Deliverable 8: User Manual Aries4People

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DOCUMENT CHANGE LOG

Issue	Issue date	Pages affected	Relevant information
1.0	2023/12/20	All	Initial version, as input to webinar

ARIES for PEOPLE-EA Explorer users guide

ARIES for PEOPLE-EA Explorer

The ARIES for PEOPLE_EA Explorer is a web-based application built on the k.LAB Integrated Modelling Platform. The application has access to all information (data and models) available on the Integrated Modelling network, and provides a dedicated user interface to allow the pilot countries to easily access and test the output of the PEOPLE-EA project, funded by the European Space Agency, and developed by the ARIES team (BC3) in collaboration with the VITO team and using the OpenEO (Open Earth Observations) platform.

- *Background map (3)*

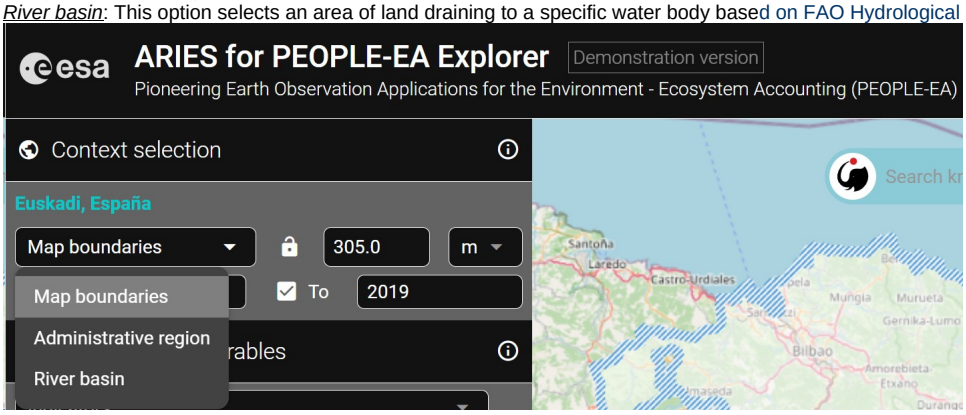
How to access the application

https://peopleea.integratedmodelling.org/modeler/?aries.peopleea.en

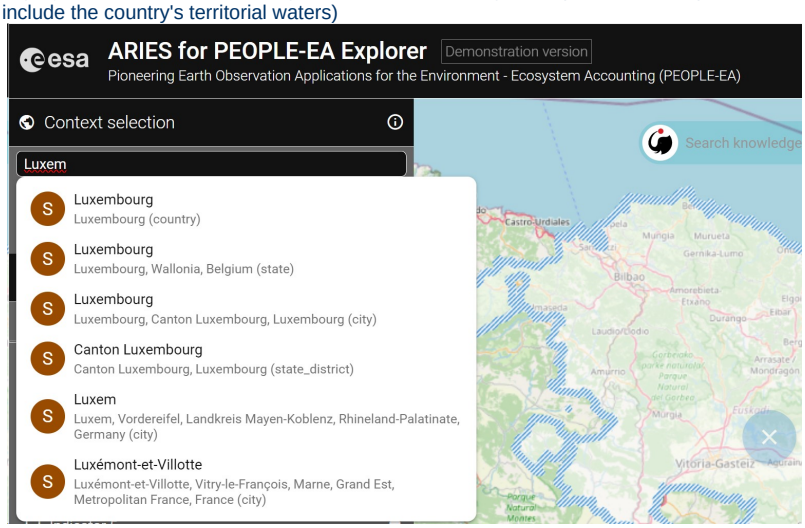
Spatial and temporal context of the analysis

At the top of the menu on the left side of the screen, you can specify the geographic area and temporal and spatial scale.

1. **Where**
   At the top of the panel, there a drop-down menu provides three options to select an analysis context by zooming and panning on the map. When the "administrative regions" or "river basin" option is chosen, the currently highlighted context will be outlined in light blue.
   a. *Map boundaries*: Select an area of interest by panning and zooming in/out. The entire area visible on the screen becomes your analysis context.
   b. *Administrative regions*: This option automatically identifies the largest administrative entity (e.g., Country or Subnational Unit) in the area selected, **according to the M49 standard endorsed by the UN.** By zooming in, the user can choose a smaller administrative region. We recommend this option for novice users, as it offers a simple way to identify standard administrative boundaries for ecosystem accounting.
   c. *River basin*: This option selects an area of land draining to a specific water body based on FAO Hydrological Basins (simplified).

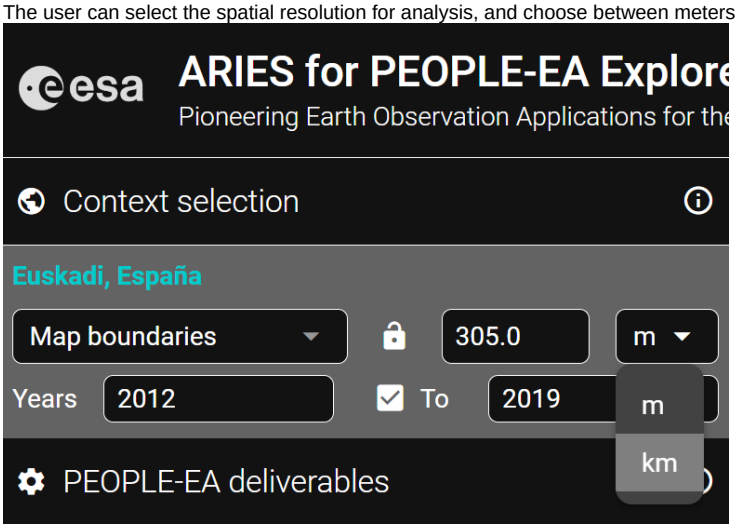


   d. Alternatively, the user can also *directly type the name of a geographical context* (i.e., country, region, city, or other geographic entity) in the ARIES for PEOPLE Search bar, starting with a capital letter.
   These names are queried from the OpenStreetMap (OSM) database. Users should be aware that OSM boundaries may differ slightly from those selected using the "Administrative regions" option of the drop-down menu (i.e. a context selected with this option include the country's territorial waters)



   e. Countries are warmly ***invited to provide their official boundaries*** in case the default options currently integrated in ARIES to identify geographical boundaries don not meet the expected NSO's specification.
2. **Spatial resolution**

The user can select the spatial resolution for analysis, and choose between meters or kilometers.



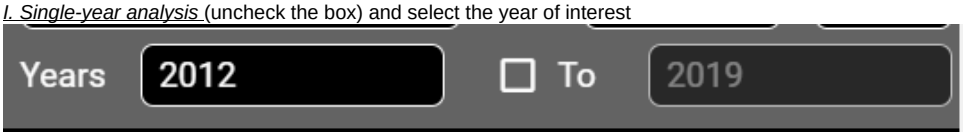
In case the resolution set is higher than the available input data, ARIES will compile accounts at the selected resolution, but based on the finest grained available data.

3. **When**

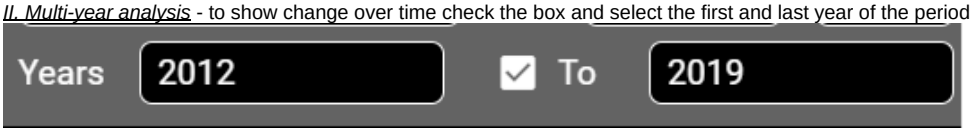
   Select the year(s) for your analysis. If data are missing for a specific year of interest, ARIES automatically fills gaps using the closest available year's data.

   By default, the context is set to a multi-year analysis.

   I. Single-year analysis (uncheck the box) and select the year of interest

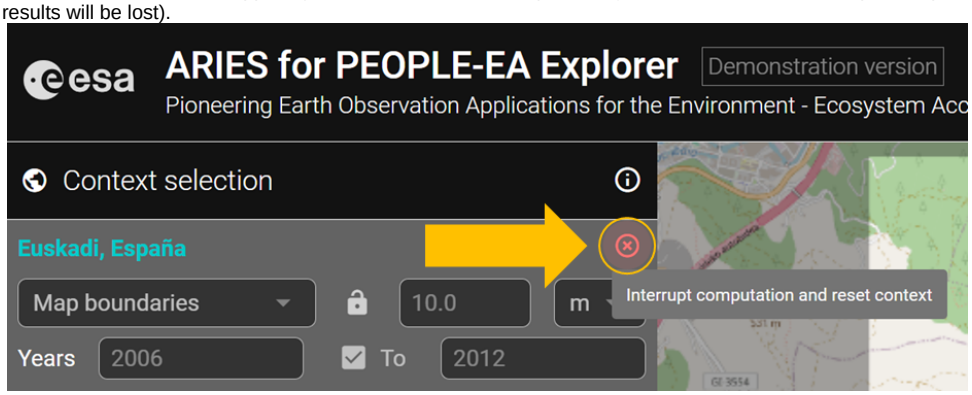


   II. Multi-year analysis - to show change over time check the box and select the first and last year of the period to analyze.



4. **Reset**

   The red "X" button on the upper right can be used to reset a previously selected context, or to stop a computation in progress (all computed results will be lost).



Forest ecosystem condition accounts

The Ecosystem Conditions accounts are composed of 3 main outputs:

- **Variable (descriptor)** = the **original** ecological measurement (**raw variable**) used to study a certain aspect of condition;
- **Indicator** = the **rescaled** ecological measurement **(raw variable)** to allow a consistent representation of the dimensions of the conditions captured in the variable. Reference values are used to determine good and bad values for a particular variable in the same type of forest (aka forest with similar characteristics), for the sake of comparing those results against other dimensions of condition in the same type of forest, or against results for the same variable in a different area.

- **Index** = the composite **weighted average of a set of indicators**, whose goal is to combine different information from several variables into a unique figure, representative of the overall condition of that type of forest in the area under analysis.

Forest ecosystem condition variables

The table below summarizes all the ecosystem condition metrics considered in the development of the Forest Conditions Accounts

> *The full list is still under development*

Ecosystem Typology Group	Ecosystem Typology Class	Typology class description	Variable	Variable description and link to dataset or DOI	Spatial Resolution	Spatial Extent	Temporal resolution/ coverage
A. Abiotic ecosystem characteristics	**A.1 Physical state**	Physical descriptors of the abiotic components of the ecosystem (e.g. Soil structure, impervious surface, water availability)	A1.1 Normalized Difference Water Index	GEE MODIS Terra Daily NDWI The Normalized Difference Water Index (NDWI) is sensitive to changes in liquid water content of vegetation canopies. It is derived from the Near-IR band and a second IR band, 1.24m when available and the nearest available IR band otherwise. It ranges in value from -1.0 to 1.0. See Gao (1996) for details. This product is generated from the MODIS /006/MOD09GA surface reflectance composites.	500m	Global	Daily 2000-2023
	A.2 Chemical state	Chemical composition of the abiotic ecosystem compartments (e.g. Soil nutrient concentration, air and water quality)	A2.1 Soil Organic Carbon	2003 OCTOP: Topsoil Organic Carbon Content for Europe - Organic carbon content in the first 30 cm of soil	1km	Europe	2003
				2014 LUCAS: Topsoil Soil Organic Carbon (LUCAS) for EU25 - Organic carbon content in the first 30 cm of soil	500m	Europe	2014
B. Biotic ecosystem characteristics	**B.1 Compositional state**	Composition/diversity of the ecological communities at a given location and time (e.g. Presence/abundance of key species, species richness, genetic diversity, presence of threatened species, diversity/abundance of relevant species groups)	B1.1 Threatened Forest Bird Species diversity	Population trend of bird species: datasets from Article 12, Birds Directive 2009/147/EC reporting (2008-2012)	5km?	Europe	2000 and 2008
	B.2 Structural state	Aggregate properties (e.g. mass, density) of the whole ecosystem or its main biotic components (e.g. Total biomass, canopy coverage, annual maximum NDVI, Vegetation density, habitat structure, food chain and trophic levels)	B2.1 Above-ground biomass	ESA's Climate Change Initiative Biomass ESA's Climate Change Initiative Biomass project provides global maps of above-ground biomass (Mg ha-1), with these being capable of supporting quantification of biomass change.	100m	Global	2010, 2017-2020
			B2.2 Leaf Area Index	Copernicus leaf area index The LAI quantifies the thickness of the vegetation cover and it's recognized as an Essential Climate Variable (ECV) by the Global Climate Observing System (GCOS).	300m	Global	2014 to present
					1km	Global	1999 to present
			B2.3 Tree cover density	Copernicus HRL tree cover density layer It offers high-resolution information on the percentage of tree cover in a given area	100m	Europe	2012, 2015, 2018
	B.3 Functional state	Summary statistics (e.g. frequency, intensity) of the biological, chemical, and physical interactions between the main ecosystem compartments (e.g. Primary productivity, community age, distribution frequency, decomposition processes)	B3.1 Net Primary Production	Dry Matter Productivity and Net Primary Production The ecosystem Net Primary Production (NPP) represents the net growth rate of the vegetation(excluding autotrophic respiration), expressed in kilograms of production per hectare per day (gC/m²/day). It is a proportion of Gross Primary Production and it's directly related to ecosystem Dry Matter Productivity, expressed in kgNPP/ha/day.	300m	Global	2014 to 2020
					1km	Global	1999 to 2020
			B3.2 Fraction of Photosynthetically active radiation	https://docs.terrascope.be/DataProducts/Sentinel-2/references/VITO_S2_ATBD_S2_NDVI_BIOPAR_V200.pdf The FPAR (Fraction of Photosynthetically active radiation) quantifies the fraction of the solar radiation absorbed by live leaves for the photosynthesis activity. Then, it refers only to the green and alive elements of the canopy. The FAPAR depends on the canopy structure, vegetation element optical properties, atmospheric conditions, and angular configuration. To overcome this latter dependency, a daily integrated FAPAR value is assessed.	10m	Europe	
			B3.3 Burned severity	MOSEV: A global burn severity database from MODIS (2000-2020) MOSEV data	500m	global	Annual 2000-2020

				- Global Patterns and Dynamics of Burned Area and Burn Severity (developed from MOSEV data) The variable is a result of the reprocessing of the relativized version of the Normalized Burn Ratio (RdNBR) spectral index. The 8-daily values of the original dataset, RdNBR, were converted into a burn severity category (non-burnt, low, moderate-low, moderate-high, high) and annualized by selecting the most represented category over the period observed.			
			B3.4 Drought Severity	https://crudata.uea.ac.uk/cru/data/drought/#global Self-calibrating Palmer Drought Severity Index (scPDSI): The scPDSI metric was introduced by Wells et al. (2004), who gave detailed information about its calculation. The scPDSI is a variant of the original PDSI of Palmer (1965), with the aim to make results from different climate regimes more comparable. As with the PDSI, the scPDSI is calculated from a time series of precipitation and temperature, together with fixed parameters related to the soil/surface characteristics at each location.	0,5 degree	Global	Annual / 1998 to 2018
			B3.4 Drought Severity (2nd variable - alternative)	Combined drought indicator (v3) - A combination of spatial patterns of precipitation, soil moisture, and greenness vegetation anomalies, the CDI identifies areas at risk of agricultural drought. dataset viewer dataset download. 2012 - 2023 documentation	5 km	Europe	10 day observations 2012-2023
			B3.5 Normalized Difference Vegetation Index	https://land.copernicus.eu/global/products/ndvi The Normalized Difference Vegetation Index (NDVI) is an indicator of the greenness of the biomes.	300m	Global	3 day observations 2020 to present
					1km	Global	3 day observations 1998 to 2020
			B3.6 Green index	Might be added later in the project	-	-	-
			B3.7 Fire occurrence	Might be added later in the project	-	-	-
C. Landscape level characteristics	**C.1 Landscape and seascape at coarse scale**	Metrics describing mosaics of ecosystem types at coarse (such as landscape and seascape) spatial scale (e.g. Landscape diversity, connectivity, fragmentation, ecosystem type mosaics)	C1.1 Forest Connectivity	Generated using GUIDOS toolbox and Corine landcover daatset - Methodology	100m	Europe	2000, 2006, 2012, 2018
			C1.2 Landscape Naturalness	Generated using GUIDOS toolbox and Corine landcover daatset - Methodology	100m	Europe	2000, 2006, 2012, 2018
			C1.1 Forest Fragmentation	Relative Magnitude of Fragmentation (RMF) Data: netCDF (12.57GB) Global remote-sensing data product (i.e. the 27-year annual ESA CCI land cover maps which can be categorized as an EBV 'Ecosystem Distribution')	300m	Global	Annual 1992-2020

Forest ecosystem condition indicators

Each variable is scaled between 0 and 1, with values getting closer to 1 as the forest conditions improve.
This allows each indicator to represent in a consistent way the information coming from the variables, which in their original values have different ranges but also different interpretation of such values, and not always higher value are associated to better conditions (e.g. if we look at variable like

Drought Severity or Forest Fragmentation, the higher the value, the worse the forests conditions).

There are 8 indicators available in the application:

1. A1.1 Normalized Difference Water Index
2. A2.1 Soil Organic Carbon
3. B1.1 Threatened Forest Bird Species Diversity
4. B2.1 Above-ground Biomass
5. B3.1 Net Primary Production
6. B3.3 Burned severity (to be added)
7. C1.2 Forest Connectivity

Reference areas representing healthy forests

These areas are used to identify forest considered in good health, so as to define the upper reference values of that variable. Forests considered in good conditions (the upper reference areas) must meet the following criteria:

- being protected areas;
- being primary forest, alias forests where the signs of human impacts, if any, are strongly blurred due to decades without forest management;
- being highly tree-covered throughout the time series (areas with a tree-covered density loss equal or higher than 5% are excluded).

Such criteria are observed based on the information of the following datasets:

- Primary forests from EPFD v2.0 - https://www.nature.com/articles/s41597-021-00988-7
- Protected Areas from IUCN data - https://www.protectedplanet.net/en/thematic-areas/wdpa?tab=WDPA
- Copernicus's High Resolution Layer Tree Cover Density - https://land.copernicus.eu/en/products/high-resolution-layer-tree-cover-density

Results are obtained combining the following inputs by using, as consistently as possible, the year 2000 as the reference year, with exception of the information on the Tree-cover density, whose earliest observation is in the year 2012.

Whenever a forest lacks to meet any of the listed criteria, it was not considered as an area of reference for good condition.

Forest types

European forests have been initially categorized based on their landcover forest class, as per the Corine dataset, which distinguishes 4 types of forest:

1. Broad-leave forest (311) - https://land.copernicus.eu/content/corine-land-cover-nomenclature-guidelines/html/index-clc-311.html
2. Coniferous forest (312) - https://land.copernicus.eu/content/corine-land-cover-nomenclature-guidelines/html/index-clc-312.html
3. Mixed forest (313) - https://land.copernicus.eu/content/corine-land-cover-nomenclature-guidelines/html/index-clc-313.html
4. Transitional woodland & shrub (324) - https://land.copernicus.eu/content/corine-land-cover-nomenclature-guidelines/html/index-clc-324.html

Bioregion zones

Such categories of forest were also combined with the information on the European bioregion zones, used to define 11 bioregions over:

1. Alpine,
2. Arctic,
3. Atlantic,
4. Black Sea,
5. Boreal,
6. Continental,
7. Macaronesian,
8. Mediterranean,
9. Pannonian,
10. Steppic regions
11. Alpine (Scandinavia)

The Scandinavian Alpine zone was differentiate from the rest of the Alpine bioregion for its characteristics, and covers the forest in the Scandinavian mountains on the border between Norway and Sweden.

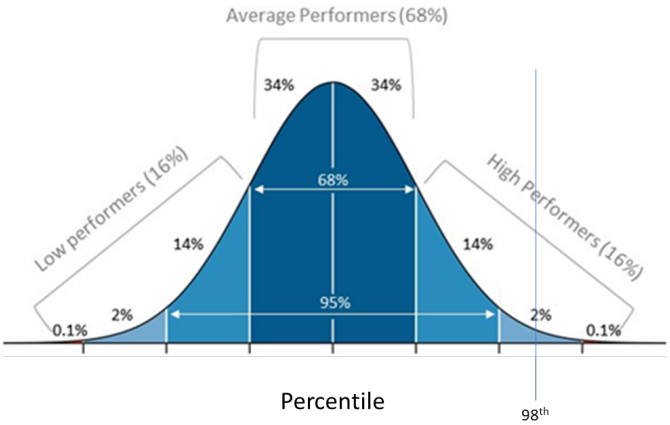
The combination of landcover forests and bioregions results in 44 forest types, following the definition of Maes, J., Bruzón, A.G., Barredo, J.I. *et al.* Acc ounting for forest condition in Europe based on an international statistical standard. *Nat Commun* 14, 3723 (2023).- https://doi.org/10.1038/s41467-023-39434-0

The following datsets were used to obtain this information:

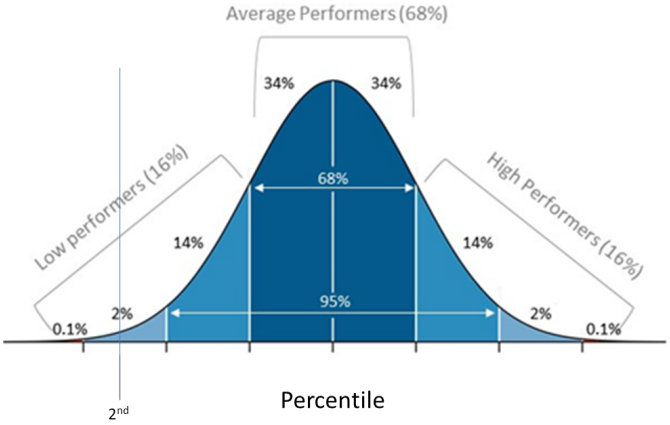
- Forest landcovers from Corine year 2000 (vector/ https://land.copernicus.eu/en/products/corine-land-cover/clc-2000), and
- Corine accounting adjusted year 2000 (raster/ https://www.eea.europa.eu/en/datahub/datahubitem-view/a55d9224-a326-4cb1-9b9c-3a324520341a?activeAccordion=1069872%2C1069948);
- European bioregion zones (https://sdi.eea.europa.eu/data/def7ac06-7d3f-4da5-880c-a76a73953cfc).

Reference values: upper and lower thresholds

- The upper (healthier conditions) reference threshold was set at the 98th percentile value observed in the reference healthy areas, for each type of forest, for each variable.



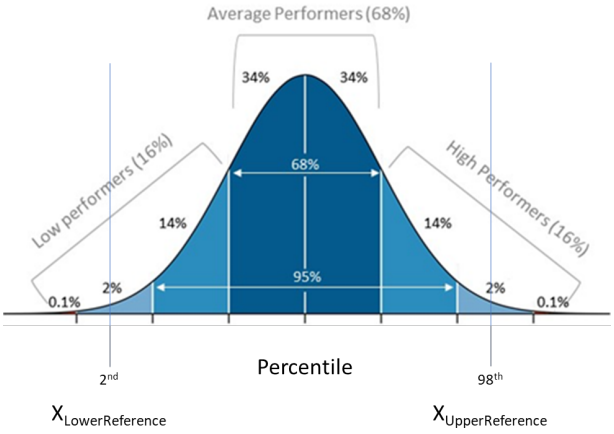
- The lower (worse conditions) reference threshold was set at the 2nd percentile value observed in the rest of the forest area (Total forest area - healthy reference area).



- The percentile might be inverted in case the healthier conditions correspond to lower values.

Rescaling of the variables

The percentile computed define the thresholds used to rescale the observed variables values into indicators ranging from 0 to 1.



$Xi = (X_{observed} - X_{LowerReference}) / (X_{UpperReference} - X_{LowerReference})$

Forest ecosystem condition index

The index summarize the overall condition of forests, computed by taking into account the several dimensions represented by each metric (raw variable).

The index has been designed to take into account one indicator for each Ecosystem Typology Class:

#	ETC class	Raw Variable	Spatial resolution (w/b.sev | w/o b.sev)	Temporal resolution (w/b.sev | w/o b.sev)	Temporal frequency (w/b.sev | w/o b.sev)	Dataset quality (w/b.sev | w/o b.sev)	Total (w/b.sev | w/o b.sev)	Weight	Weight w/o Burn severity
1	A1	Net Difference Water Index	6 | 5	7 | 6	7 | 6	6.5 | 5.5	26.5 | 22.5	**0.24**	**0.27**
2	A2	Soil Organic Carbon	2 | 2	1 | 1	1 | 1	2 | 2	6 | 6	**0.05**	**0.07**
3	B1	Threatened Forest Bird Species Diversity	1 | 1	3.5 | 3.5	3 | 3	1 | 1	8.5 | 8.5	**0.08**	**0.10**
4	B2	Above-ground Biomass	6 | 5	3.5 | 3.5	3 | 3	4.5 | 4	17 | 15.5	**0.15**	**0.18**
5	B3	Net Primary Production	4 | 3	5 | 5	6 | 5	6.5 | 5.5	21.5 | 18.5	**0.19**	**0.22**
6	B3	Burned severity*	3 | -	6 | -	5 | -	4.5 | -	18.5 | -	**0.17**	**-**
7	C1	Forest Connectivity	6 | 5	2 | 2	3 | 3	3 | 3	14 | 13	**0.12**	**0.16**
Total			28 | 21	28 | 21	28 | 21	28 | 21	**112 | 84**	**1.0**	**1.0**

> ** While variables in the same typology class are usually highly correlated, Burned severity doesn't have a strong correlation with NPP, and for this reason is selected as an additional indicator to the index.*

The table ranks each variable considering the aspects in the column headers.

- *Spatial Resolution* describes the size of the smallest feature that can be detected by a satellite sensor or displayed in a satellite image. It is usually presented as a single value representing the length of one side of a square,
- *Temporal resolution* refers to the total amount of years in the dataset,
- Temporal frequency considers the availability of temporal observation over the same period. While all variable are annualized, annual averages obtained from highly frequent observation are more accurate and thus considered better input overall.
- Dataset quality represents the proximity of the first and latest year in the dataset, respectively, to the to reference year (2000) and to the present.
- When variables are ranked the same in one criterion, they are assigned the average of the positions they would represent. For example, if there are three variables which should be ranked 7, they will be assigned 6 since it is the average of the positions these variables represent (5, 6 and 7).

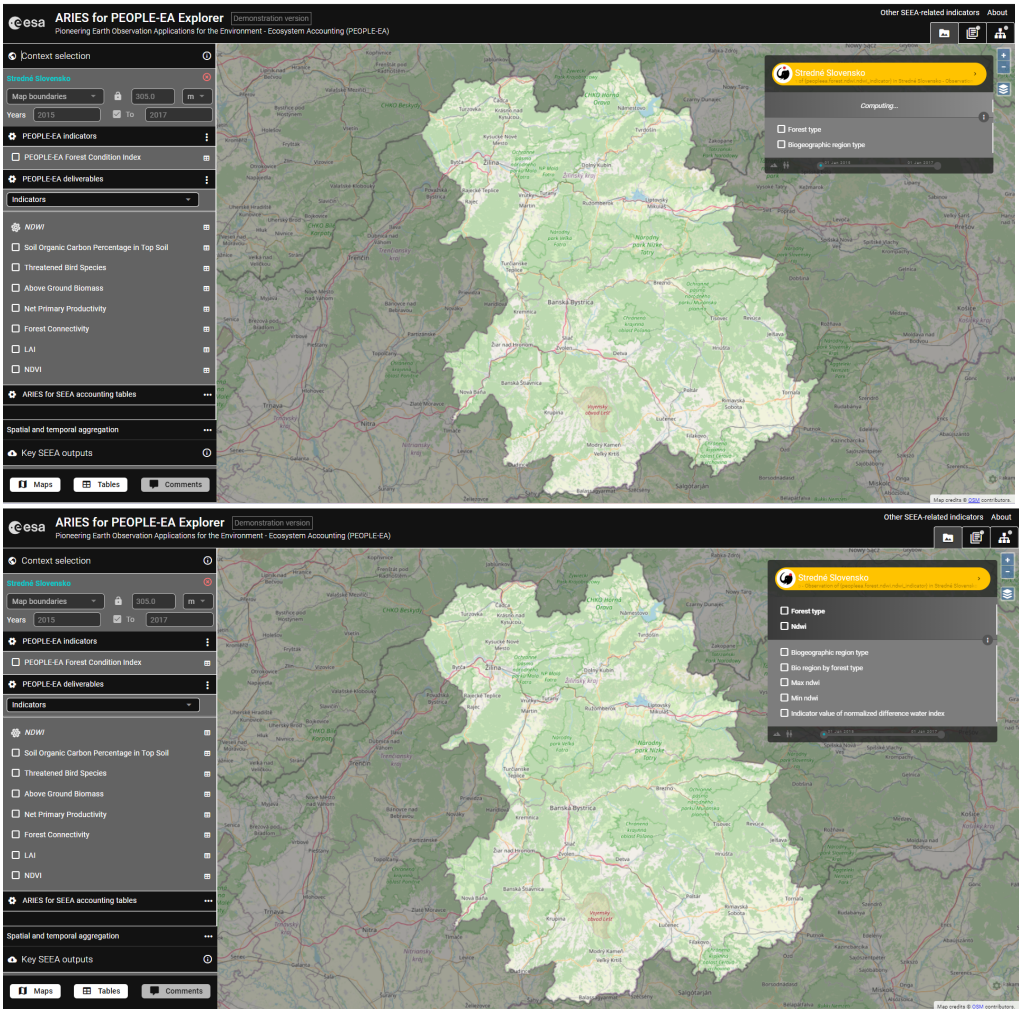
Overall condition index =
(Net Difference Water Index x 0.24) + (Soil Organic Carbon x 0.05) + (Threatened Forest Bird Species Diversity x 0.08)+
(Above-ground Biomass x 0.15) + (Net Primary Production x 0.19) + (Burned severity x 0.17) + (Forest Connectivity x 0.12)

Compile the accounts in the k.Explorer

The People EA deliverables section contains the list of the forest condition metrics currently developed as part of the project.

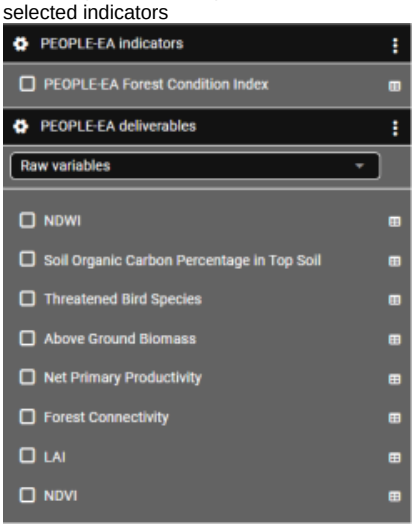
Once the context has been set, the user simply checks the box of the condition metrics (raw variables, indicators or index) to compute its result.

When the knowledge bar turn yellow and the elephant's ball spins, the system is computing the information queried.

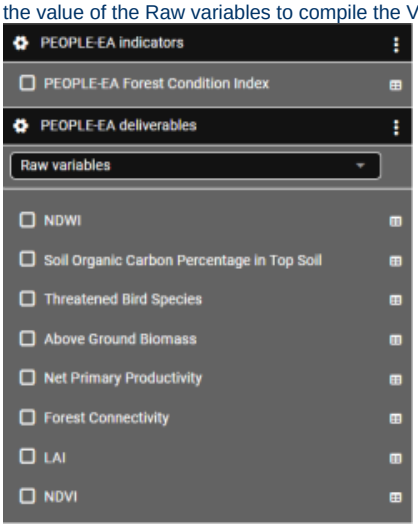


The user can decide to observe:

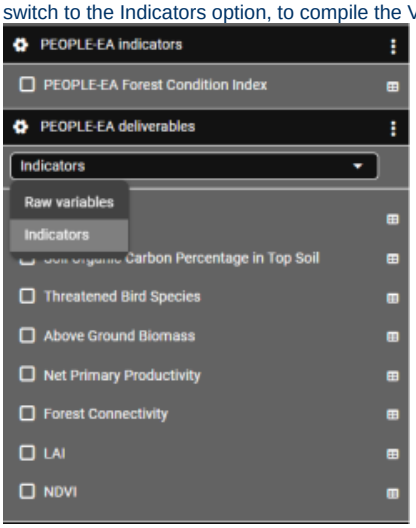
- the first option is to compile the Forest Condition Index to estimate the overall condition based on a set of experts-defined weighted and selected indicators



- the value of the Raw variables to compile the Variable Forest Ecosystem Condition Account(s),



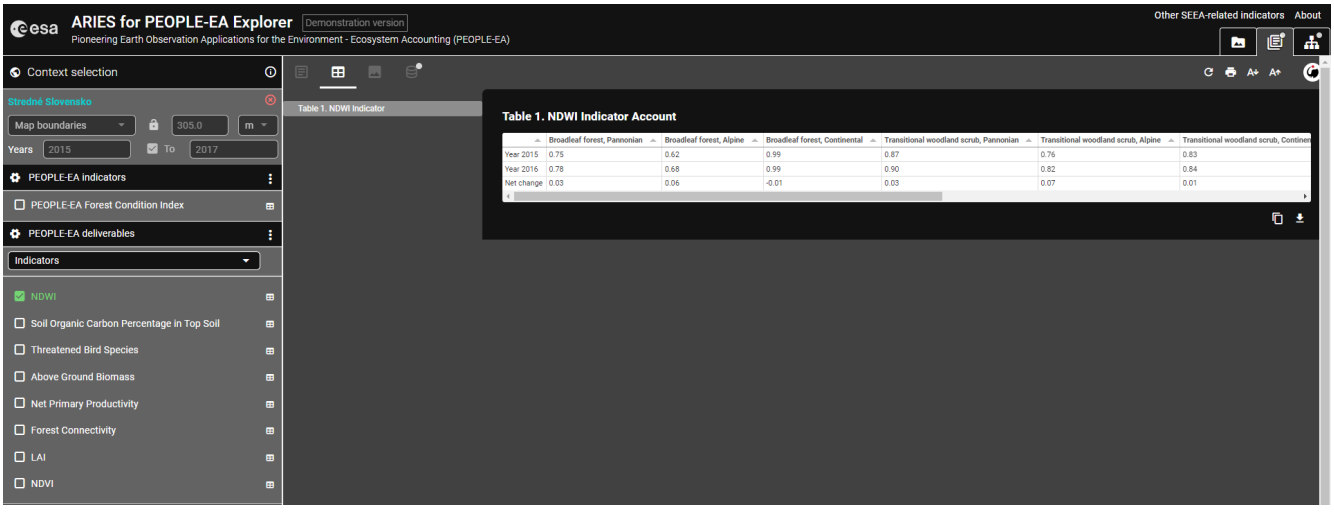
- switch to the Indicators option, to compile the Variable Forest Ecosystem Condition Account(s),



This action will trigger the model(s) underlying the output(s) selected, in case more ecological metrics are selected, the computational flow is continuous and after the whole workflow to compute one metric is completed, the system moves to the next tasks in the queue of computation. The models to be computed follow the order of selection of the user.

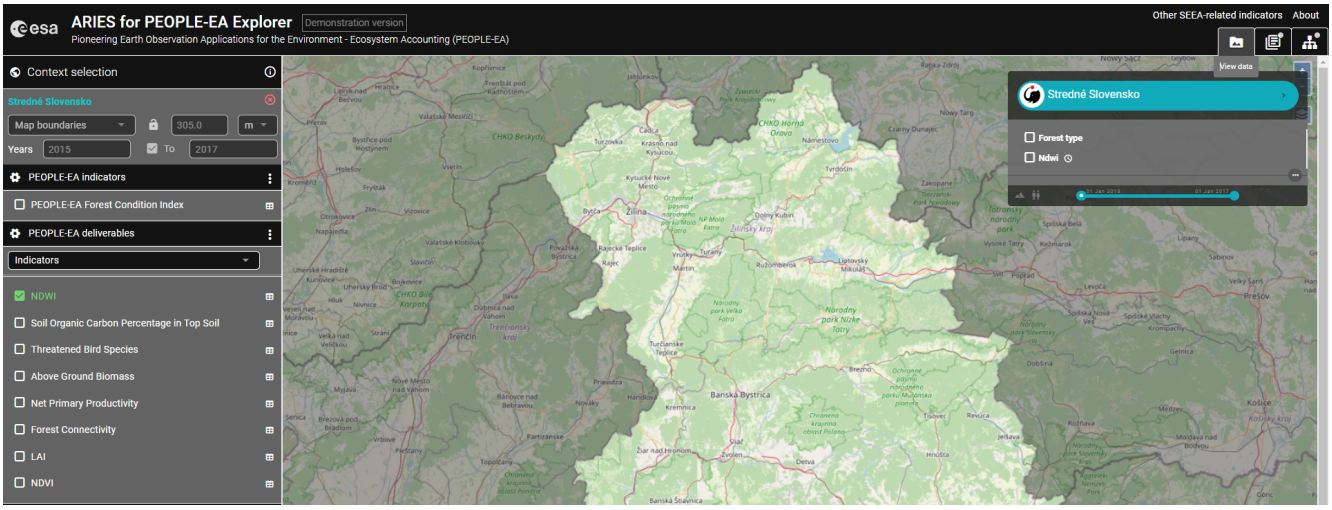
Most of the metrics are modeled from different datasets, so time of computation should be similar, but in case an account shares inputs used in a previous computation, those are not re-calculated, thus once should expect faster computation of the additional output(s).

Once the account is computed, the k.Explorer moves automatically from the *Data view*, to the *Documentation section*, to the Table section

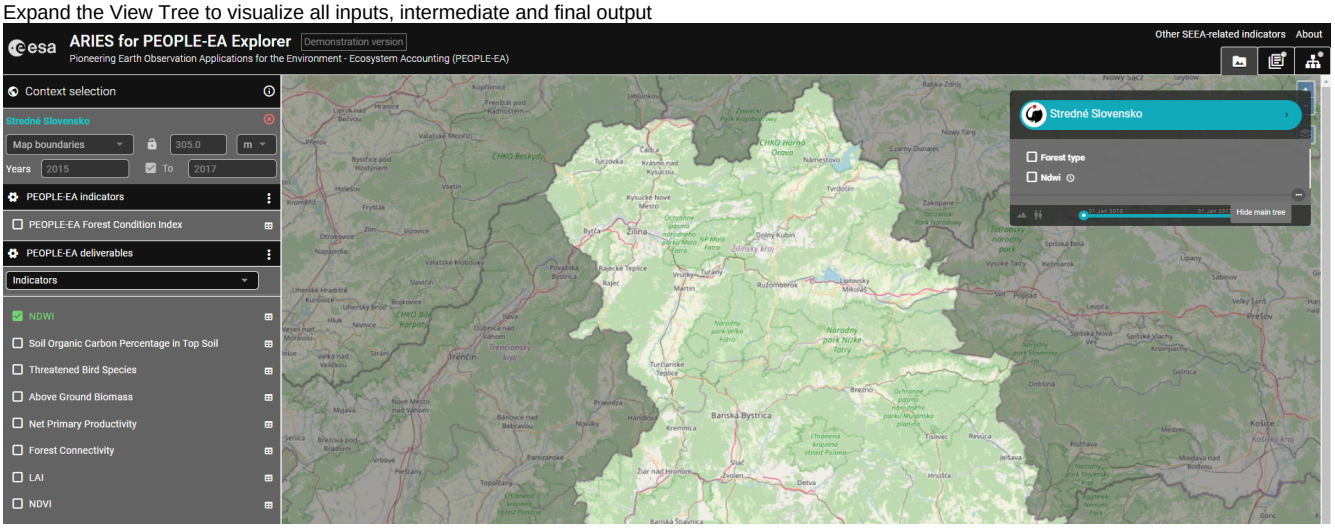


The table can be copied or downloaded (click on the symbols at the right bottom of the table to export it)

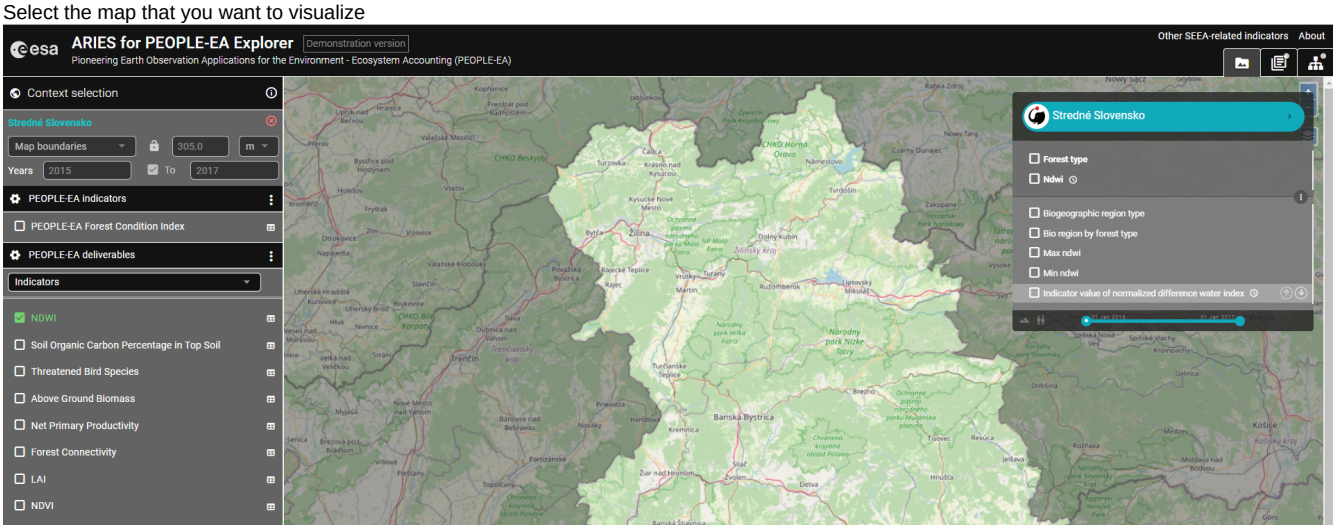
To explore the geospatial explicit information in the maps used to summarize the results in the table, go back to the *View Data* section:



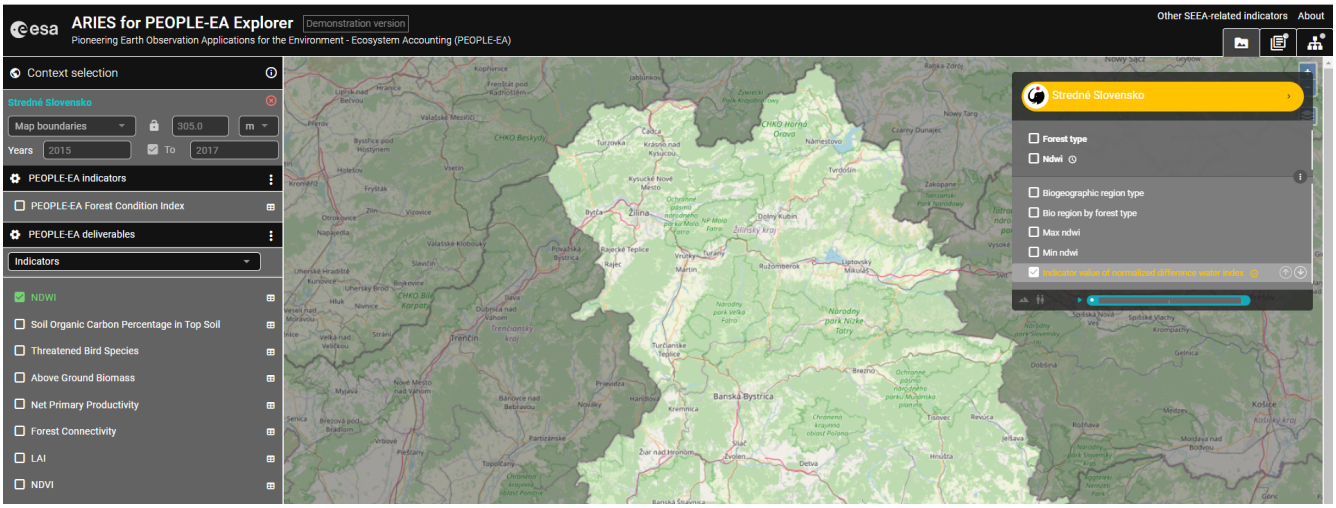
Expand the View Tree to visualize all inputs, intermediate and final output



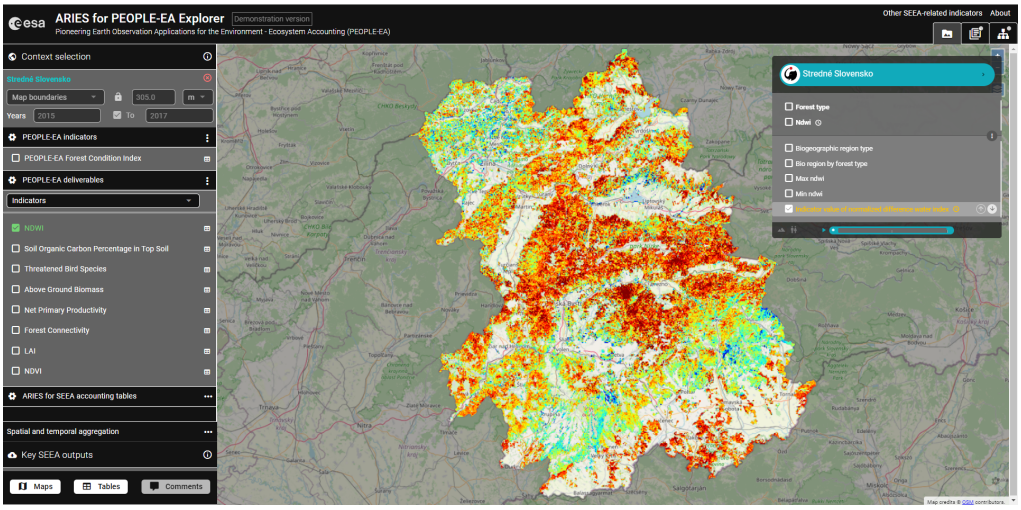
Select the map that you want to visualize



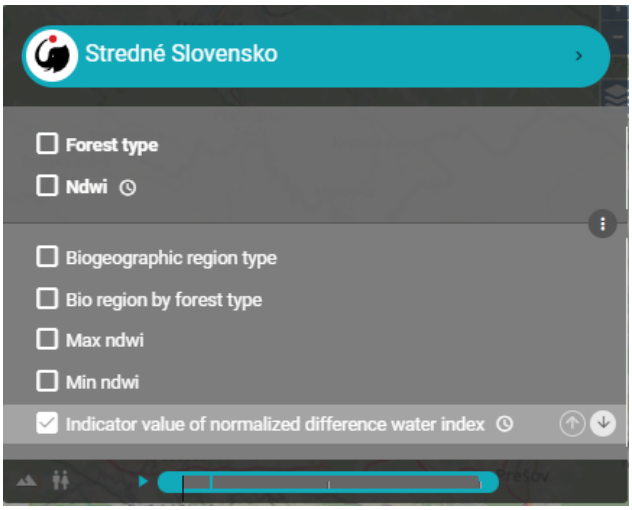
When the knowledge bar turn yellow and the elephant's ball spins, the system is computing the information queried.
In this case, is loading the map



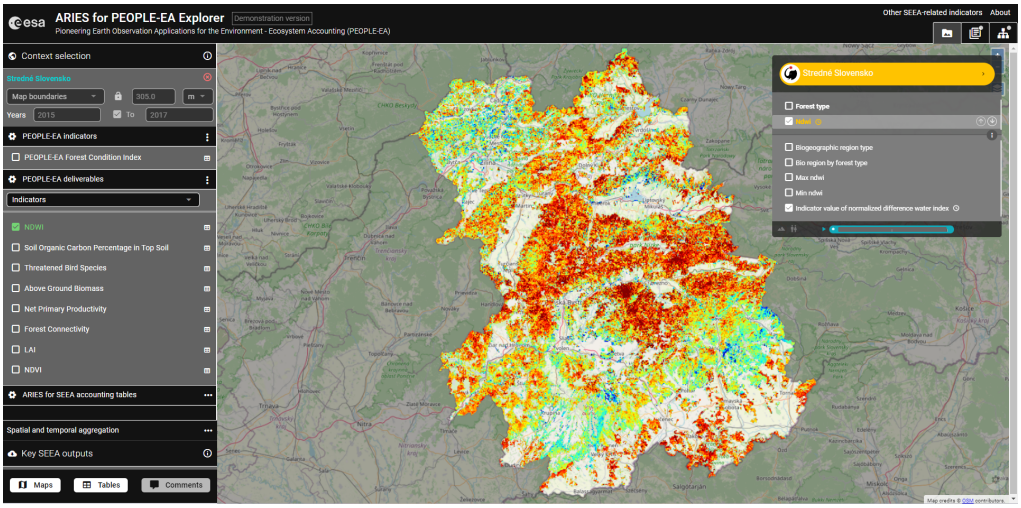
This can be visualized in the explorer or downloaded as a raster file (.tiff format) for further analyisis in a GIS system.



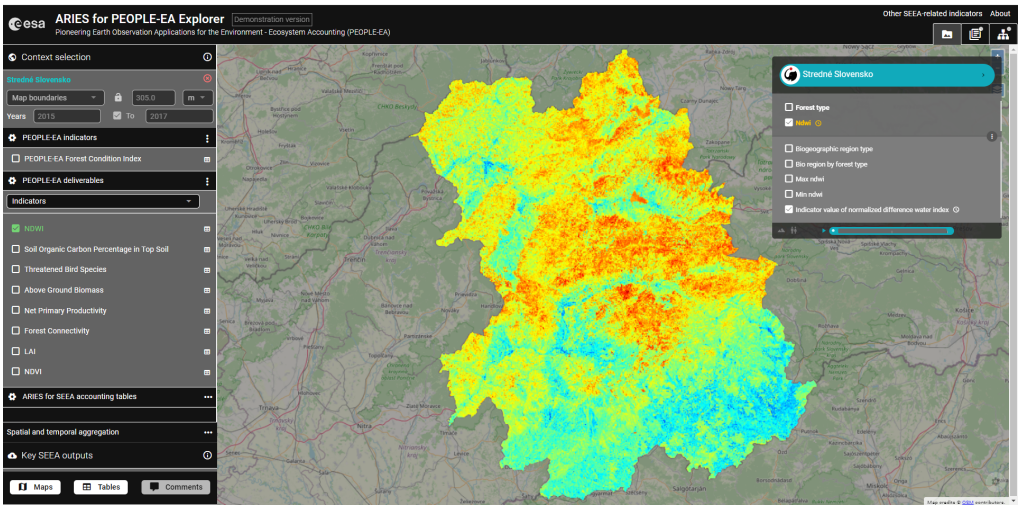
One can download a map by clicking on the arrow pointing down () that appears when hovering over the observation (an observation is any of the element observed in the workflow and listed in this menu)



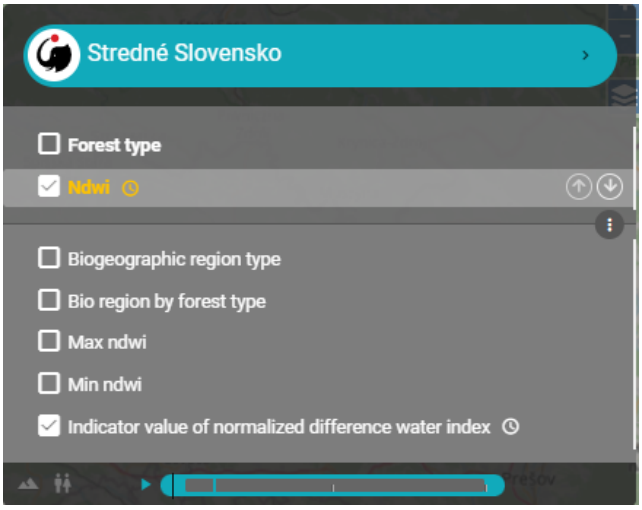
This was the main output, but any input and intermediate output of a workflow can be observed by ticking their boxes.



The results for NDVI are shown below.

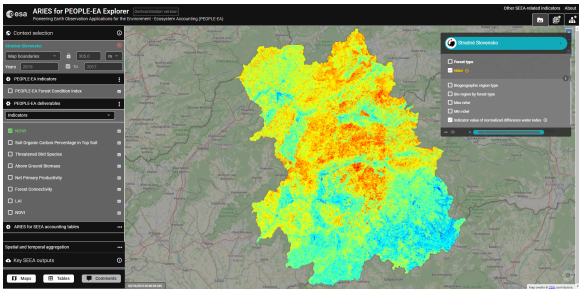


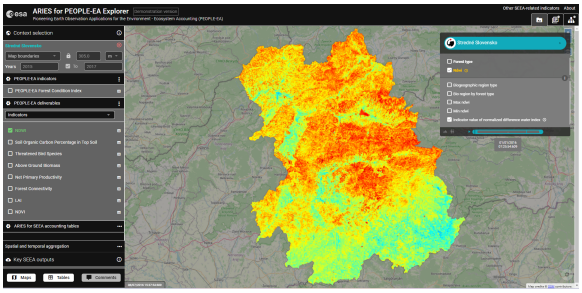
Notice how observations that changes over time in the context selected, have the symbol of a clock next to them, and at the bottom of the menu, you'll see a timeline, in a light blue color.
In this example, as there are just two temporal observations, there is just one separator, the small in yellow, dividing the 2 temporal observations (2015 and 2016).



Selecting a different temporal observation, the map will change and the system displays the result for that year

2015 2016

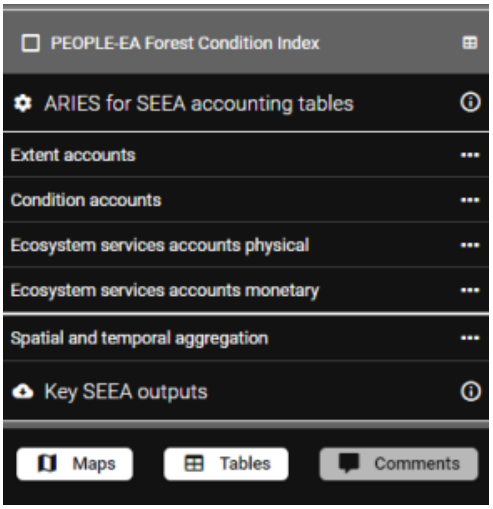




ARIES for SEEA accounting tables

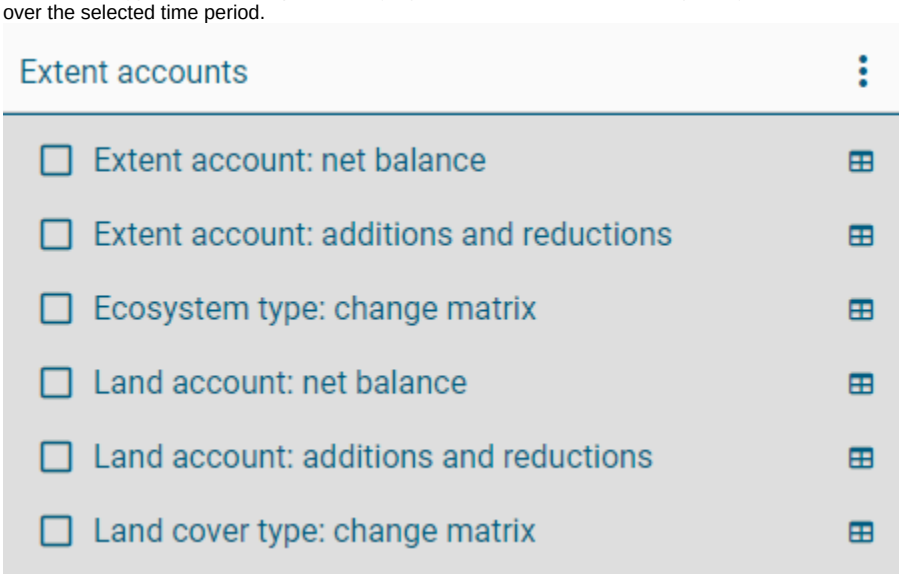
Below the Forest Condition Index option, there is a section containing the results of the ARIES for SEEA application.

Each account contains a drop-down menu (three horizontal dots), from which the user can select accounts to compile:

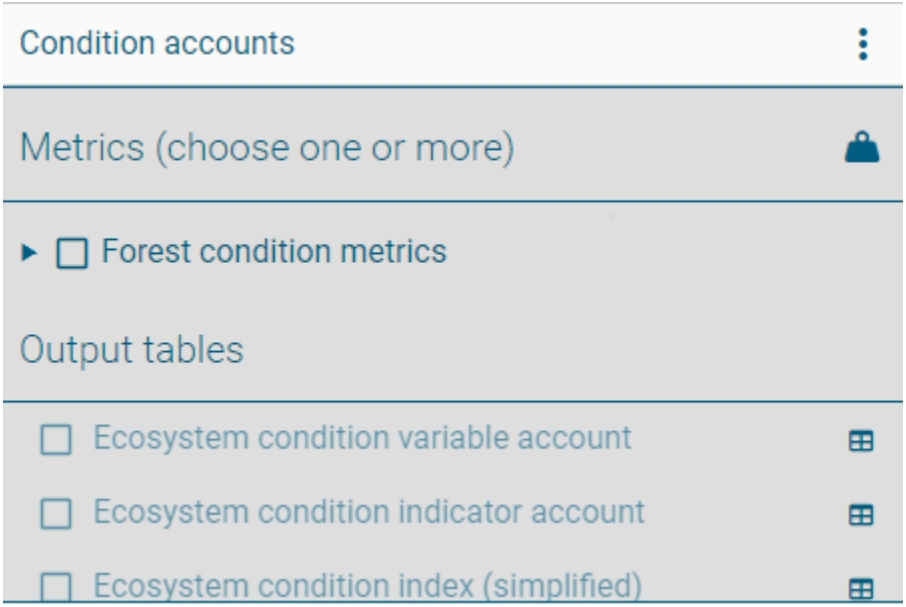


There is a dedicated guide to the use of the ARIES for SEEA application.

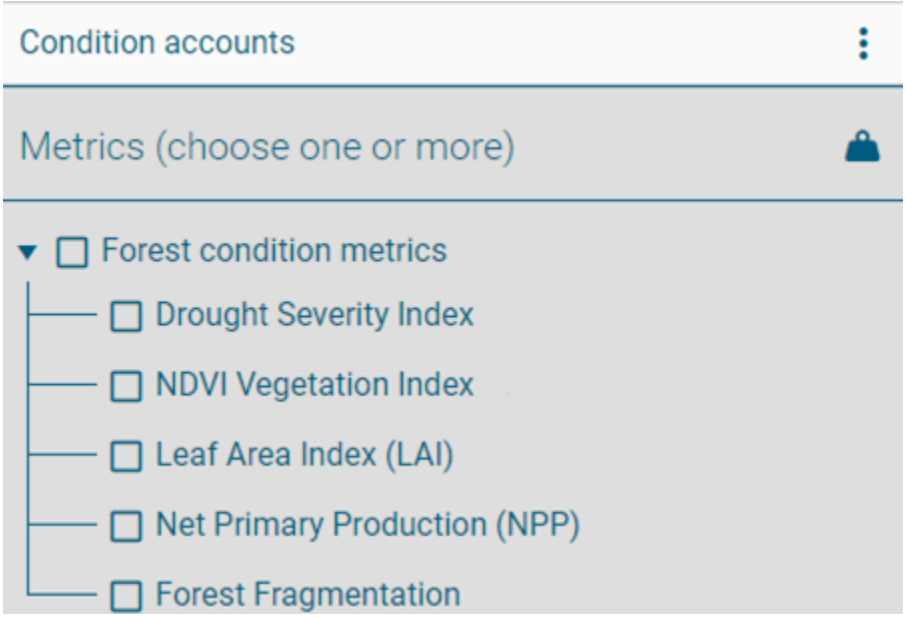
- **Extent Accounts**
  These accounts measure the extent of the IUCN Global Ecosystem Typology ecosystem types, or land cover, present in the context of your analysis, in km^2.
  The different types of accounts provide varying levels of detail in summarizing ecosystem/land cover extent and its change over the selected time period.



- **Condition Accounts**
  These accounts measure ecosystem condition. Currently, only forest ecosystem condition accounts are supported, but condition accounts for other ecosystem types will be added soon (beginning with those for grasslands).

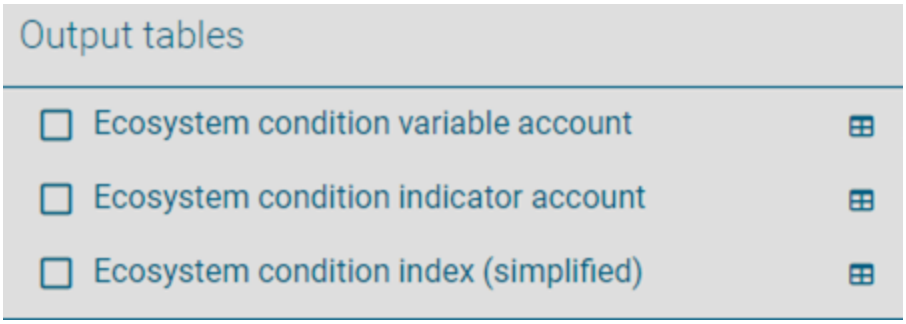


The conditions metrics available for inclusion in the account appear in a drop-down menu when the user clicks on the triangle next to "Forest condition metrics".

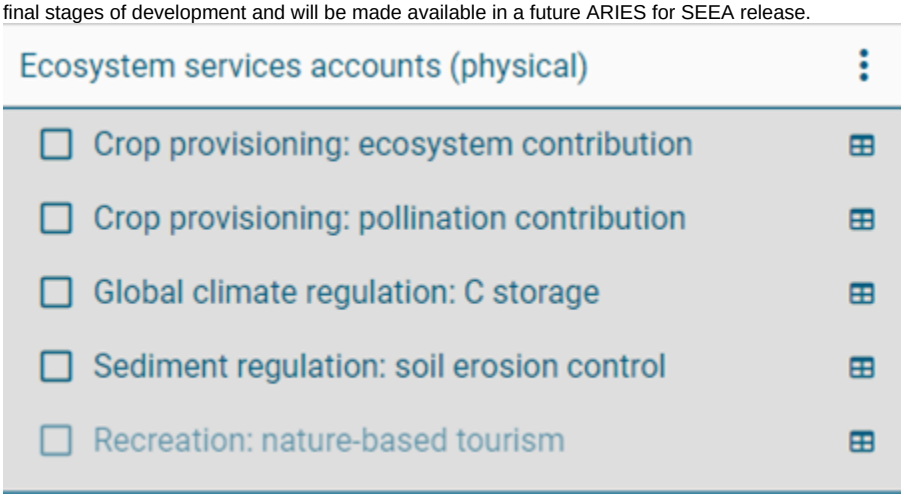


Three types of ecosystem condition accounts are available:

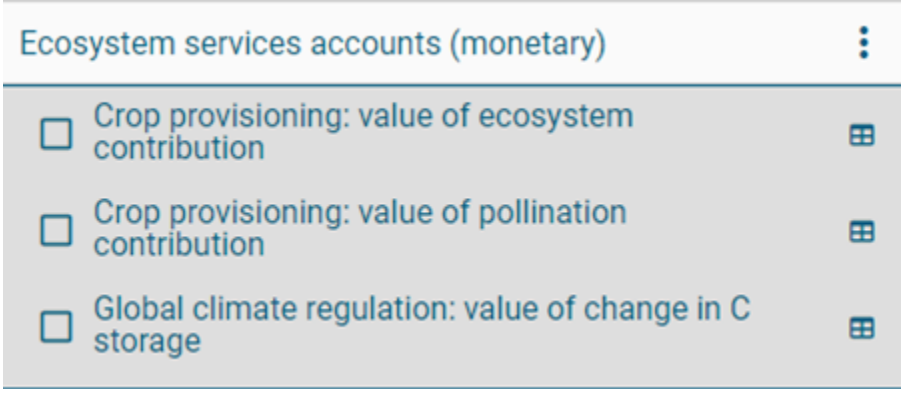
1. Condition Variable Account: report the value of each condition metric in their originally observed values (*non-transformed*);
2. Condition Indicator Account: rescale ecosystem condition variables to values between 0 and 1. Rescaling is calculated as the difference between the observed condition variable value and the optimal condition reference.
   By *normalizing* multiple condition variables, different indicators can be more directly compared;
3. Condition Index Account: combines all indicators together using a *weighted mean*. Currently, all indicators take the same weight, summing to 1 (e.g., 0.25 when four condition metrics are selected). In future releases of ARIES for SEEA, users will be able to assign custom weights to the indicators to better reflect their local importance when accounting for ecosystem condition.



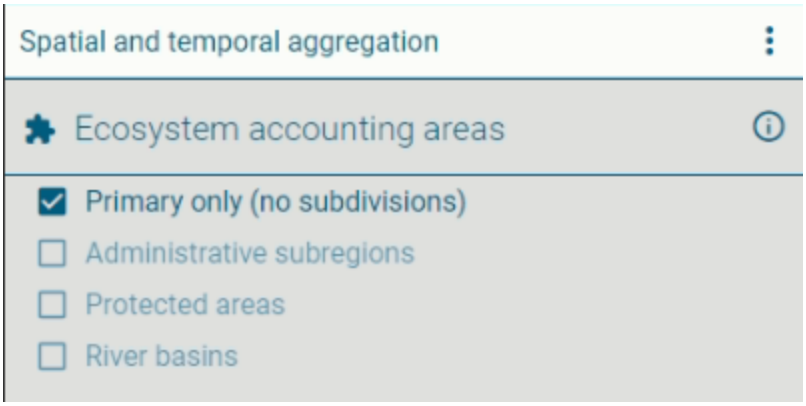
- **Ecosystem services account (physical terms)**
  These accounts measure the biophysical quantities of services provided by ecosystems and used by economic units. Use tables are not explicitly supplied with the model outputs, but use is described in the automatically generated reports for the selected accounts. In the current version, four ecosystem services are available. A fifth one, Nature-based tourism, is in its final stages of development and will be made available in a future ARIES for SEEA release.



- **Ecosystem services account (monetary terms)**
  These accounts measure the monetary value of the selected ecosystem services, applying SEEA EA-compliant valuation method(s). Use tables are not explicitly supplied with the model outputs, but use is described in the automatically generated reports for the selected accounts. In the current version, three ecosystem services are available. A fifth one, Nature-based tourism, is in its final stages of development and will be made available in a future ARIES for SEEA release.

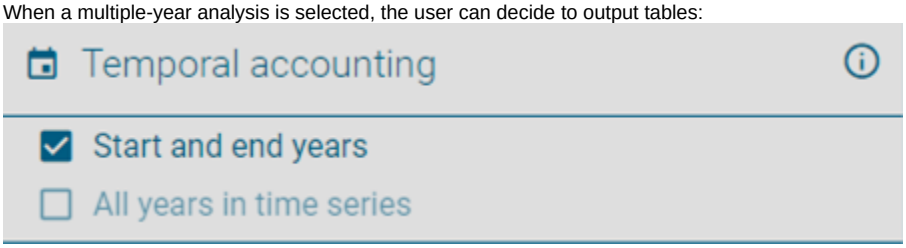


- **Spatial and temporal aggregation**
  The user can select how the results of the accounts are aggregated in accounting tables.
  Currently, only the first option is available. In future ARIES for SEEA releases, the user will be able to generate accounting tables as follows:



1. "Primary only": a single table summarizing results for the entire context identified by the user;
2. Administrative subregions: multiple tables grouped by subnational jurisdictional entities (i.e., administrative level 1 - State, Province, or District);
3. Protected areas: multiple tables grouped for protected areas found in the analysis context;
4. River basins: multiple tables grouped results by watersheds found within the analysis context.

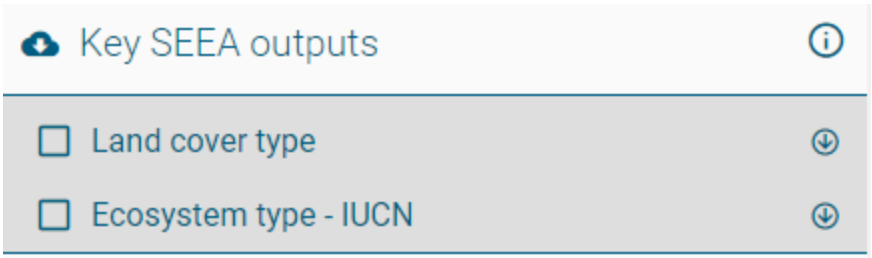
- **Temporal accounting**
  When a multiple-year analysis is selected, the user can decide to output tables:



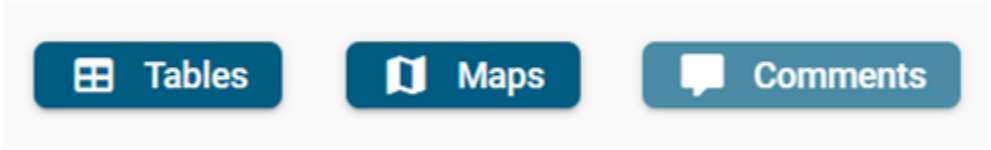
1. For the first and last years of the time series only, or
2. For all years within the time period selected.

Key outputs and observations

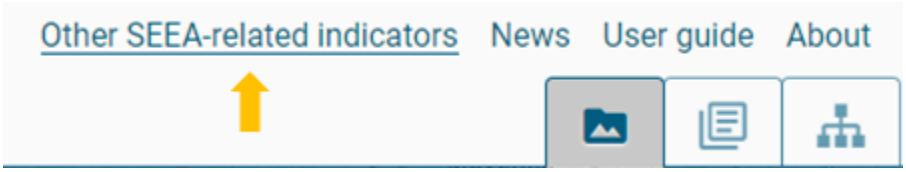
This section shows the most relevant spatial inputs and outputs in the account(s) run by the user
(e.g., in the case of ecosystem extent, the most relevant outputs are land cover and ecosystem type data).



The last section stores all tables and maps produced in that session, so that the user can download them in a zipped file (of Excel spreadsheets or GeoTIFFs) before leaving the application.

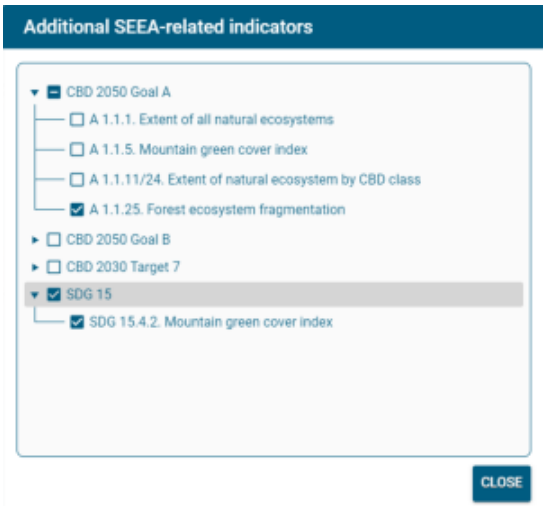


In the upper left corner of the application, there is a section dedicated to SEEA-relevant indicators.

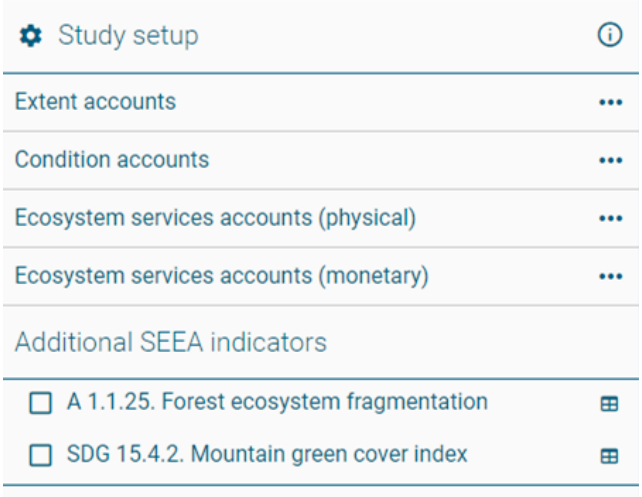


This section includes selected indicators from the Sustainable Development Goals (SDGs) and the Convention on Biology Diversity (CBD) Post-2020 Biodiversity Indicators, which have been added to the application.

Once it is opened, a drop-down menu shows the list of available indicators.



Those selected by the user are added in the ARIES for SEEA panel as if they were an additional standard SEEA EA account

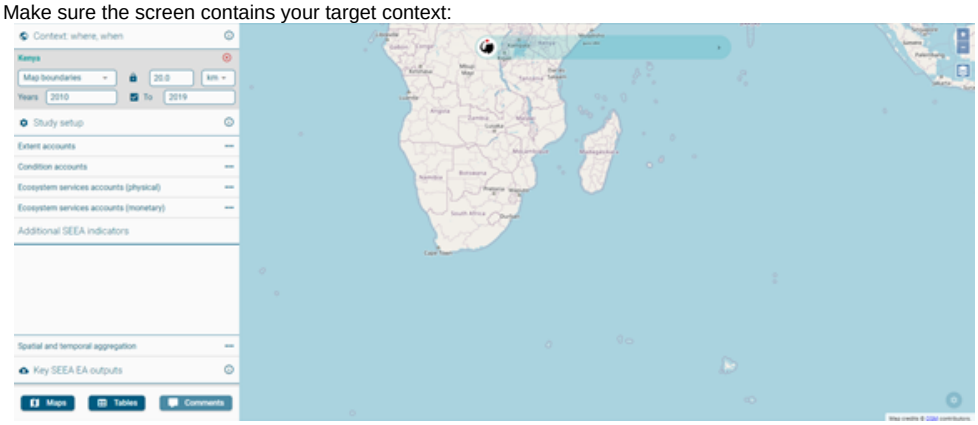


Quick tips

- Set your context (e.g., Cape Town in South Africa). Suggested way:

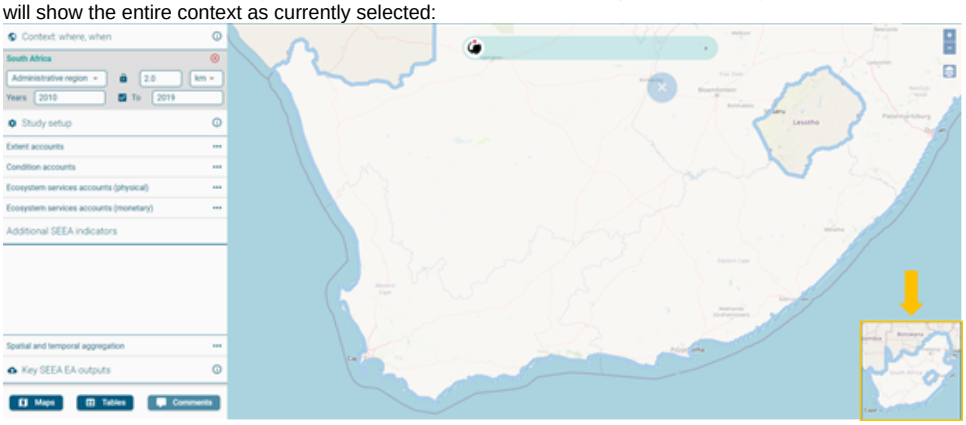
1. Zoom and pan using the Map boundaries option:

2. Make sure the screen contains your target context:

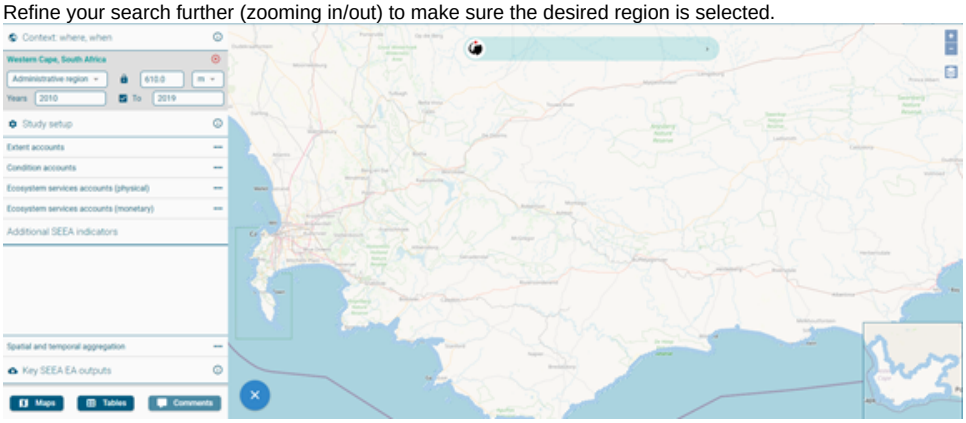


3. Once the screen contains the area of interest, switch to Administrative region:

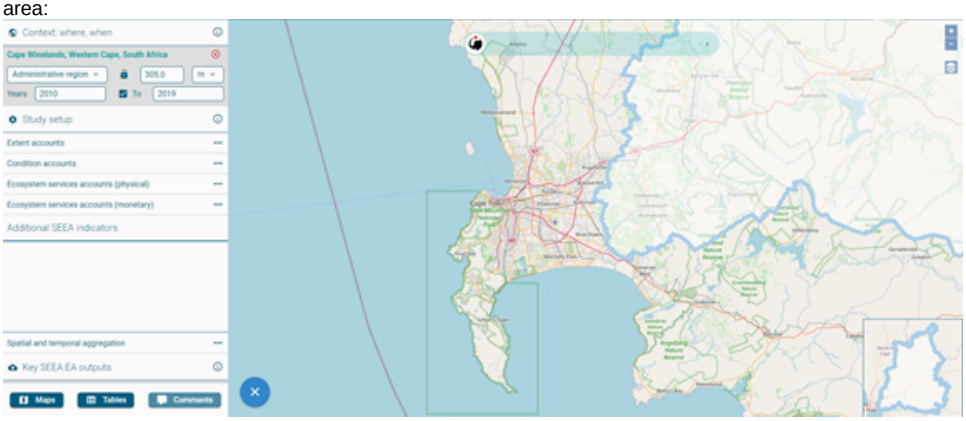
4. If the whole administrative region does not fit the screen, a locator map in the lower-right corner of the interface will show the entire context as currently selected:



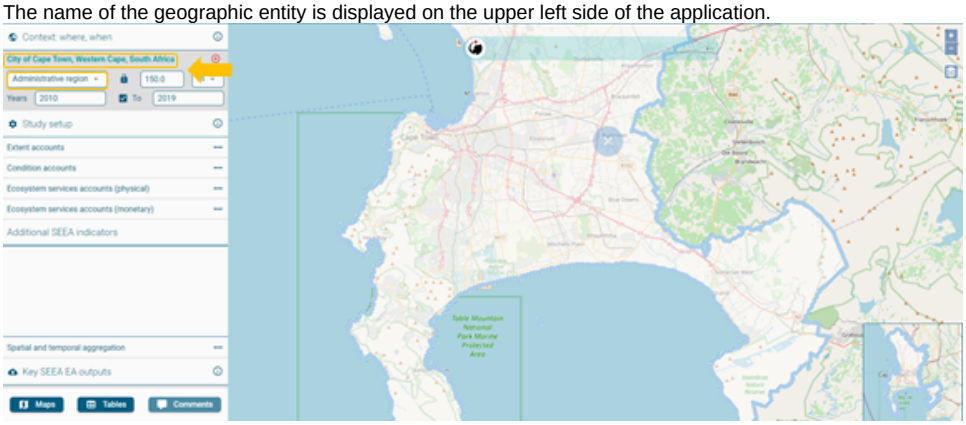
5. Refine your search further (zooming in/out) to make sure the desired region is selected.



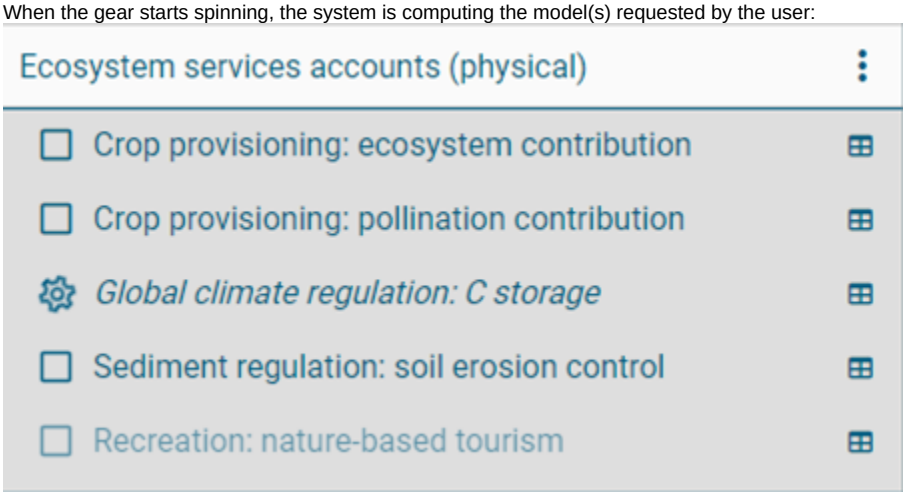
6. Note: the region automatically selected is not always the most central, but part of the screen occupying the largest area:



7. The name of the geographic entity is displayed on the upper left side of the application.



- When the gear starts spinning, the system is computing the model(s) requested by the user:



- To offer the best visualization of the context in analysis, the search bar/results box can be positioned where the user prefers.

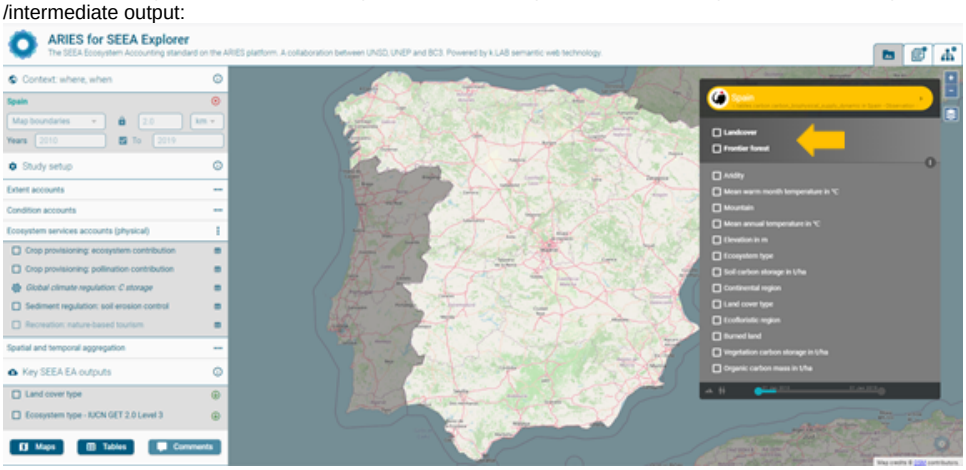
  To do so, point the cursor over the search bar, and once this symbol  appears, drag it to a preferred location.

Explore results and methods used to run your accounting models

Aspects of the user interface change once you begin to run an accounting model:

i. Run an accounting model (e.g., ecosystem extent account - simple net balance).
   1. Once the extent account is selected, the search bar will turn yellow.
      A rotating gear will appear next to the selected account(s), which indicates that the model is being compiled.
      When a model input or intermediate output has been computed, it is listed and can be explored individually, by selecting the specific layer (e.g., aridity):

2. When a main output of the model is computed, this is listed (in the darker section) above the other inputs /intermediate output:

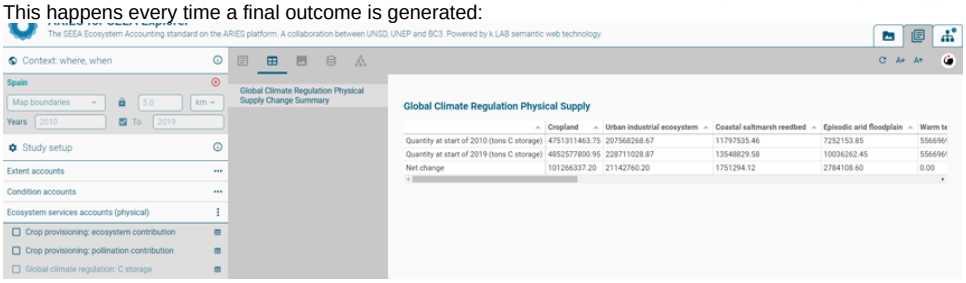


3. If the model is dynamic (i.e., is calculated for >1 year), the progress bar at the bottom of the search bar/results box progresses as the computation continues:

4. In the right-upper corner of the app, three tabs are now available:

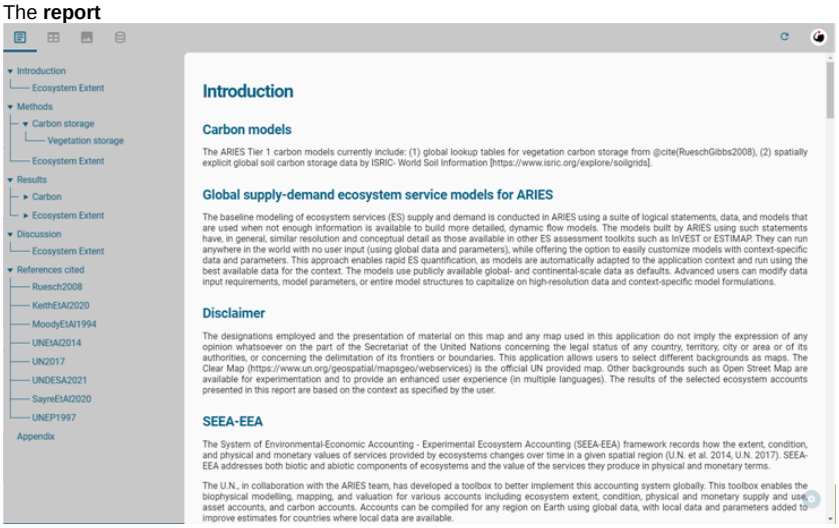
   i. Data view (always available)
   ii. Documentation view
   iii. Data flow view

5. In our example, the application automatically takes the user to the section showing the accounting result(s). This happens every time a final outcome is generated:



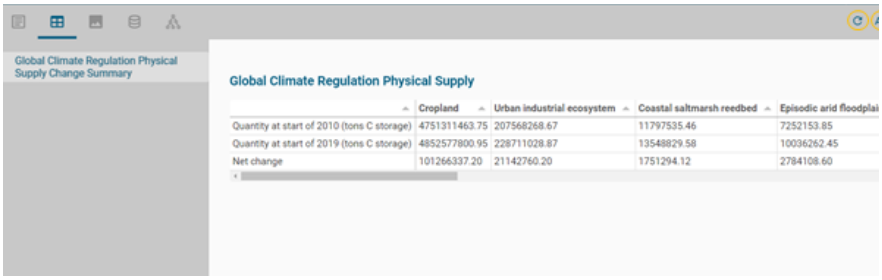
6. To review other sections of the documentation:

7. The **report**



8. The tree menu on the left facilitates navigation. Each report includes:
    a. A general introduction to the model(s);
    b. Information on the SEEA framework or any other more general modeling frameworks (when part of a larger set of models);
    c. The methods applied;
    d. A summary of the main results;
    e. Caveats or other considerations in interpreting model results, as part of the discussion; and
    f. Reference(s) for data and method(s) used.

    i. ## Tabular results



    To ease the observation of the results:
        a. The first column is visible while scrolling to the right,
        b. Results can be sorted by the element in the first column, or by ascending and descending order of the result of any column,
        c. Text size can be adjusted using the buttons in the upper right (with yellow circles).

    ii. ## Image(s) section

    Figure(s) and (maps) generated during the computation are listed in this section and can be explored individually.
    If results come from multi-year models, the maps are interactive and show changes over time.

Figure 1. Ecosystem type

Figure 2. Vegetation carbon storage in t/ha

Figure 3. Organic carbon mass in t/ha

Figure 1

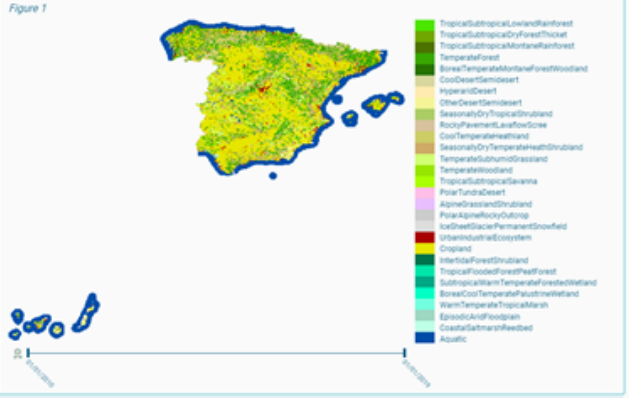


Figure 2

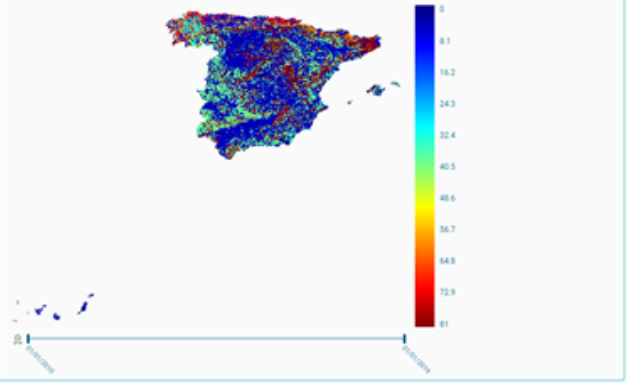
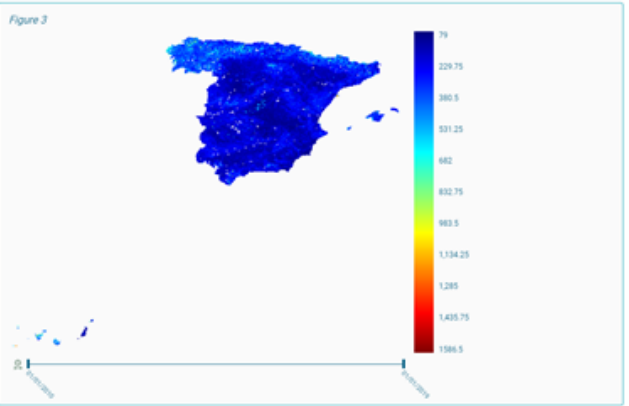
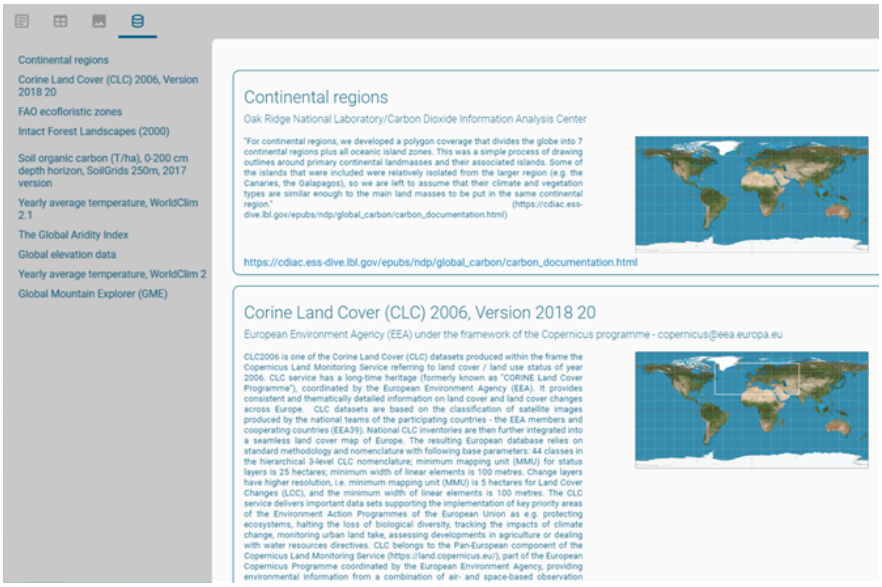


Figure 3



iii. **Resources section**

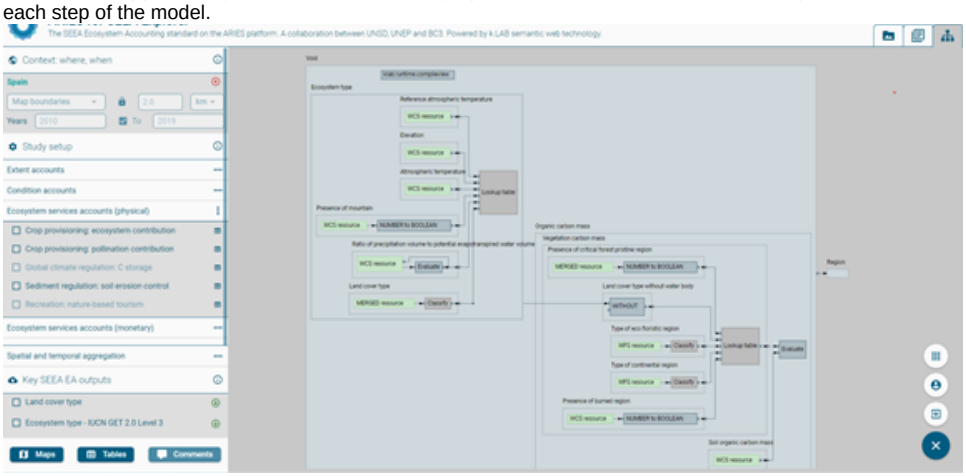


Lists all the resources used in the computations, to provide full-transparency on the final output. Each of the data resource can be explored individually

iv. **Dataflow section**: shows a list containing a visual summary of each model component and how these were combined to obtain the final results. In the next version of ARIES for SEEA, this section will also report the decisions taken by the system on:
    a. Which combination of data and models was implemented,
    b. Which data and model alternatives could have been used instead and,
    c. The AI parameters used to support the choices made.

2. The third tab available once a model has run is the **Dataflow view**

   This shows a diagram that visually summarize each model component and how those were combined to obtain the final result(s). Clicking on an individual rectangle provides details about the dataset, algorithm, etc. used at each step of the model.



Other ARIES features

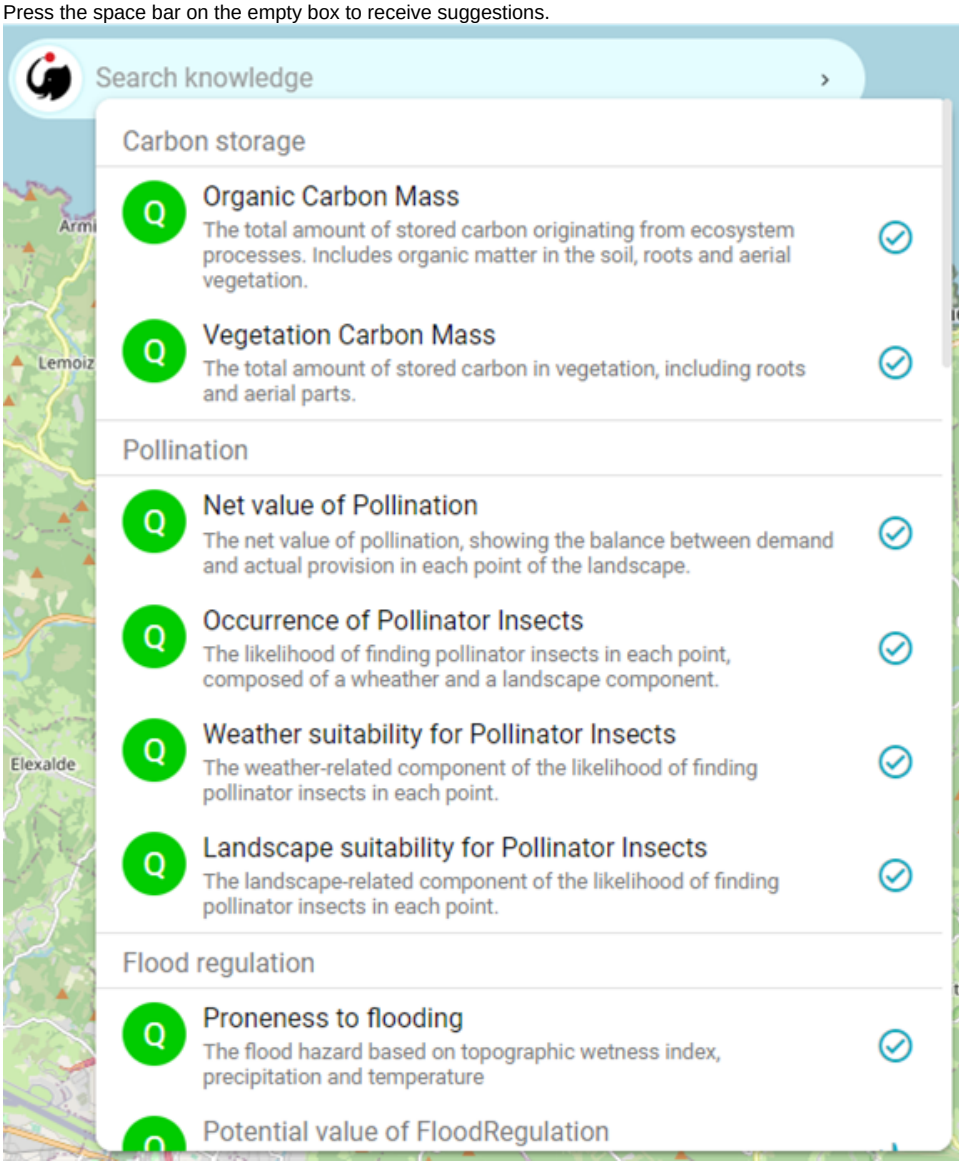
While most of the functions needed to compile SEEA accounts are available through ARIES for SEEA interface, the normal functionalities of the ARIES Explorer remain available through the search bar.
This sections shows how to query them.

1. **Search the knowledge bar (1)**

This box is used to call models, select your context, modify default settings, and show the help page.

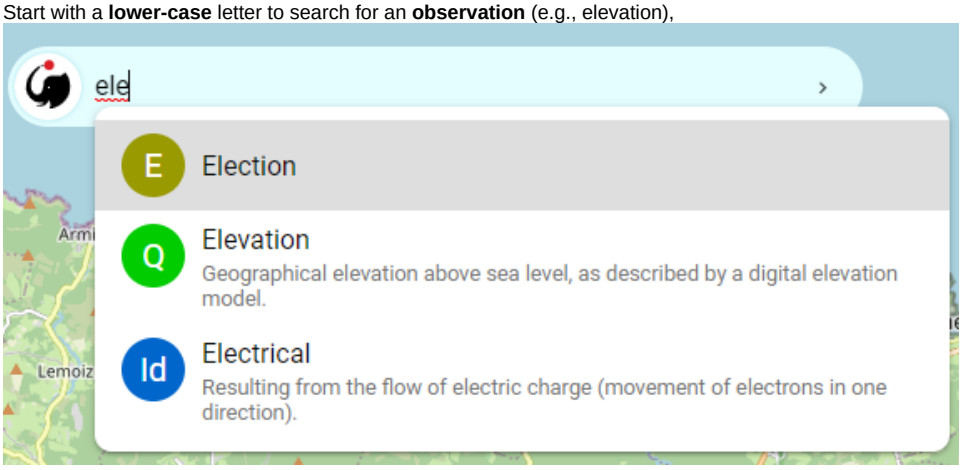
a. Query an observable from the space bar (A):
Please note: unlike the search bar in the ARIES for SEEA application, the general ARIES Explorer search bar is **case-sensitive**.

i. Press the space bar on the empty box to receive suggestions.



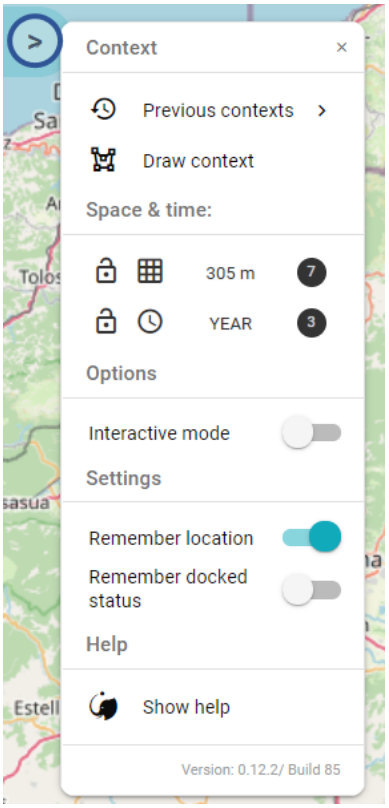
ii. Start with an **upper-case** letter to search for a **geographical context** (invalid if you have already set a context).

iii. Start with a **lower-case** letter to search for an **observation** (e.g., elevation),



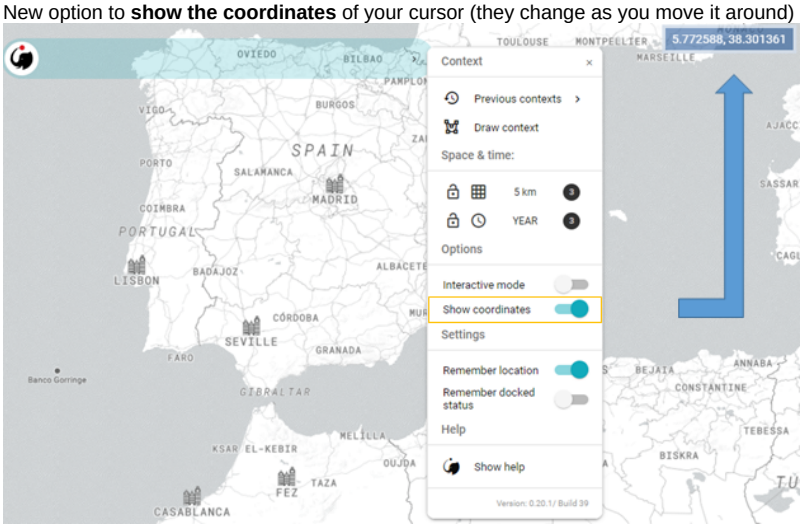
Option (iii) enables users to compute a model available in the ARIES Explorer environment and appropriate for the SEEA framework, but which is not contained as an option in the application. This option can be used to explore a wide range of different models (termed *observables*), which can refer to model inputs or outputs.

b. Other settings/options/help (B)

c. 

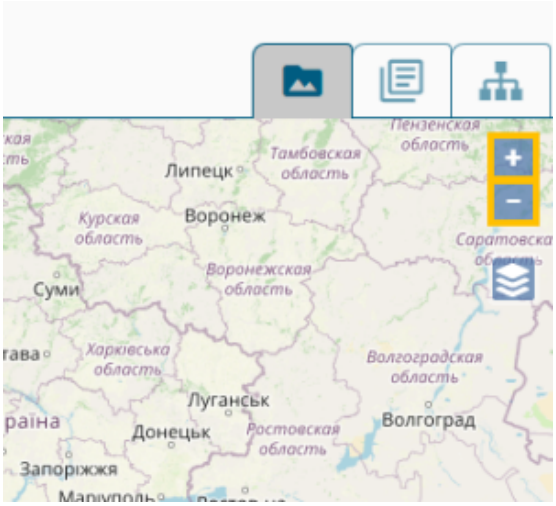
   i. Context:
      1. Reset a previously used context
      2. Draw a new context (using your cursor)
   ii. Space and time:
      1. Adjust the spatial and/or temporal resolution of your analysis
   iii. Options
      1. Activate the interactive mode to add manually add input to the model (adjusting parameter values)
   iv. Settings
      1. Remember location (remember the last context selected)
      2. Remember docked status
   v. Help
      1. Show the help tutorial

d. New option to **show the coordinates** of your cursor (they change as you move it around)

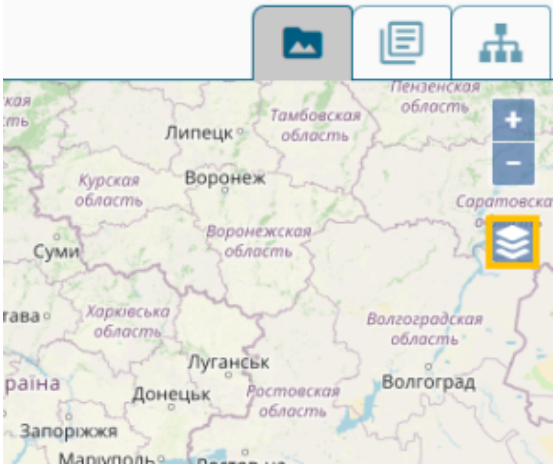


2. **Zoom (2)**

   Zoom in (by clicking on the ⊕) and out (⊖). This can be useful when selecting your context using map boundaries (entire rectangle shown in the interface) or administrative regions or river basins, which change as a user zooms and pans the map.



3. **Background map (3)**
   Select the background map you prefer. By default, ARIES uses OpenStreetMap as it currently offers the best user experience even at higher resolutions.



The user can switch to other available background maps as desired.