



Republic of the Philippines

Philippine Statistics Authority



# Country Experiences in Compiling Physical Land Asset Accounts of the Philippines

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# Outline:

- Philippine Statistics Authority
- Institutional Mechanism
- Policy Drivers
- Frameworks
- PSA Compilation of Environmental Accounts and Statistics
- PSA-UNSD Project
  - Work done
  - General Methodology
  - Data Sources
  - Challenges
  - Ways forward



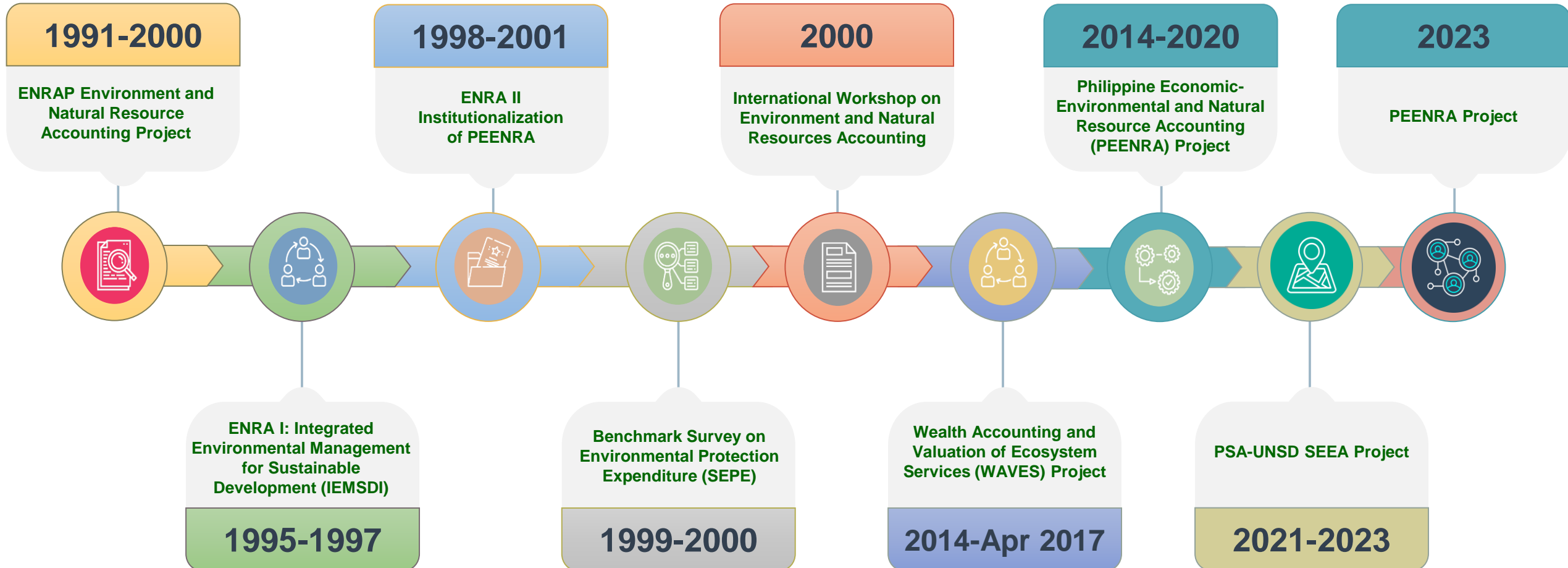
The **Philippine Statistics Authority (PSA)** is the **central authority on statistics, generation of national accounts/satellite accounts, coordinator of the Philippine Statistical System (PSS)**, administrator of civil registration functions and Philippine Identification System (PhilSys).



The **Environment and Natural Resources Accounts Division (ENRAD)** of the **Macroeconomic Accounts Service** have the following functions:

- Development and compilation of environmental-economic accounts, as well as ecosystem accounts
- Collection and maintenance of statistics and indicators on environment, climate change, disasters
- Coordination and technical support to statistical inter-agency committees, task forces, and technical working groups on environment statistics

# Historical Development of NCA in the Philippines



# Institutional Mechanism for Envi Accounts and Statistics



The **Inter-Agency Committee on Environment and Natural Resources Statistics (IACENRS)** serves as forum for discussion on the development, compilation, dissemination, and use of environment and natural resources statistics, including climate change, disaster statistics and other environment/ecosystem related information.



TWG on Mineral Resources Statistics

TWG on Energy Resources Statistics

TWG on Water Resources Statistics

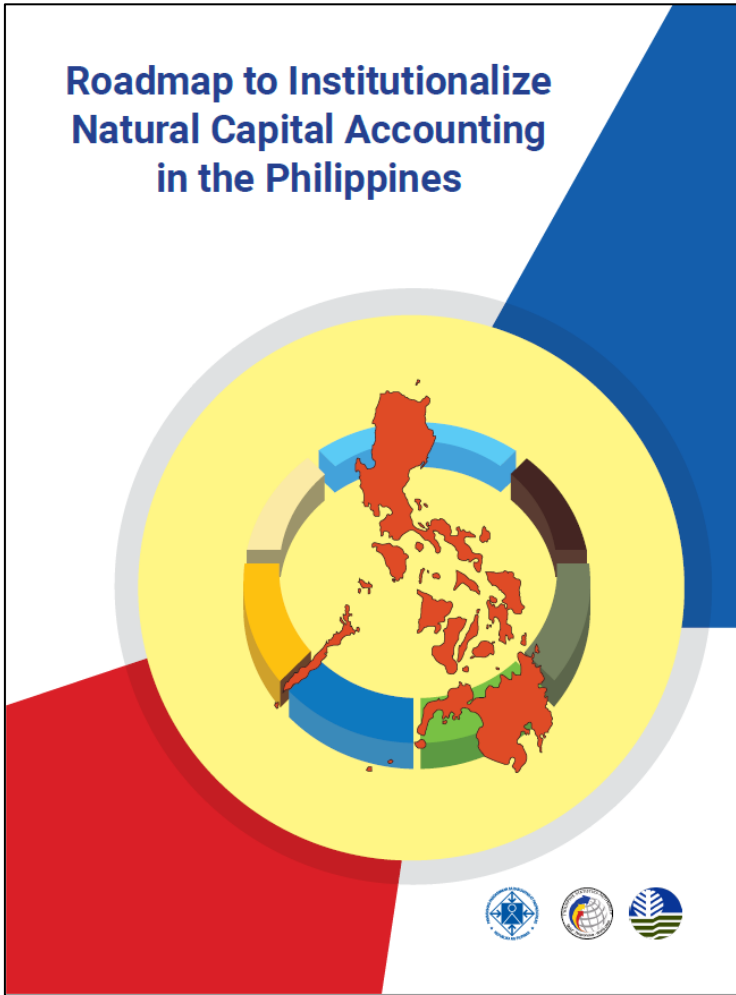
TWG on Land and Soil Resources Statistics

TWG on Natural Capital Accounts

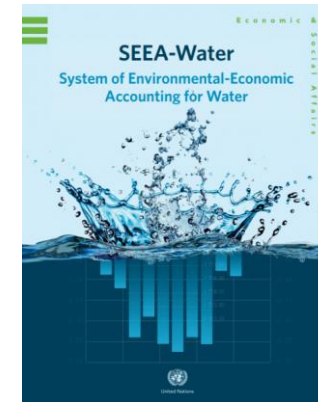
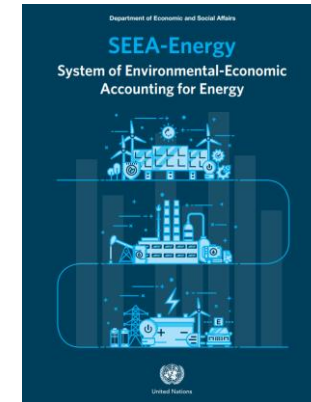
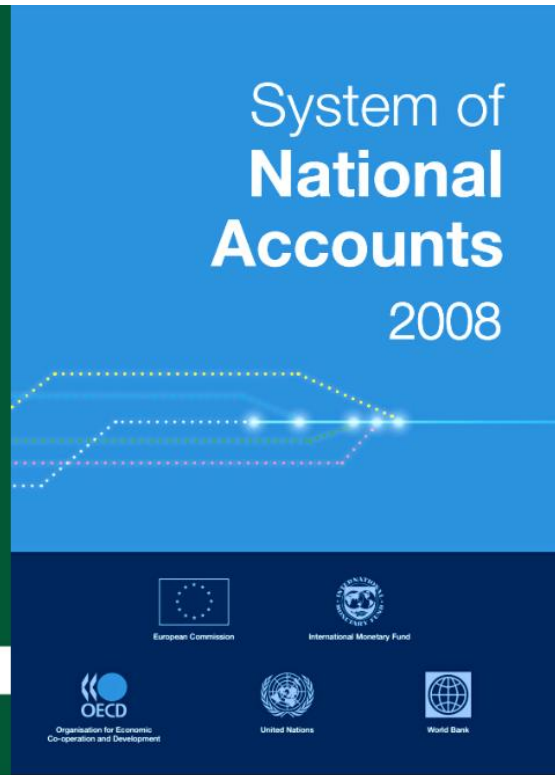
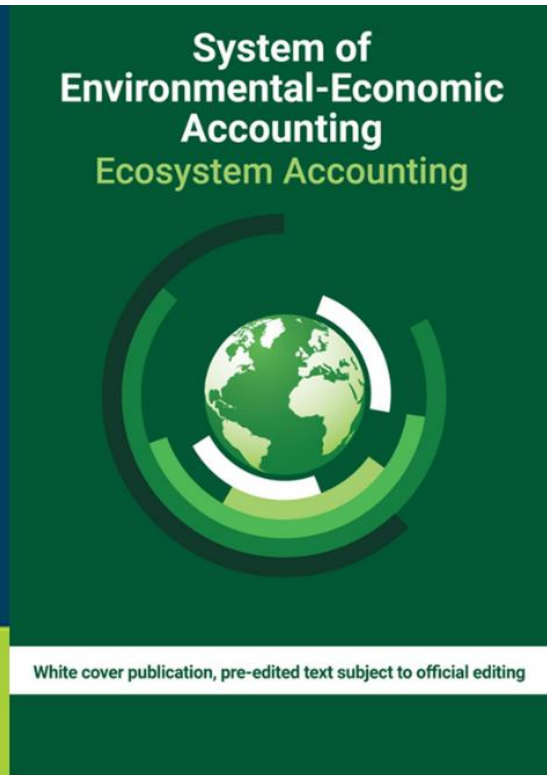
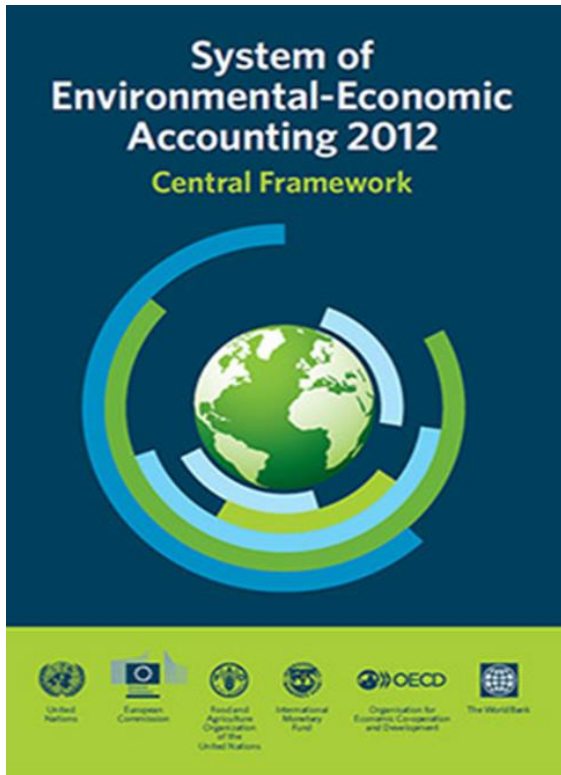
TWG on Climate Change and Disaster related Statistics



# Policy drivers



# Frameworks

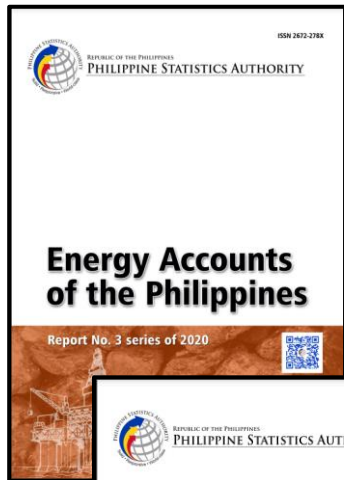




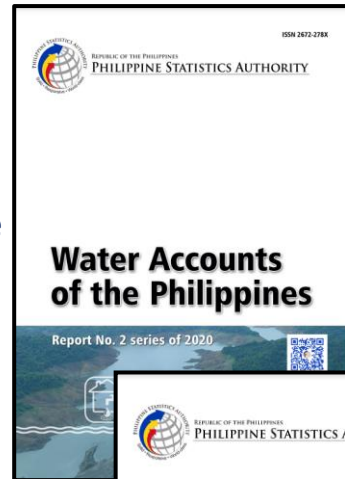
# Environmental-Economic Accounts and Statistics

The PSA regularly releases the following accounts and statistical compilation:

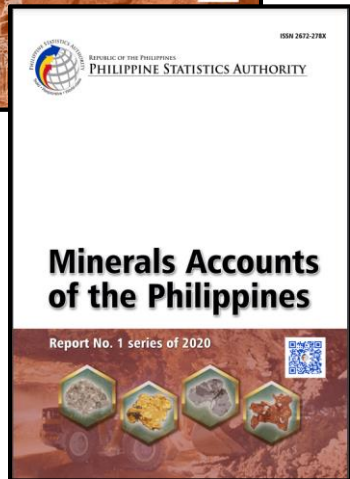
The PSA publications:



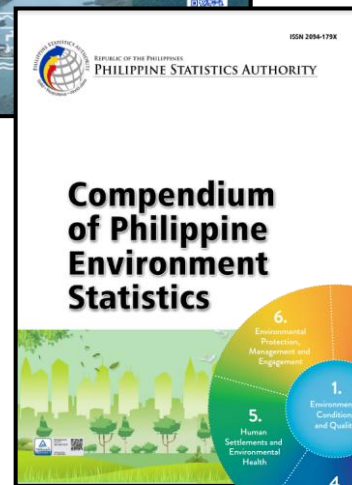
Asset Accounts for Coal, Oil, Natural Gas, and Condensate



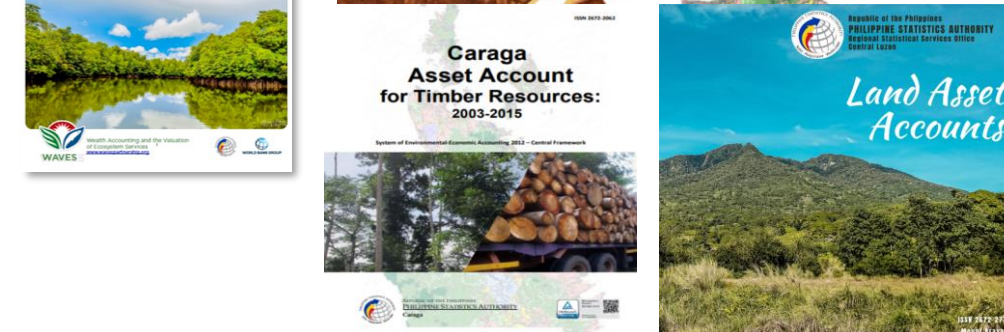
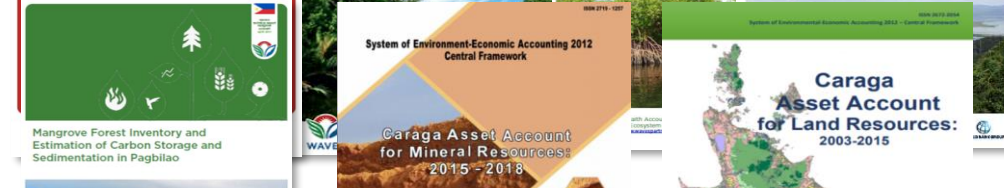
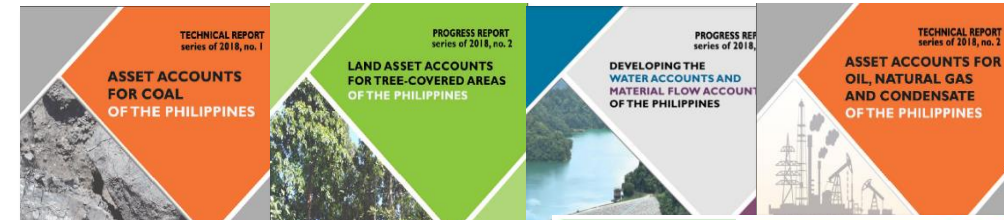
Flow Accounts for Water Resources



Asset Accounts for Gold, Copper, Nickel, and Chromite



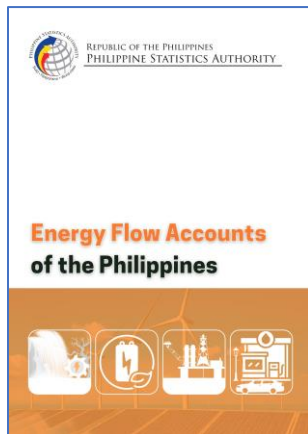
Compilation of statistics following the FDES Components



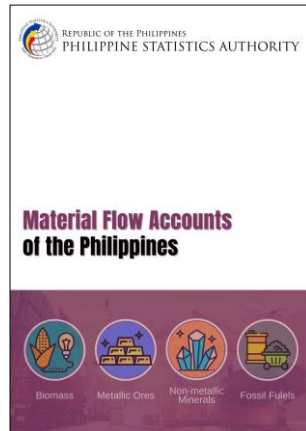


# Environmental-Economic Accounts and Statistics

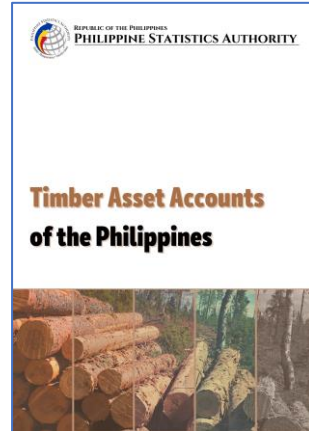
## On-going Research and Development



allows consistent monitoring of the supply and use of energy, by energy type



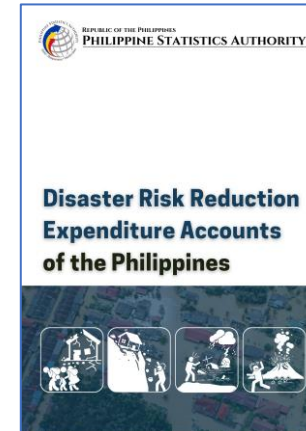
Measures natural resource extraction, trade in natural resources, waster disposal and emissions



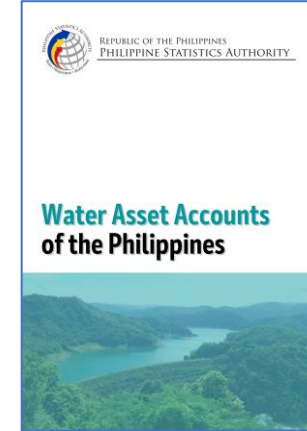
It provides information for use in assessing and managing changes in timber resources and the services they provide



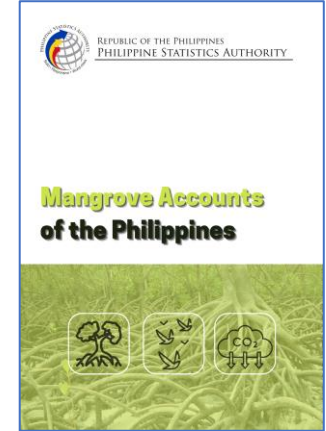
Compiles species accounts for threatened flora and fauna species



Monitors the progress related to actionable priorities in the Sendai Framework and SDG Targets



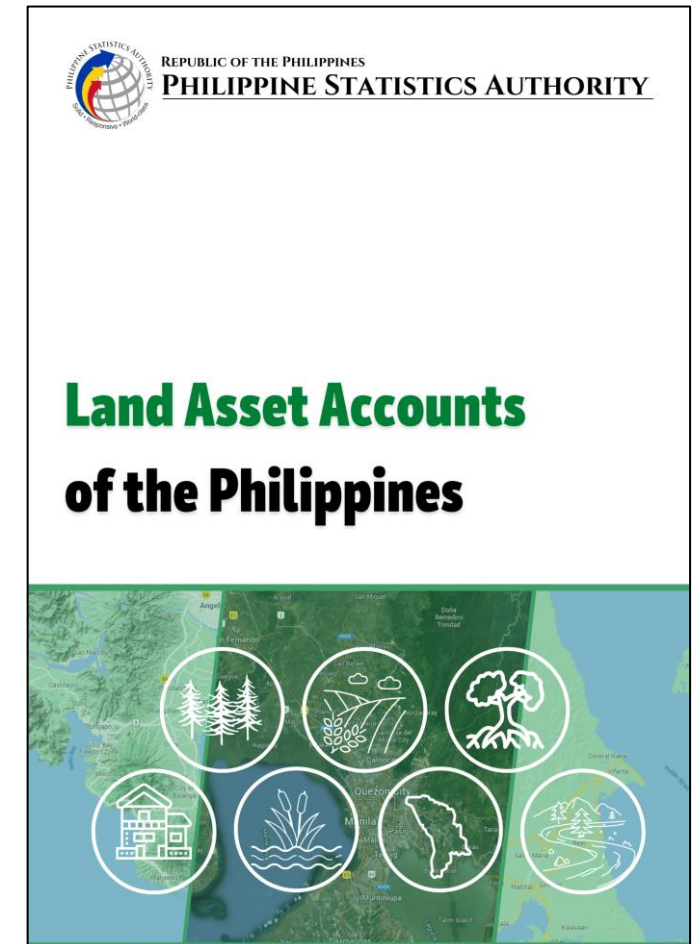
Measures the inflows and outflows of water to and from the land surface and subsurface, and on the destination of these flows



Measures the extent, condition, and services of mangroves

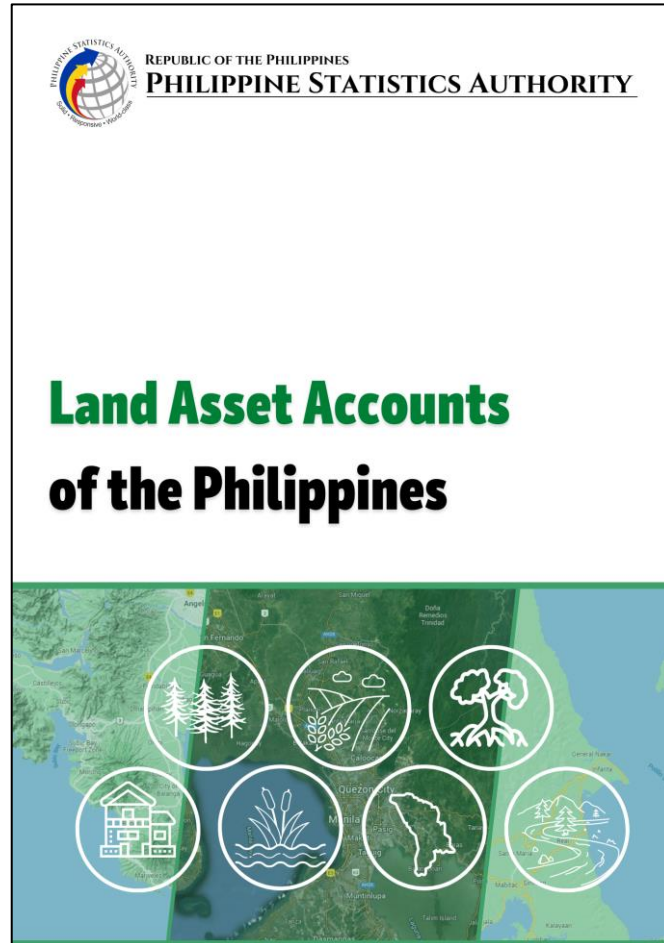
## “Environmental-Economic Accounting for Evidence-based Policy in Africa and Asia” Project

- A collaborative effort between the Philippine Statistical Authority and the United Nations Statistics Division.
- It aims to address the technical and institutional barriers to the establishment of routinely produced environmental-economic accounts at the national level by national statistical offices.
- Output includes a) land accounts, b) ecosystem extent accounts, and c) Action Plan for Philippine SEEA



# Land Asset Accounts of the Philippines

## Land Cover Classes Bridge Table

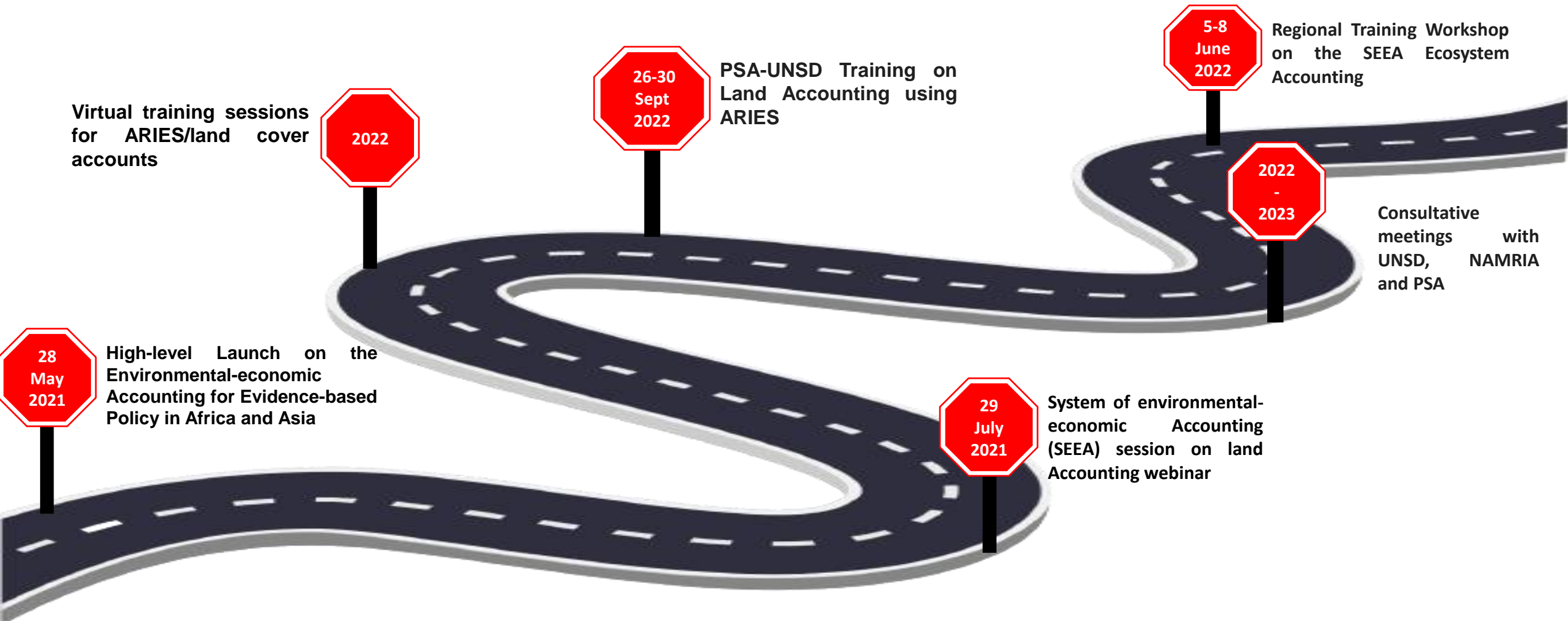


- Land delineation and enumeration within various assets
- Land cover includes biological surface

| AGG12 class     | SEEA Class  |
|-----------------|---|
| Built-up        | Artificial surfaces (including urban and associated areas)        |
| Grassland       | Grassland   |
| Annual crop     | Herbaceous Crops  |
| Fishpond        | Inland water bodies   |
| Inland water    |   |
| Mangrove forest | Mangrove  |
| Brush/Shrubs    | Shrub covered areas   |
| Marshland/swamp | Shrubs and/or herbaceous vegetation, aquatic or regularly flooded |
| Open/barren     | Terrestrial barren land   |
| Open forest     | Tree covered areas  |
| Closed forest   |   |
| Perennial crop  | Woody crops   |

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# Work Done for the ARIES for SEEA

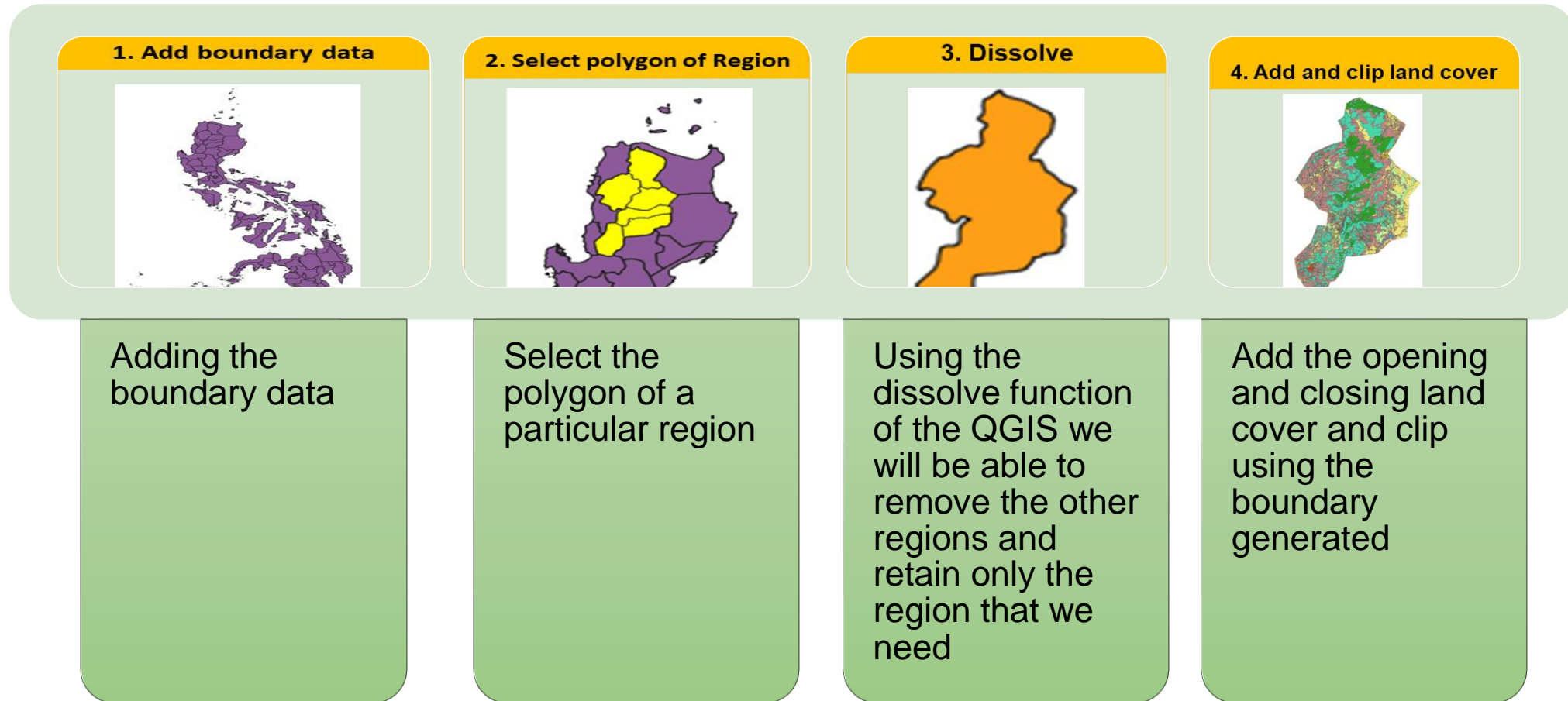




## Adjusted Land Cover Maps

### Methodology

#### A. Preparation of Land Cover Maps



## Adjusted Land Cover Maps

### Methodology

#### B. Geometry/Topology Checking and elimination of gaps and overlaps

##### 1. Identify geometry error



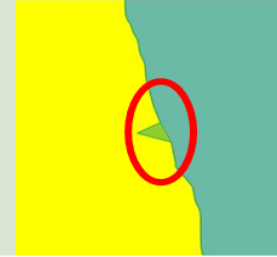
Using the “check validity” function of QGIS application we will be able to identify the geometry errors

##### 2. Correct geometry error



Using the “fix geometries” function, we can correct the geometry errors

##### 3. Identify gaps



Identifying the gaps and overlaps

##### 4. Identify Overlap

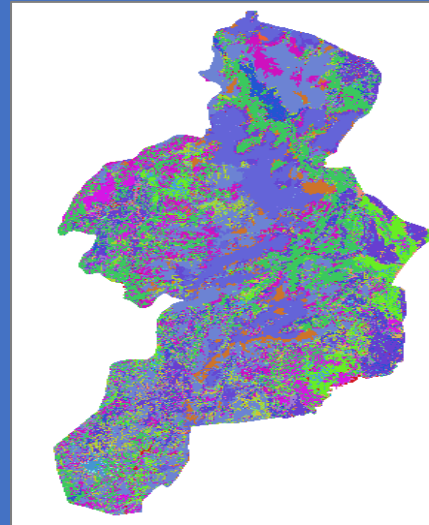
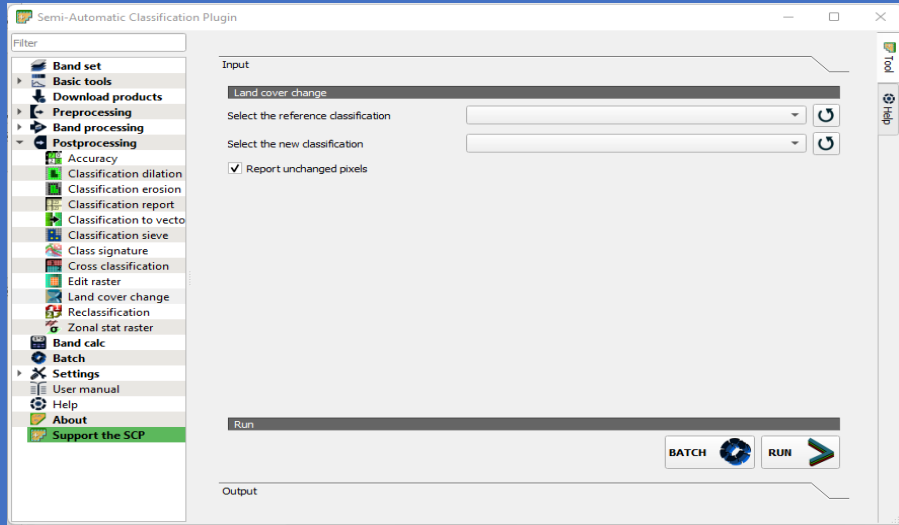


Eliminating the gaps and overlaps

# Adjusted Land Cover Maps

## Methodology

### C. Post Processing of Land cover change using SCP Plug in



Rasterizing the processed 2015 and 2020 Land Cover data and postprocessing using the Semi-Automatic classification Plugin or the SCP plug-in of the QGIS Application and generating the Land cover change matrix.

```
> LAND COVER CHANGE MATRIX [metre^2]
> NewClass
```

| V_ReferenceClass | 1.0        | 2.0        | 3.0        | 4.0       | 5.0        | 6.0        |
|------------------|------------|------------|------------|-----------|------------|------------|
| 1.0              | 1583865000 | 88180000   | 437742500  | 32537500  | 417500     | 68917500   |
| 2.0              | 197877500  | 3716697500 | 693870000  | 18637500  | 451145000  | 126107500  |
| 3.0              | 431882500  | 1246140000 | 3314100000 | 36955000  | 36387500   | 879960000  |
| 4.0              | 27500000   | 14712500   | 30132500   | 112602500 | 3972500    | 13765000   |
| 5.0              | 5187500    | 451410000  | 75110000   | 8330000   | 2010852500 | 3982500    |
| 6.0              | 112400000  | 43440000   | 311345000  | 8540000   | 2462500    | 867205000  |
| 7.0              | 19560000   | 915000     | 5800000    | 22352500  | 0          | 23292500   |
| 8.0              | 26615000   | 3707500    | 14545000   | 642500    | 2500       | 1790000    |
| 10.0             | 5820000    | 865000     | 7132500    | 137500    | 0          | 2152500    |
| Total            | 2410707500 | 5566067500 | 4889777500 | 240735000 | 2505240000 | 1987172500 |

# Adjusted Land Cover Maps

## Methodology

### D. Identification of Improbable Transitions

| CrossClassCode | NewClass | ReferenceClass | PixelSum | Area [metre^2] | Area ha | LC name 2015   | LC name 2020    | Improbable transitions (1 = improbable transition) |
|----------------|----------|----------------|----------|----------------|---------|----------------|-----------------|--|
| 7              | 1        | 10             | 219058   | 21905800       | 2190.58 | Brush/Shrubs   | Closed Forest   | 1  |
| 16             | 1        | 14             | 49281    | 4928100        | 492.81  | Grassland      | Closed Forest   | 1  |
| 19             | 1        | 16             | 31883    | 3188300        | 318.83  | Annual Crop    | Closed Forest   | 1  |
| 37             | 1        | 20             | 398      | 39800          | 3.98    | Built-up       | Closed Forest   | 1  |
| 52             | 4        | 20             | 103000   | 10300000       | 103     | Built-up       | Open Forest     | 1  |
| 66             | 7        | 20             | 7200     | 720000         | 72      | Built-up       | Mangrove Forest | 1  |
| 76             | 10       | 19             | 8589     | 858900         | 85.89   | Fishpond       | Brush/Shrubs    | 1  |
| 81             | 10       | 20             | 187488   | 18748800       | 1874.88 | Built-up       | Brush/Shrubs    | 1  |
| 88             | 14       | 17             | 724729   | 72472900       | 7247.29 | Perennial Crop | Grassland       | 1  |
| 103            | 14       | 20             | 50363    | 5036300        | 503.63  | Built-up       | Grassland       | 1  |
| 113            | 16       | 20             | 799013   | 79901300       | 7990.13 | Built-up       | Annual Crop     | 1  |
| 119            | 17       | 20             | 606776   | 60677600       | 6067.76 | Built-up       | Perennial Crop  | 1  |
| 125            | 19       | 20             | 6388     | 638800         | 63.88   | Built-up       | Fishpond        | 1  |
| 131            | 21       | 20             | 13906    | 1390600        | 139.06  | Built-up       | Inland Water    | 1  |
| 154            | 9999     | 20             | 18543    | 1854300        | 185.43  | Built-up       | Sea and ocean   | 1  |

Identifying the improbable transitions after the generation of Land Cover Change Matrix

| Improbable transitions |                  |               |             |                 |              |             |           |             |                |          |          |              |               |
|------------------------|------------------|---------------|-------------|-----------------|--------------|-------------|-----------|-------------|----------------|----------|----------|--------------|---------------|
|                        | V_ReferenceClass | Closed Forest | Open Forest | Mangrove Forest | Brush/Shrubs | Open/Barren | Grassland | Annual Crop | Perennial Crop | Fishpond | Built-up | Inland Water | Sea and ocean |
| 193                    |                  |               |             |                 |              |             |           |             |                |          |          |              |               |
| 194                    |                  |               |             |                 |              |             |           |             |                |          |          |              |               |
| 195                    |                  |               |             |                 |              |             |           |             |                |          |          |              |               |
| 196                    |                  | 1             | 4           | 7               | 10           | 13          | 14        | 16          | 17             | 19       | 20       | 21           | 9999          |
| 197                    | Closed Forest    | 1             | 0           | #N/A            | 0            | 0           | 0         | 0           | 0              | #N/A     | 0        | 0            | #N/A          |
| 198                    | Open Forest      | 4             | 0           | #N/A            | 0            | 0           | 0         | 0           | 0              | #N/A     | 0        | 0            | 0             |
| 199                    | Mangrove Forest  | 7             | #N/A        | 0               | 0            | 0           | 0         | 0           | 0              | 0        | 0        | 0            | 0             |
| 200                    | Brush/Shrubs     | 10            | 1           | 0               | 0            | 0           | 0         | 0           | 0              | 0        | 0        | 0            | 0             |
| 201                    | Open/Barren      | 13            | 0           | 0               | 0            | 0           | 0         | 0           | 0              | 0        | 0        | 0            | 0             |
| 202                    | Grassland        | 14            | 1           | 0               | 0            | 0           | 0         | 0           | 0              | 0        | 0        | 0            | 0             |
| 203                    | Marshland/Swamp  | 15            | #N/A        | 0               | #N/A         | #N/A        | 0         | #N/A        | #N/A           | #N/A     | #N/A     | 0            | #N/A          |
| 204                    | Annual Crop      | 16            | 1           | 0               | 0            | 0           | 0         | 0           | 0              | 0        | 0        | 0            | 0             |
| 205                    | Perennial Crop   | 17            | 0           | 0               | 0            | 0           | 1         | 0           | 0              | 0        | 0        | 0            | 0             |
| 206                    | Fishpond         | 19            | #N/A        | #N/A            | 0            | 0           | 0         | 0           | 0              | 0        | 0        | 0            | 0             |
| 207                    | Built-up         | 20            | 1           | 1               | 1            | 0           | 1         | 1           | 1              | 1        | 0        | 1            | 1             |
| 208                    | Inland Water     | 21            | 0           | 0               | 0            | 0           | 0         | 0           | 0              | 0        | 0        | 0            | 0             |
| 209                    | Sea and ocean    | 9999          | #N/A        | #N/A            | 0            | 0           | 0         | 0           | 0              | 0        | 0        | 0            | 0             |



# Data Source



National Mapping and Resource  
Information Authority

- 2015 Land Cover
- 2020 Land Cover



# Challenges:

## Capacity Building



Continuous capacity buildings and learning sessions  
e.g., GIS and SEEA Frameworks

## Equipment



Availability of high specs computer that can run the QGIS Application

## Software



Availability of more advance software  
e.g., ARCGIS

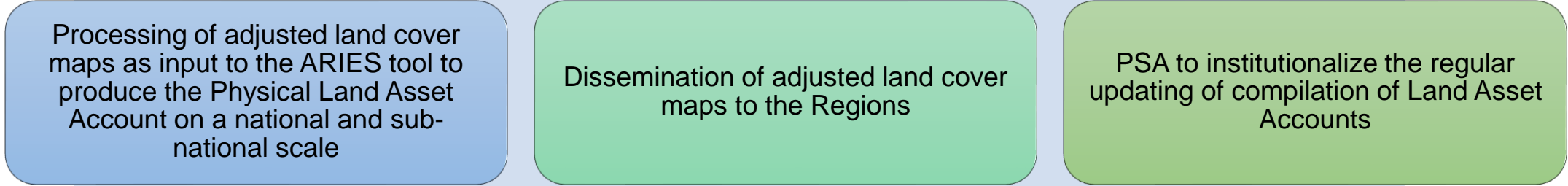
## Internet Connection



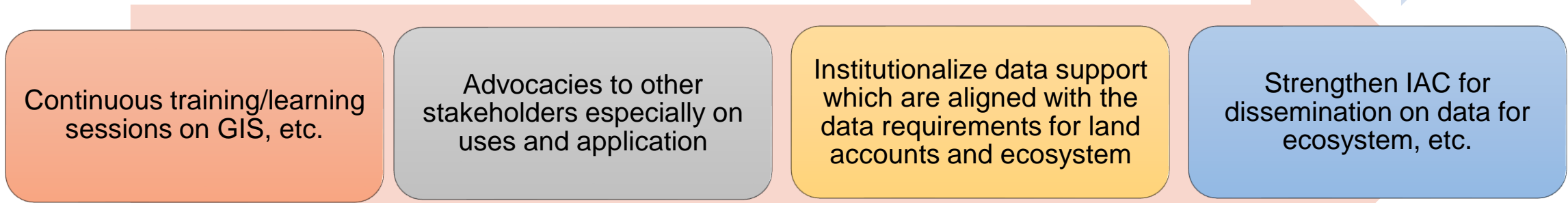
Stable internet connection  
e.g., conduct of online meetings with exercises

# Ways forward

## Immediate: 2023-2024



## Medium Term : 2023 onwards



# Thank you!



<http://www.psa.gov.ph>



<http://openstat.psa.gov.ph>



<https://twitter.com/PSAgovph>



<https://www.facebook.com/PhilippineStatisticsAuthority>



# References

- System of Environmental-Economic Accounting Central Framework -[https://seea.un.org/sites/seea.un.org/files/seea\\_cf\\_final\\_en.pdf](https://seea.un.org/sites/seea.un.org/files/seea_cf_final_en.pdf)
- High-level launch project launch for Environmental-Economic Accounting for Evidence-Based Policy in the Philippines <https://seea.un.org/ru/events/high-level-launch-project-launch-environmental-economic-accounting-evidence-based-policy>
- Land Cover Maps , NAMRIA