

Setting natural and administrative boundaries

The goal of this exercise is to learn how to set river basin boundaries as an initial step to support geospatial analysis of transboundary river basins. We will locate the main water streams, the administrative boundaries (*e.g.* across countries) and water infrastructure, particularly dams. You will need to provide the map and topological scheme requested in Step 2 and in Step 3 as part of your second assignment in Week 4. First, follow the tutorial in Step 1.

Step 1. Map of the Red River Basin

- 1) Go to the following link <http://riverbasins.wateractionhub.org/> to find the shapefiles of the world's river basins.
- 2) From the drop-down menu in 'Find Basin by Country' select Vietnam. There are 8 different basins associated with Vietnam, select the HONG(RED RIVER) BASIN, and download the shapefile. It will download as a .zip file containing 5 files, you will need all of them.
- 3) Import the contents of the shapefile into the python notebook [RiverBasinMap.py](#) and follow the instructions within.

Step 2. Map of the Nile River Basin

Generate a map for the Nile River Basin, the map should contain the following:

- 1) Boundary of the Nile basin.
- 2) Lakes and rivers.
- 3) Country boundaries of Sudan, Egypt, and Ethiopia with country names, you can use a different fill color for each country.
- 4) The four major dams and their names placed at their corresponding longitude and latitude.

You can use a similar workflow as in Step 1, but feel free to explore newer map creation libraries in python such as [cartopy](#).

Useful resources:

<https://www.hydrosheds.org/products/hydrobasins>

<https://public.opendatasoft.com/explore/dataset/world-administrative-boundaries/export/>

Step 3. Generate the topological representation of modelled objects.

This scheme has the purpose of helping you organize what to include and what not to include in your model. The diagram should contain at least the following:

- 1) The reservoirs and their names (the four major ones).
- 2) Inflows (from a reservoir in parallel, streamflow, lateral flows) and outflows (for specific users, including hydropower production).
- 3) Country boundaries.

Figure 1. Examples of different reservoir layouts.

