

# On doing Hydrology with Lions

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*John Cabot (1450-1500) was an Italian explorer who sailed **The Matthew** from Bristol to North America. The ship on this picture is a replica of the original **Matthew**.*



[https://en.wikipedia.org/wiki/Matthew\\_\(ship\)](https://en.wikipedia.org/wiki/Matthew_(ship))





At the time of Cabot's journey, information came from maps like the **Fra Mauro world map** from 1459, which shows seemingly complete knowledge of the world even though most of the world was unexplored.

However, on closer inspection, maps like this one included statements like **HIC SUNT LEONES** – *here are lions* – and images of lions to demarcate unexplored regions.

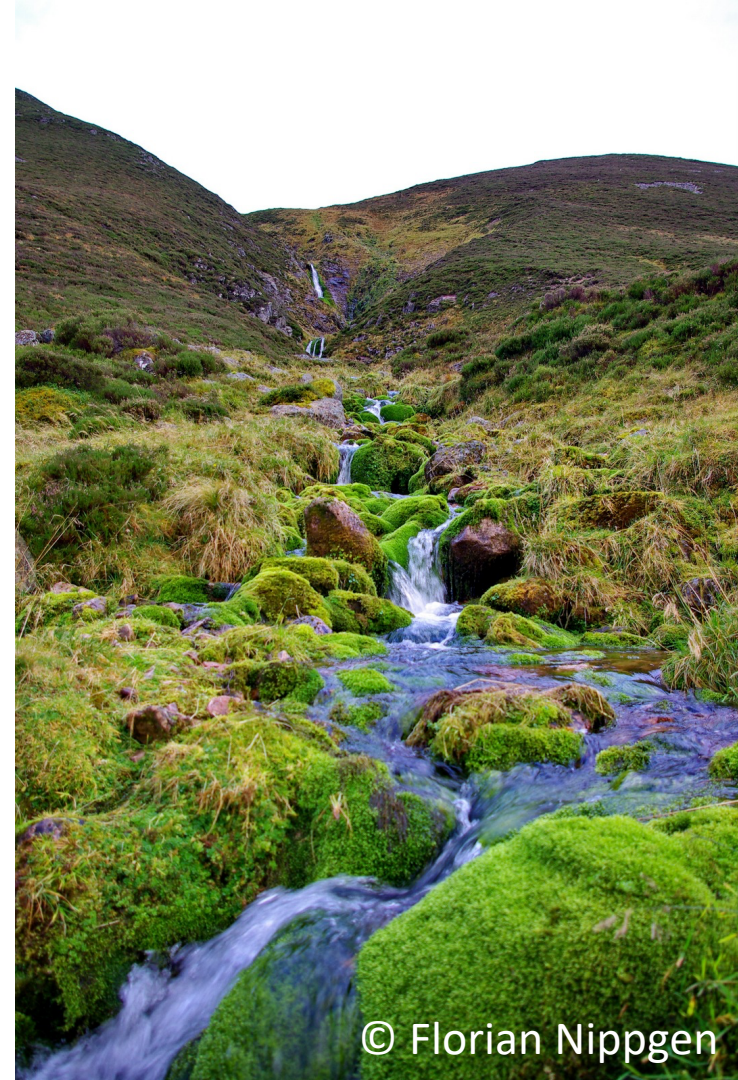


Maps changed with the journeys of explorers like Columbus and Cabot. The **Salviati Planisphere** is a world map from 1525 without imagined representations, thus highlighting knowledge gaps and encouraging exploration of unknown areas!



In hydrology, we have moved from modelling **catchments** to regularly producing both data sets and simulations covering **large domains** (even global) (Wood et al., 2011, *WRR*<sub>doi.org/10.1029/2010WR010090</sub>; Archfield et al. 2015, *WRR*<sub>doi.org/10.1002/2015WR017498</sub>).

However, moving the study domain in hydrology to larger and larger regions leaves us with **significant knowledge gaps** because we are unable to observe the hydrology of many parts of the world, and in-depth hydrologic studies cover only a fraction of our landscape.





In this visual abstract, and in the accompanying draft commentary, we postulate ways to reduce the problem:

- First, **shared and collective perceptual models** in which we share our experience and current understanding with hydrologic systems for open debate. A discussion of perceptual models in a top-down manner (to avoid getting lost in detail) would enable us to identify and highlight disagreements in our understanding.
- Second, **improved knowledge accumulation** by enabling the myriad of hydrologic studies published in journal articles to be organized through metadata – *essential hydrologic descriptors* – such as the location of a study, the time period analysed, etc. Such metadata should be included in the submission of each journal paper as machine readable tags (as well as adding them retrospectively to historical articles).

Read the commentary by Wagener et al. (*On doing large-scale hydrology with lions*) available at [eartharxiv.org](https://eartharxiv.org) shortly (currently in pre-moderation)