System of Environmental Economic Accounting

Extent Accounts

Session 5: Introduction to the Extent accounts (hands-on work and ARIES for SEEA model)

Regional Training Workshop on an Accounting Approaches to Climate Change Policy

Nairobi, 4-5 September 2023

United Nations

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- Introduction to Extent accounts
  I. Run the accounts in the ARIES for SEEA application
  II. Interpretation of the accounts

- Ecosystem Type Extent accounts

- Ecosystem Type model (Tier 1)
  I. Exercise on the excel

- Geospatial approach to SEEA EA compilation
  I. Global vs local datasets
  II. Data harmonization
  III. Definitions and datasets heterogeneity
  IV. How can ARIES for SEEA help?

SEEA EA Framework – Illustrative Example

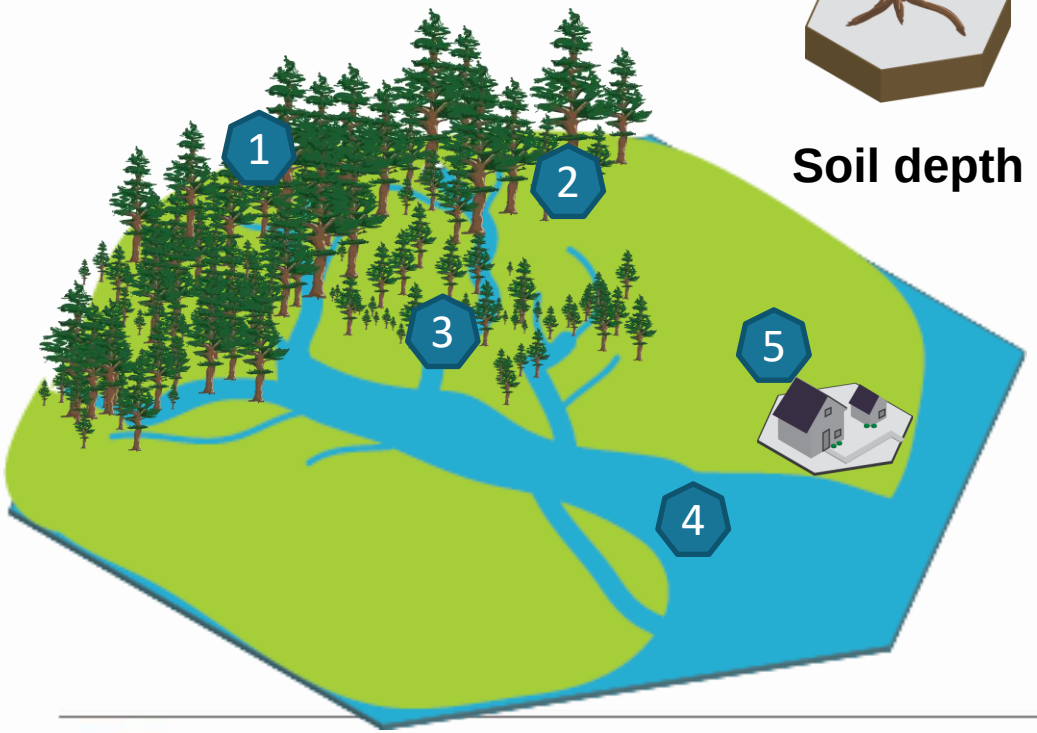
1 **Extent**

2 **Condition**

3 **Services**

4 **Benefits**

5 **Beneficiaries**



Soil depth

Water filtration

Clean water

People

Ecosystem types:

1. Forest ET
2. Shrubland ET
3. Wetland ET
4. Coastal ET
5. Urban ecosystem

SEEA EA Framework – Extent accounts

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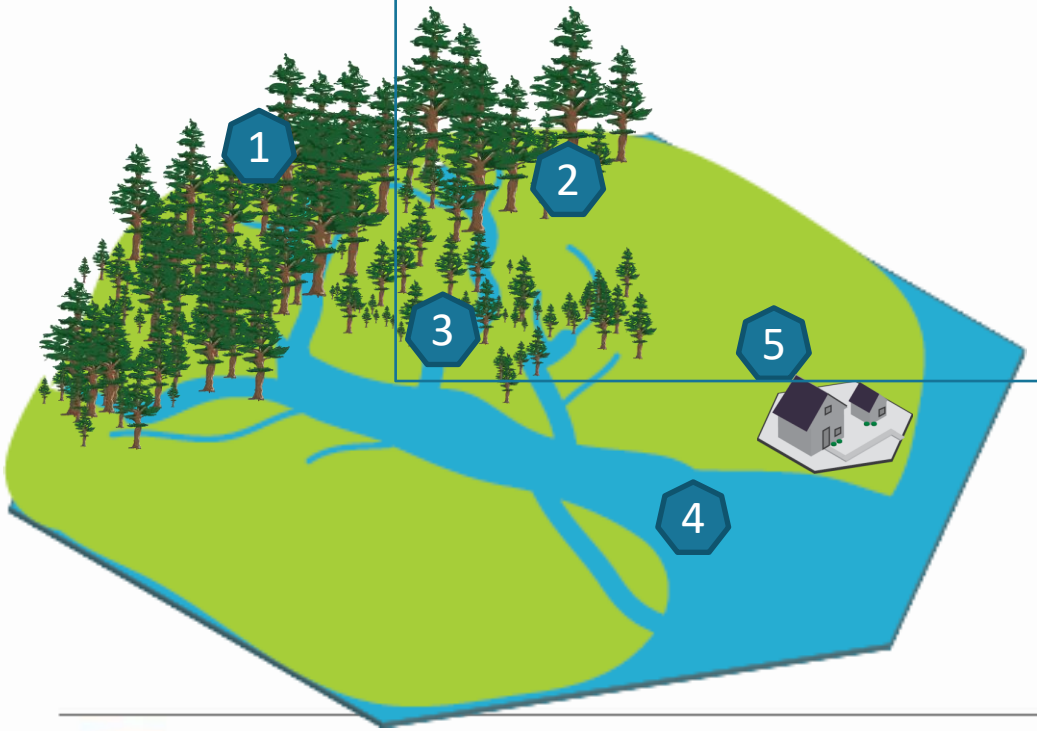
Extent



Ecosystem Type Extent accounts:

- *Net change account;*
- *Addition and Reduction account;*
- *Matrix of changes account*

Landcover Extent accounts

- *Net change account;*
- *Addition and Reduction account;*
- *Matrix of changes account*

Ecosystem Type Extent Accounts

- Basic breakdown of the other results compiled in the SEEA EA framework
- Also modelled using a multi-layer look-up table
- Based on Global Ecosystem Typology classification (https://global-ecosystems.org/)
- NCA-perspective – each BSU (Basic spatial unit) must be associated with a unique ET, but nature

i. Transitional biomes (level 2) are identified
ii. Transitional EFGs are more difficult to represent

Ecosystem Type

The IUCN GETs (Global ecosystem Typology - https://global-ecosystems.org/) are used as a proxy to identify ETs (Ecosystem Types) in the SEEA EA framework, which are used to break-down results by type of natural assets.

Methodology

Maps **29 ecosystem functional groups** (EFGs, primarily terrestrial & wetland) based on IUCN GET 2.0[1]. A second version, map up to 50 ETs, but needs to be further tested. The model was built based on:

- temperature,
- landform,
- elevation,
- aridity,
- land cover[2]

Potential improvements to the model and **challenges**

- Expand to more EFGs (especially freshwater/marine EFGs)
- Conceptual and data challenges remain
- Collaborate more closely with NSOs and IUCN GET team to bridge the gap for mapping EFGs at global level.

1: Keith, D. et al. 2020. IUCN Global Ecosystem Typology 2.0. IUCN: Gland, Switzerland. –
2: Using thresholds from Sayre, R., et al. 2020. An assessment of the representation of ecosystems in global protected areas using new maps of World Climate Regions and World Ecosystems. Global Ecology and Conservation 21:e00860.

Global vs. local datasets

Global data (e.g., ESA-CCI land cover) harmonise information for all countries on Earth, are **consistent over time**, enabling **direct comparison** **across years** & **countries**.

Local data are typically **more accurate, trusted, well-suited** for local/national use but are single observations. Combining & harmonizing multiple versions to obtain a time series can be **cumbersome to impossible**

ARIES
ARtificial Intelligence for Environment & Sustainability

Possible solution:

1. **Semantic** annotation provide **consistent definition** of the data

2. ARIES can help verify whether data are suitable for accounting by **identifying and correcting inconsistencies** (e.g., different projections or country boundaries, illogical transitions, no-data values)

Data harmonization and time series

Geographical boundaries

Data **extent** must be **aligned**

Spatial resolution (BSU)

Common **resolution**

(the **coarsest** resolution of model inputs can determine spatial resolution **for the entire series**)

Consistency over time

Main causes:

Technology used to obtain satellite imagery

Algorithm & methods to **process** the **satellite images**

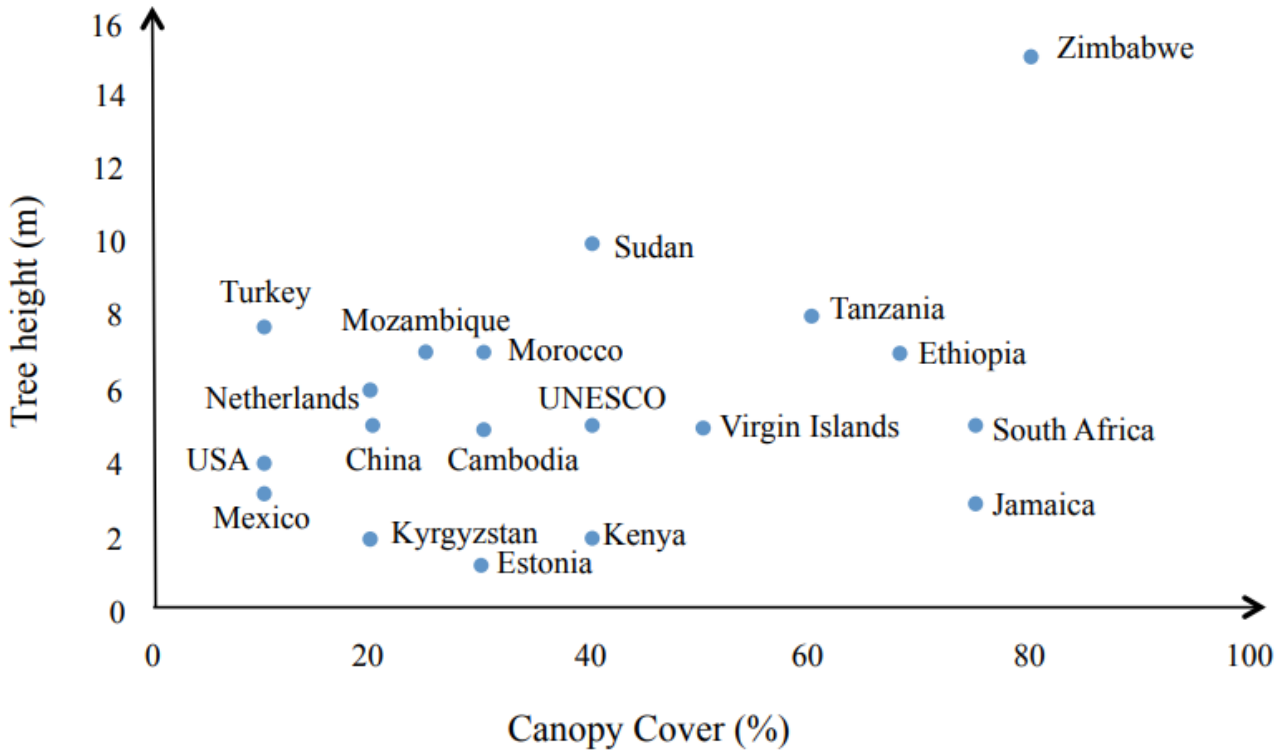
Different **classification**

Main correction:

Harmonize classifications & data content through **semantic annotation**

Correct **illogical transitions**

Forest definition heterogeneity



Di Gregorio, A. (2016). *Land cover classification system* (Vol. 3). Food & Agriculture Org.

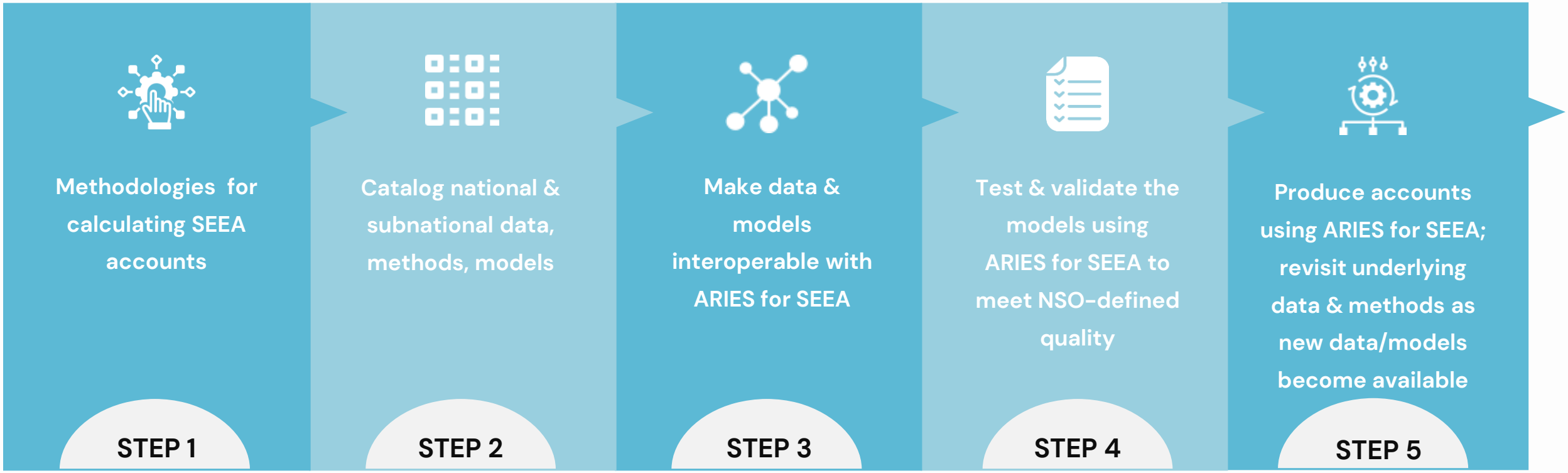
There are more than 350 definitions for *Forest*.

This graph shows some of the differences across countries in the definition of *Forest* based on two elements: tree height (in m) and canopy cover (in %).

Future opportunities

- **Strongly support Accounts-ready dataset** & similar initiatives, which are essential **to mainstream adoption of environmental accounting**
- Working towards future data becoming **accounts-ready**
- Move towards (semantic) interoperability of data & models. For instance:
  - > Custodians of data sets (global & national) to share data through the available platform
  - > Interconnect data through semantics / classifications
  - > For land use & cover, align with FAO-LCCS / UML, for Ecosystem Type align with IUCN GET through experts' input - authorities & classifications custodians play an important role

How can NSOs use ARIES for SEEA



Note: at no point above is there a step for "run ARIES for SEEA in your country using default global data/models," nor to "directly compare outputs derived from global data & models to results from step 4." Those steps could optionally happen, but publicizing results using global data/models too early may risk undermining confidence in the process.

Ecosystem accounts compilation

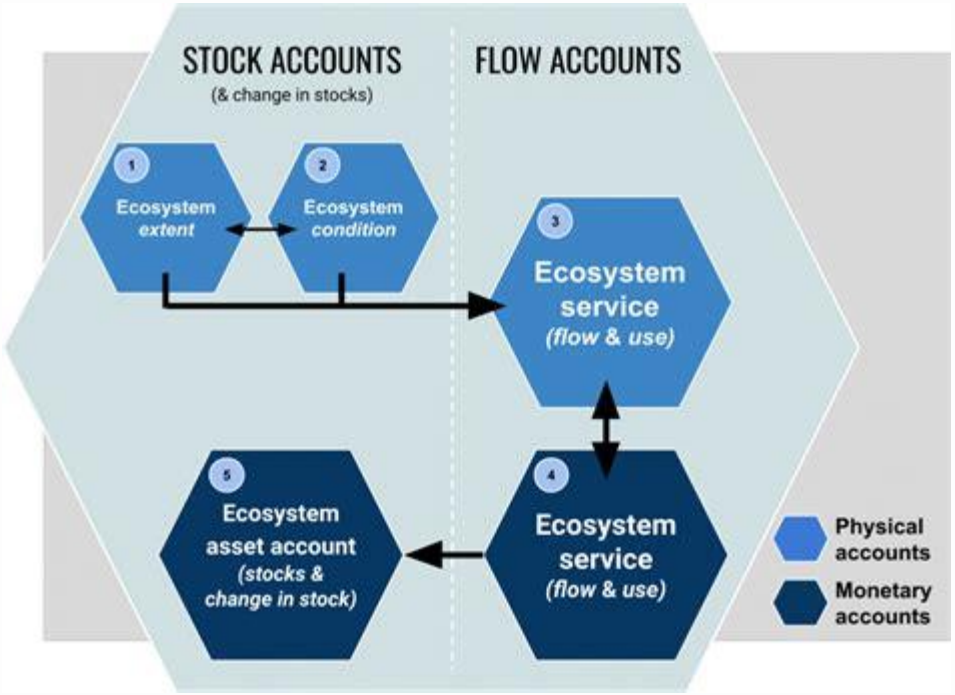
- Facing similar challenges comparable to compilation of energy accounts
- Potentially more challenging due to the need to **combine statistics with geospatial data**
- Challenges in **data collection and harmonization** of datasets across different areas (data may be already in-house but used for other goals) -> demand global production of **accounts-ready data**
- Biophysical modelling is even more complex due to the **uncertainty** added:

I. **Estimates** of biophysical output, a perfect model does not exist (geospatial vs statistics approach)
II. Learn **work-around** and find solutions when data is not perfect/available (be brave and smart!)

- Learn from one another / what's our role:

I. To **facilitate compilation** of accounts
II. Integrating national/local **(your) knowledge**
III. Building capacity together (in both ways)

- How to convince our government that EA is important? Tier1 demonstration



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Thank you for your attention!

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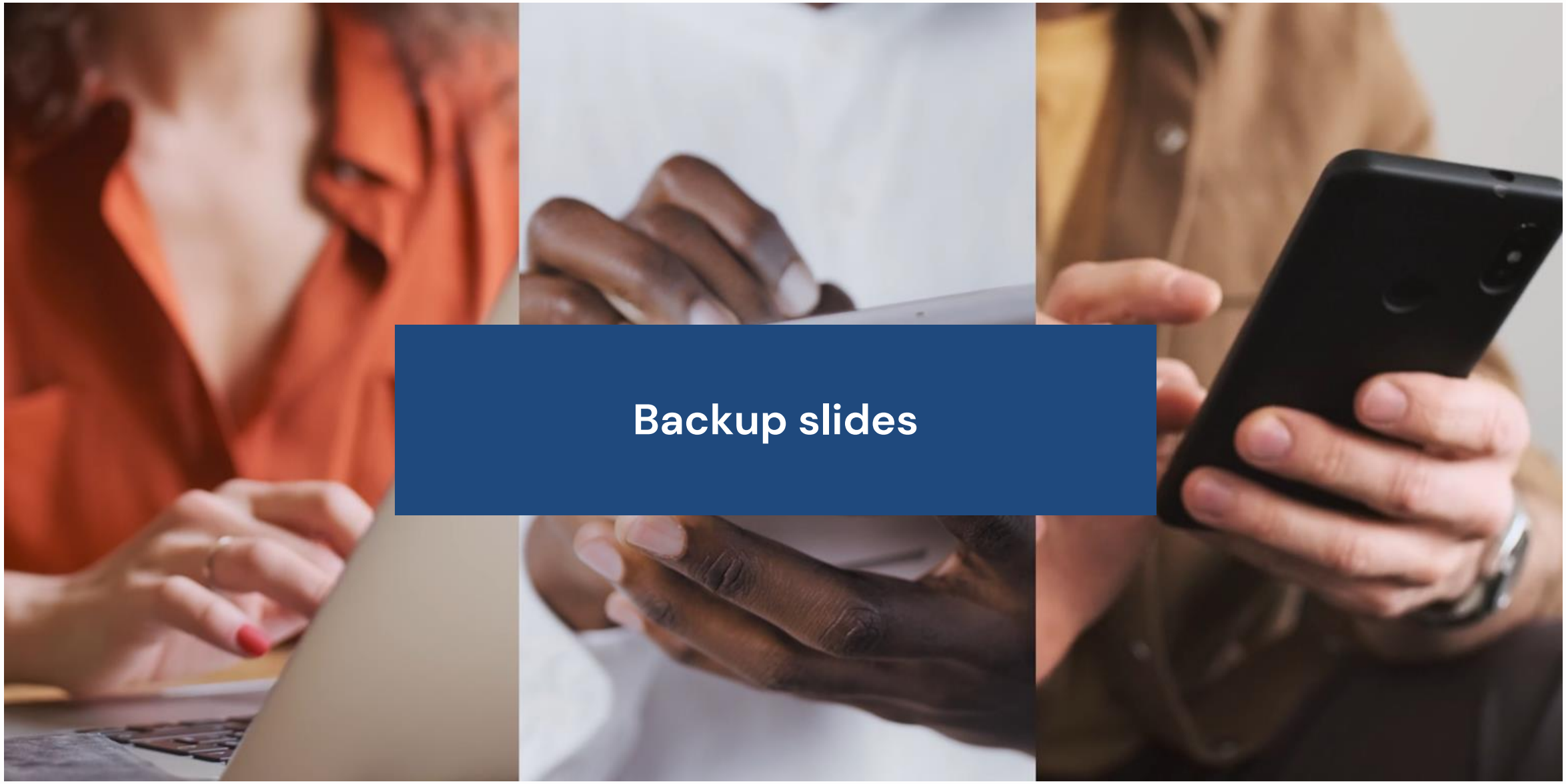


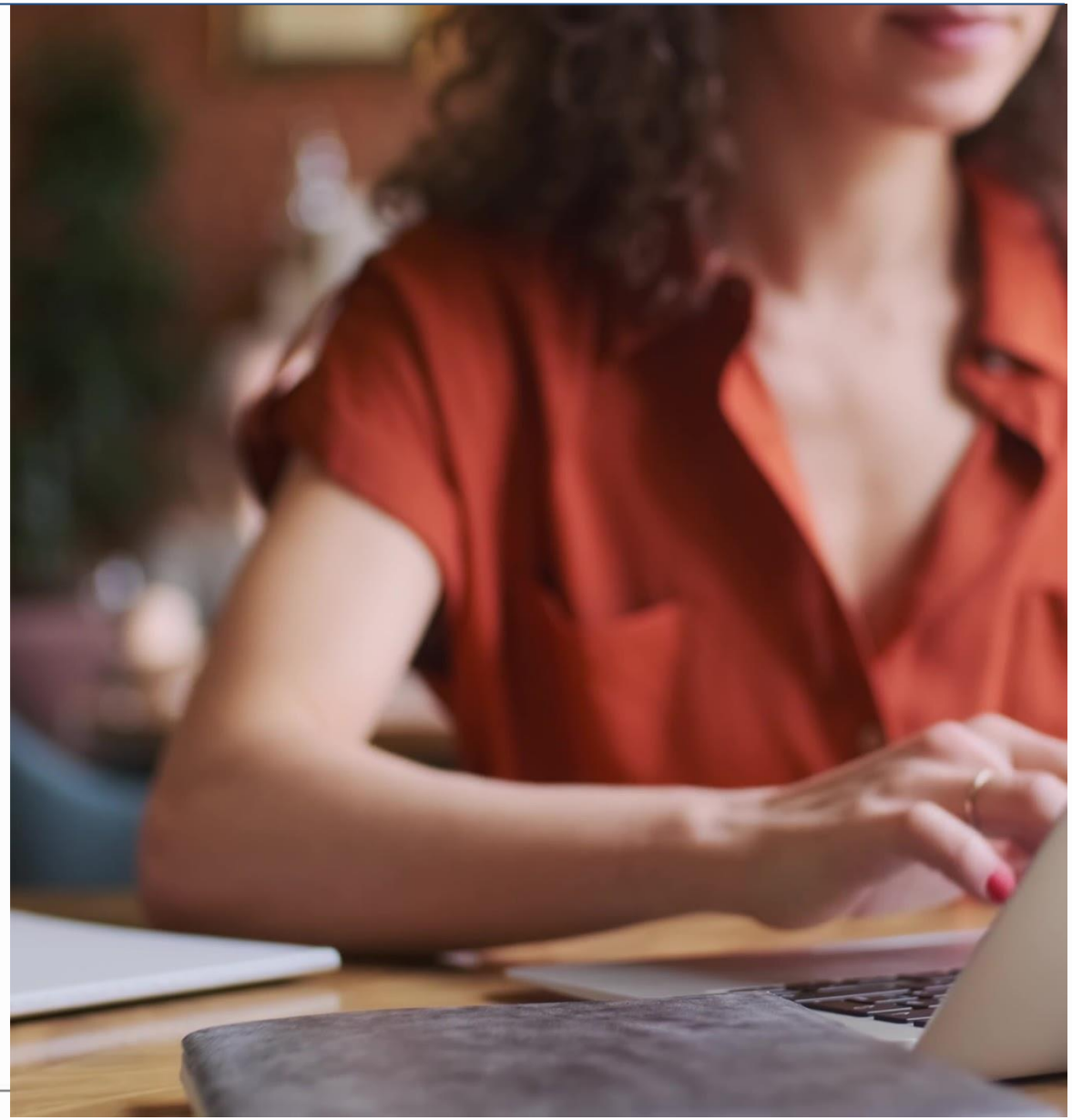
Backup slides

Access the application

1. The first step is to **register** in the Integrated Modelling hub
2. Once created a profile, **access the link** to launch the application from your browser (or download the Control Center – the software for modelers, and install it on your engine)
3. Use the intuitive user-interface to **compile account(s) everywhere on earth**

Useful links to explore

1. ARIES for SEEA explorer
2. Registration in the IM hub
3. Technical note
4. YouTube channel
5. Write us for support at support@integratedmodelling.org or for if you're interested to join our modelling journey at aries@integratedmodelling.org



Machine reasoning: How do can a machine pick the "best" data/model under which circumstances?

Initial prioritization, adjustable by advanced users:

1. Lexical scope (how "close" are the data/model to the namespace, project, within k.LAB repositories);
2. Trait concordance (shared attributes with concept requested);
3. Scale coverage (data with more complete coverage chosen preferentially);
4. Scale specificity (local models chosen over national, over global);
5. Inherency (models specified for location/scale-specific use chosen over generalized models);
6. Subjective concordance (user-specified metadata & weightings);
7. Evidence (data models chosen over computed models)
8. Reliability (human input that affects the reliability of a source of information)