of farms. Cost 0 means the DST margins favour the change, not that it is free.

where each number comes from

What is measured, what is a table, what is an assumption

Field data (measured or modelled)

Crop and soil class of each field, nitrogen retention, share of high nature value, share on peat, water body.

DST tables (trans4num project)

Leaching and gross margin per crop and soil, sand and clay only. Margin unit assumed to be DKK/ha, converted at 7.46 DKK per EUR.

Rules we set

Payment floor 200 EUR/ha (ADAPtES). Catch crops skip rapeseed and maize with grass. Wetland = fields at least 50 % on peat.

Placeholders you can change

Wetland: 10 kg N/ha leaching after rewetting and 600 EUR/ha per year. Not DST values. Type your own in the form.

Goal figures: 13,000 t N national goal $\times$ 28 % = 3,640 t for the Limfjord; 1,500 t is the site share. All results are estimates.

Why results can differ

The payment you assume

Without a minimum payment the same goal looks almost free on paper. At €200 per hectare it needs about 52,400 ha and €10.8 M.

Which fields count

Soil type, how much nitrogen the soil holds back and nature-value limits decide which fields are included.

The area you drew

The whole fjord or one bay gives different totals. Each answer says how much of the Limfjord is inside your box.

An idea is not a plan

Testing one measure and planning for a goal answer different questions, so the numbers differ.

Every answer lists the settings it used, so you can compare like with like.

What the numbers are, and are not

- Estimates from tables: good for comparing options, not forecasts
- Every selected field is assumed to change: a potential, not what farmers will do
- A cost near zero on paper does not mean free
- The map shows where a measure applies, not which farms
- No data yet for buffer strips, lowland wetlands or Natura 2000
- Wetland cost and nitrogen effect are placeholders: type your own

Play with the assumptions

Change this	To see
Minimum payment per hectare	What the same goal costs
Nature-value limit	Which fields stay out
Soils, crops, nitrogen leakiness	Where the effect is largest
One water body	A focus on one bay
A cap on hectares	How fast the benefit grows
Your own wetland cost	What rewetting would give

Type it in the chat, or change it in the form under the answer and press Run.

Try these questions

What happens if we convert sandy low-retention fields to perennial grass?

Cut 1,500 tonnes of nitrogen a year, avoiding high nature value fields, with at least 200 euro per hectare.

Show me on the map.

Focus on Nibe Bredning only.

What if we rewet the peat fields, assuming 800 euro per hectare?

What does the ADAPtES study say about the grass-clover value chain?

Other tools you may run into

Background lookup (Wikipedia)

A short explanation of a general concept, place or policy, with the page link. Background only, never about your area's data.

Statistics (Eurostat)

Official regional figures: population, density, business. Also national fertiliser use and nutrient balance.

Your own files

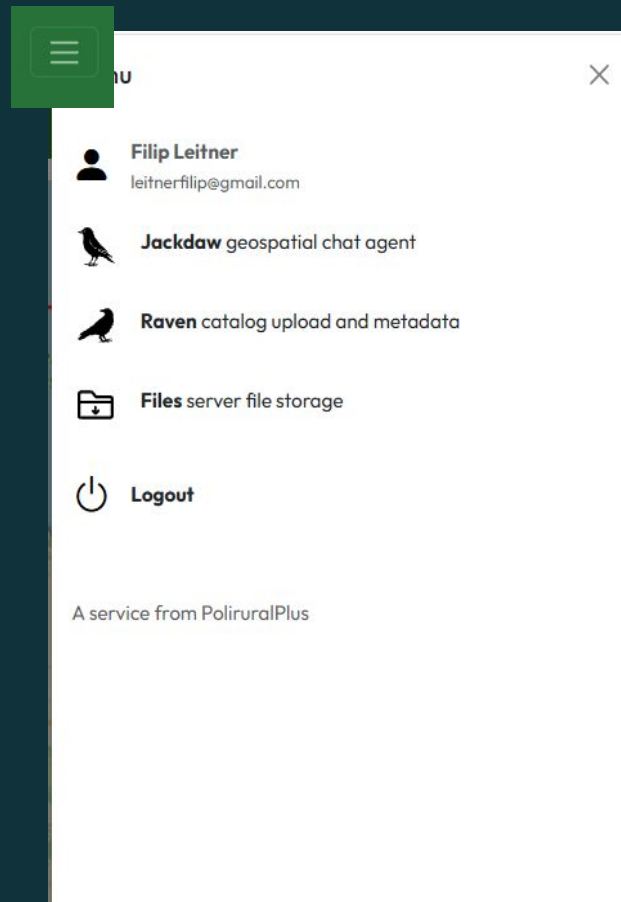
Upload a document and ask questions about it. The assistant reads and quotes it.

"What can you do here?"

Ask the assistant which tools and data fit your area.

Your own files – Raven

- stores, organizes, and exposes local data so an AI assistant can use it.
- from your point of view
 - a. knowledge base = documents (pdf, markdown, docx)
 - b. spatial vector data (shp, geojson) + optionally documents.
 - c. rasters - for datacubes



Vector upload

Upload a vector file to create a new dataset.



Click to browse or drag and drop

GeoJSON, KML, KMZ, ZIP Shapefile, GPKG

Supported: GeoJSON, KML, KMZ, zipped Shapefile, GeoPackage

Title *

Dataset title

Upload file

Datasets 16

Describe drafts, manage attachments, run embeddings for profiled datasets, edit metadata, or delete datasets.

Refresh

Title	Status	Updated	Features	Actions		
UAT_Bacau#39owner: 364	Ready	16h ago	93	Edit	Attachments	Delete
Monaghan Landscape Character Areas#6owner: 13	Ready	22. 6.	9	Edit	Attachments	Delete
Agricultural fields of Denmark 2025#37	Ready	18. 6.	616 406	Edit	Attachments	Delete
Points of interest Athens#36owner: 816	Ready	16. 6.	15	Edit	Attachments	Delete

Raven spatial data

New knowledge base

Title

e.g. Product documentation

Description

Brief description of the knowledge base

Visibility

Public

Coverage ⓘ

No coverage

Open the map to draw an optional area, or leave it available everywhere.

Knowledge bases 1

Manage metadata, coverage, and documents for each knowledge base.

Title

Documents

Updated

Mosonmagyaróvár news

News and informations from Mosonmagyaróvár, Hungary

1

Just now

- upload vector spatial data of your choice
- geojson, gpkg, shp (zipped)
- current limit of about 1gb per user total
- 100mb per file
- discoverable (from chat) for everyone, manage rights can be shared

Edit dataset

Agricultural fields of Denmark 2025 - #37 - manage metadata, attachments, sharing, and geometry

← Back

Metadata

Attachments

Access

Geometry

Title *

Agricultural fields of Denmark 202!

Tags

fields, crops, agriculture, Denmark

Description *

This collection is comprised of agricultural fields ("Marker") which are an extract of fields notified to the Danish Agency for Agriculture from the most recent application year (2025 in this case)

For best search quality, describe the dataset in English and/or in the language people are expected to query in.

Temporal coverage *

☐ Unknown / N/A

☒ Specify range

From (year-month)

január 2025

To (year-month)

december 2025

Column descriptions

The system has suggested types where it could. Add or edit descriptions, change types, or remove columns you don't want to track in the catalog - the data stays in the table.

Column	Type	Description	Semantic type	Unit	
a.fgkcode	numeric	Crop code	measure	e.g. m, krr	
a.fgroede	character varying	Crop name	name	e.g. m, krr	
gb	numeric	If basic payment is applied	measure	e.g. m, krr	
gbanmeldt	numeric	Area eligible for basic paym	measure	e.g. m, krr	

Spatial data

Knowledge bases

Raven spatial data

New knowledge base

Title

- provide description for dataset so we can identify and pair it with users query.

Description

- The better the description the better explorability

Visibility

- Use expected language of queries

Public

- Duplicate into english to make

Coverage

No coverage limit

- describe attributes so we can read the data. "gb" doesn't ring the bell "whether basic payment is applied" does

Knowledge base

manage metadata, coverage, and documents for each knowledge base.

Title

Documents

Updated

Mosonmagyaróvár news

1

Just now

News and informations from Mosonmagyaróvár , Hungary

Raven knowledgebase

Collection of documents which assistant can use to answer questions from your own material — manuals, guides, reports, notes.

create + set coverage, upload documents, manage

chat queries which does not intersect coverage area won't have documents available

.pdf (no ocr), .txt, .md, .docx

New knowledge base

Title

e.g. Product documentation

Description

Brief description of the knowledge base

Visibility

Public

Coverage ⓘ

No coverage limit

Hide map ^



Create knowledge base

Knowledge bases ⓘ

Manage metadata, coverage, and documents for each knowledge base.

Refresh

Title	Documents	Updated	Actions
Mosonmagyaróvár news and current information News and informations from Mosonmagyaróvár, Hungary	1	4d ago	<button>Edit</button> <button>Documents (1)</button> <button>Delete</button>

Raven knowledgebase

Collection of documents which assistant can use to answer questions from your own material — manuals, guides, reports, notes.

create + set coverage, upload documents, manage

chat queries which does not intersect coverage area won't have documents available

.pdf (no ocr), .txt, .md, .docx

New knowledge base

Title

e.g. Product documentation

Description

Brief description of the knowledge base

Visibility

Public

Coverage ⓘ

No coverage limit

Hide map ^



Create knowledge base

Knowledge bases 1

Manage metadata, coverage, and documents for each knowledge base.

Refresh

Title	Documents	Updated	Actions
Mosonmagyaróvár news and current information	1	4d ago	Edit Documents (1) Delete
News and informations from Mosonmagyaróvár, Hungary			

Raven knowledgebase

- Write a clear description — it helps the assistant know when to use this knowledge base
- The better the description the better explorability
- Use expected language of queries
- Duplicate into english to make automatically updated after submitted changes however it can take few seconds to become available for chat

Manage knowledge base

Mosonmagyaróvár news and current information#1 - metadata, coverage, and documents

← Back

Metadata Documents (1)

Add documents



Click to browse or drag and drop

PDF, DOCX, TXT

Supported: PDF, DOCX, TXT

Upload document

Documents 1

Refresh

Filename	Size	Status	Actions
mosonmagyarovar-city-guide.md	11.7 KB	Ready	Delete

Raven knowledgebase

Metadata Attachments Access Geometry

- Write a clear description — it helps the assistant know when to use this knowledge base

- The better the description the better explorability

- Use expected language of queries

- Duplicate into english to make automatically updated after submitted changes however it can take few seconds to become available for chat

- Edit description/title

- Add new document

- Delete document

Manage knowledge base

Mosonmagyaróvár news and current information#1 - metadata, coverage, and documents

← Back

Metadata Documents (1)

Add documents



Click to browse or drag and drop

PDF, DOCX, TXT

Supported: PDF, DOCX, TXT

Upload document

Documents 1

Refresh

Filename	Size	Status	Actions
mosonmagyarovar-city-guide.md	11.7 KB	Ready	Delete