

System of  
Environmental  
Economic  
Accounting

# Workshop objectives and overview of virtual training sessions

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# Workshop objectives

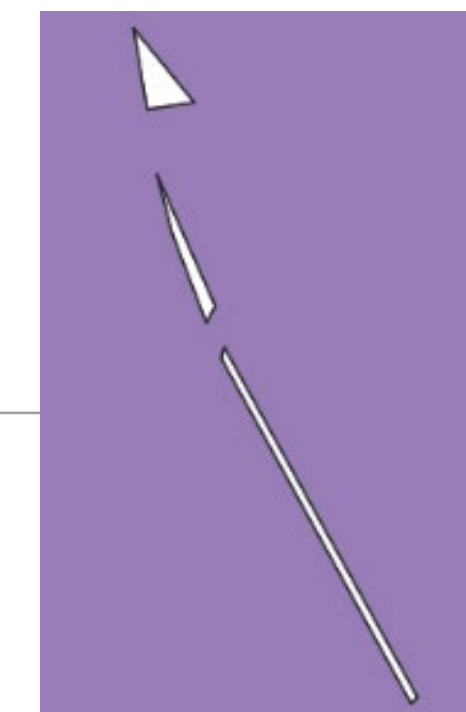
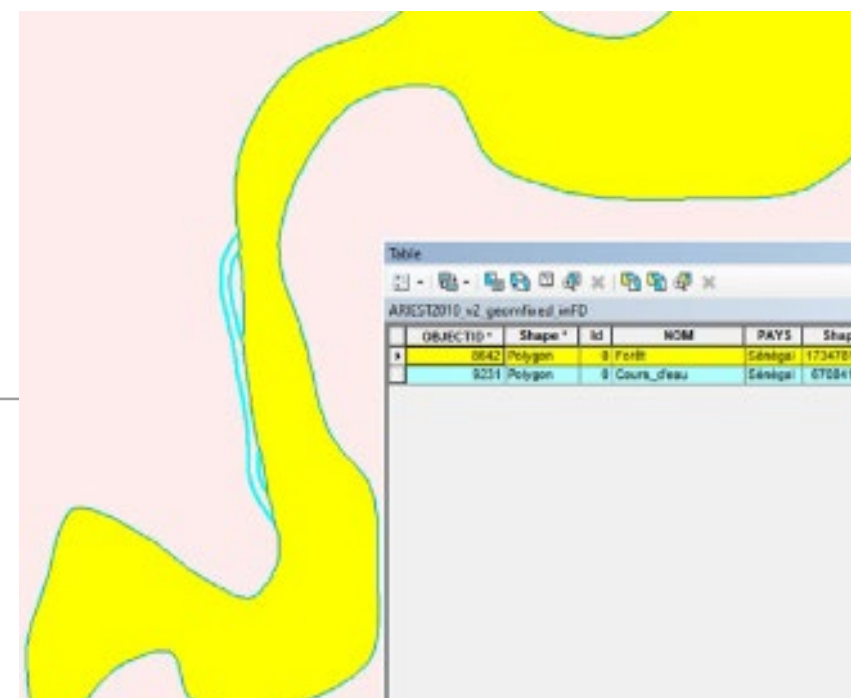
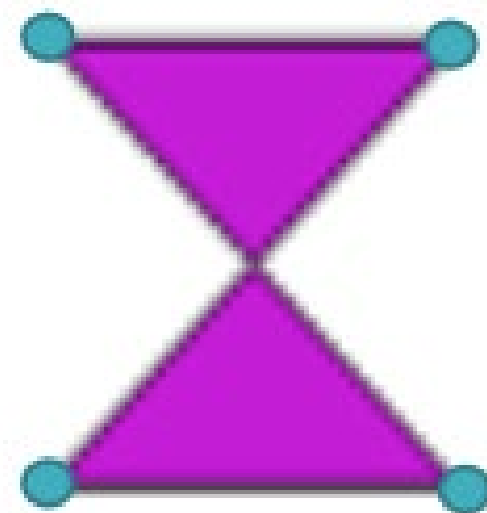
- Support compilation of land accounts for the Philippines for 2015 – 2020
  - > Review conceptual basis for land and ecosystem accounting
  - > Understand how GIS tools and ARIES for SEEA can be used for production of the accounts, particularly moving forward
  - > QGIS: Importance of account-ready data
  - > ARIES for SEEA
    - Integrating currently available data
    - Semantic annotation
    - Future modelling possibilities
- Establish a foundation for the compilation of ecosystem extent accounts
  - > Technically (i.e. ARIES for SEEA)
  - > Practically (available data sources)

# Work done thus far – setting context for virtual training

- Comparison of 2010 and 2015
  - > Illogical transitions detected
  - > Raw data and methodology used for maps differed
    - 2010: local data, 10 mt resolution
    - 2015: LandSat data, 30 mt resolution
    - 2010 map's built-up areas were generalized (i.e. other land cover types seen to suddenly “appear” in 2015 in previously urban areas)
  - > Suggest not to directly compare
- Focus on 2015 and 2020

# Virtual training

- Focus on CAR region (inland) for 2010 and 2015
- Designed to cover steps needed to create land accounts
- Many preparatory steps to ensure that data is “account-ready”
- Step 1: Preliminary data correction
  - > Three areas to check
    - Geometry errors, overlaps and gaps
    - Geometry errors: Invalid polygons (e.g. self-intersecting polygons)
    - Overlap issues: causes issues when vector is converted to raster. Which land cover class is assigned to a pixel?
    - Gaps: Converting from vector to raster can result in pixels with NoData values



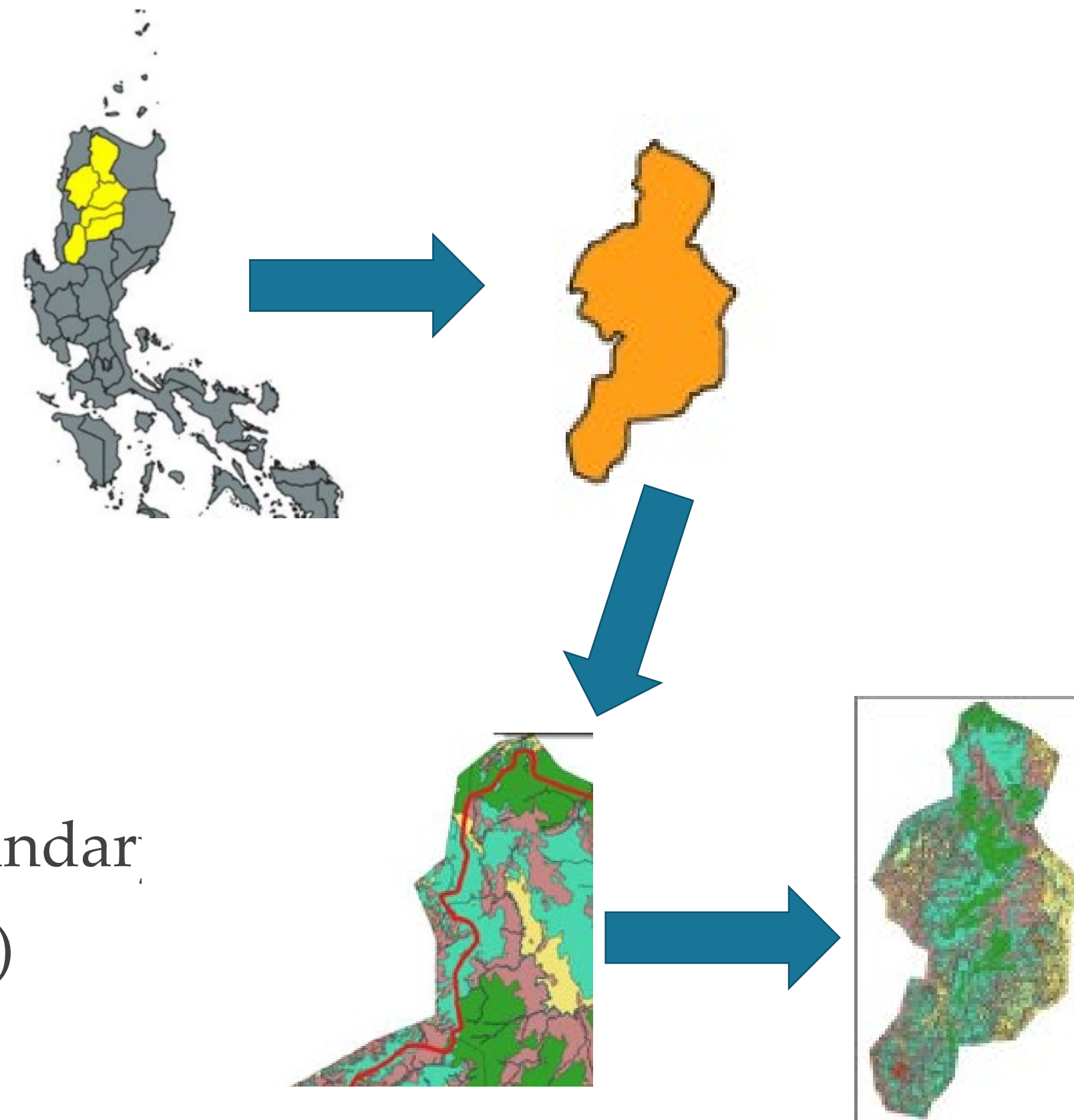
# Virtual training

- Step 2: Creating land cover change accounts

- > Reading in data

- Add boundary data
    - Select appropriate polygons within boundary
    - Dissolve
    - Added LC data
    - Ensure common projection, clip data to the boundary
    - Rasterize data (requirement to read into ARIES)
    - Create overlay of land cover change maps
    - Create accounts

- Manually, using QGIS functions (raster calculator—e.g. 4002, change from LC class 4 to class 2)
      - Use of semi-automatic classification plugin (SCP) (homework)





# Virtual training

- Step 3: Examining the land cover change matrix
  - > Important quality assurance step: check for “illogical” changes
  - > Why do we need to take a spatial point of view, and not just a statistical one?
    - Land cover change matrix displays NET changes
  - > Prioritize those polygons that show improbable transitions by focusing on those with the largest maximum area
    - Use landcover change raster (2010 and 2015)
    - Polygonize the raster (each polygon provided with a raster of a specific LC change type)
    - Calculate area of each polygon
    - Create table with maximum area of polygons having a particular transition
- Step 4: Further investigate problematic polygons and correct as needed (not completed)
  - > Can methodology or metadata explain anything?
  - > Ecological experts, regional offices
  - > Ground truthing

# Virtual training

- Step 5: ARIES for SEEA
  - > Integrate account-ready data using the k.modeler
    - k.modeler allows to you to integrate local data, access ARIES network, develop models, annotate data
    - Web-based explorer only uses global data
    - We are using the data locally, but also possible to use data through geoserver
    - Rasterized maps
    - Need projection that uses Open Geospatial Consortium (OGC) standards
  - > Defining context (space, i.e. shape file; resolution/grid; projection; time)
  - > Semantic annotation
    - Creating the crosswalk of national classification used, with ARIES land cover ontology (based on ESA CCI, Corrine land cover and National Land Cover Database classes)
    - <https://bitbucket.org/integratedmodelling/im/src/master/src/landcover.kim>



# Virtual training

- Step 5: ARIES for SEEA
  - > Semantic annotation
    - Creating the crosswalk of national classification used, with ARIES land cover ontology (based on ESA CCI and Corrine land cover classes)
    - <https://bitbucket.org/integratedmodelling>

Table 1. Land Cover Categories Definition based on DENR Memorandum Circular 2005-005

LAND COVER CATEGORIES	DEFINITION
1. Closed Forest	Formations where trees in the various storeys and the undergrowth cover a high proportion (>40 percent) of the ground and do not have a continuous dense grass layer (cf. The following definition). They are either managed or unmanaged forests, primary or in advanced state of reconstitution and may have been logged-over one or more times, having kept their characteristics of forest sands, possibly with modified structure and composition.
2. Open Forest	Formations with discontinuous tree layer with a coverage of at least 10 percent and less than 40 percent. They are either managed or unmanaged forests, in initial state of succession.



```
model 'Local:alessio.bulckaen:un.seea.aries.psa:lc_4326_5
      'Local:alessio.bulckaen:un.seea.aries.psa:lc_4326_5
as landcover:LandCoverType classified into
landcover:NonIrrigatedArableLandHerbaceous if 1,
landcover:OpenMixedForest if 2,
landcover:Shrubland if 3,
landcover:InlandWaterBody if 4,
landcover:ClosedMixedForest if 5,
landcover:Grassland if 6,
landcover:BareArea if 7,
landcover:ArtificialSurface if 8,
landcover:InlandSwamp if 9,
landcover:WaterBody if 10,
landcover:PermanentCropland if 11,
landcover:Wetland if 12;
landcover:SeaAndOcean if 13;
```



# Virtual training

- Step 5: ARIES for SEEA
  - > Run the model
    - Drag and drop the context into the Explorer

The screenshot displays the ARIES for SEEA interface. On the left, a map of the Philippines is shown with a yellow header bar indicating 'Philippines north 300m 4326'. A legend for 'Land cover type' is visible. On the right, two data tables are displayed:

**Table 1. Gains and losses in land cover types**

**Table 2. Pairwise land cover change**

**Table 1. Selected land cover types**

	Artificial surface	Bare area	Closed mixed forest	Grassland	Inland swamp	Inland water body	Non irrigated arable land herbaceous	Open mixed forest	Permanent cropland	Shrubland	Water body	Wetland	Unacco
Opening area 2010	198.84	1251.05	4240.22	17934.73	1480.71	396.81	13409.72	73.25	9034.48	16617.99	901.21	17.48	103.29
Expansions	62.70	1279.44	2753.74	4006.90	813.18	262.90	4347.72	30.65	1867.77	4100.38	535.56	8.96	23.68
Regressions	54.92	823.65	1907.00	3006.26	406.60	217.43	3737.68	31.06	1843.05	7310.64	487.60	4.00	57.69
Net change	7.78	455.79	846.74	994.64	206.58	45.47	610.04	-0.41	24.72	-3210.25	47.96	4.95	-34.01
Closing area at start of 2016	206.62	1706.84	5066.96	18929.36	1687.30	442.27	14019.76	72.83	9059.20	13407.73	949.18	22.43	69.29

**Table 2. Selected land cover types**

	Artificial surface	Bare area	Closed mixed forest	Grassland	Inland swamp	Inland water body	Non irrigated arable land herbaceous	Open mixed forest	Permanent cropland	Shrubland	Water body	Wetland
Artificial surface	143.92	1.17	0.27	23.15	9.51	0.45	0.00	10.17	0.00	1.61	6.10	1.60
Bare area	3.31	427.39	34.23	364.81	52.78	5.81	56.37	2.58	5.55	285.13	11.29	0.18
Closed mixed forest	1.34	65.82	2333.22	691.61	23.45	21.46	150.42	0.62	33.78	886.56	28.15	0.18
Grassland	37.10	455.28	272.43	14928.47	567.94	63.88	171.63	5.08	8.82	1218.27	200.14	3.99
Inland swamp	8.52	116.84	13.04	393.60	874.12	4.02	6.17	1.25	0.18	45.58	12.89	0.18
Inland water body	0.71	5.38	44.95	46.54	4.55	179.38	5.28	0.62	0.89	26.36	56.72	0.89
Non irrigated arable land herbaceous	0.00	94.15	265.04	318.94	26.75	10.99	9672.05	1.16	1665.45	1290.63	63.06	0.00
Open mixed forest	2.76	3.76	0.35	6.32	0.72	0.53	0.80	42.18	0.27	9.86	3.65	1.42
Permanent cropland	0.00	56.85	53.10	43.17	2.76	8.04	1407.80	1.07	7191.43	238.79	28.90	0.00
Shrubland	2.60	499.95	2024.04	1917.33	107.38	31.08	2507.25	2.22	129.56	9307.35	123.52	0.44
Water body	4.84	15.34	39.65	167.88	11.54	101.88	39.40	3.74	21.03	82.21	413.62	0.09
Wetland	0.27	0.09	0.00	1.78	0.09	0.09	0.00	0.54	0.00	0.62	0.54	13.48
Unaccounted	1.25	4.83	6.64	5.78	5.72	14.67	2.60	1.61	2.23	11.74	0.63	0.00

# Training workshop

- Small group -> please feel free to ask questions
- At the end of the training, have some results
- Next steps? -> follow up on illogical changes with relevant experts as needed
- Replicate with other regions to compile national level accounts

## Your inputs?

- What are your expectations for the workshop?
- We would like to hear from you: What is the best way to collaborate going forward? What can we do to help to ensure that this exercise is carried forward sustainably?