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Global scale assessment of riverscape effects on floodplain urbanization

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1. Research context and objectives

68% of the worldwide population will be urban by 2050¹ and floodplains are home to many expanding cities. Urbanization process alters these vulnerable ecosystems², yet the impacts worldwide are not known.

The GloUrb project aims to :

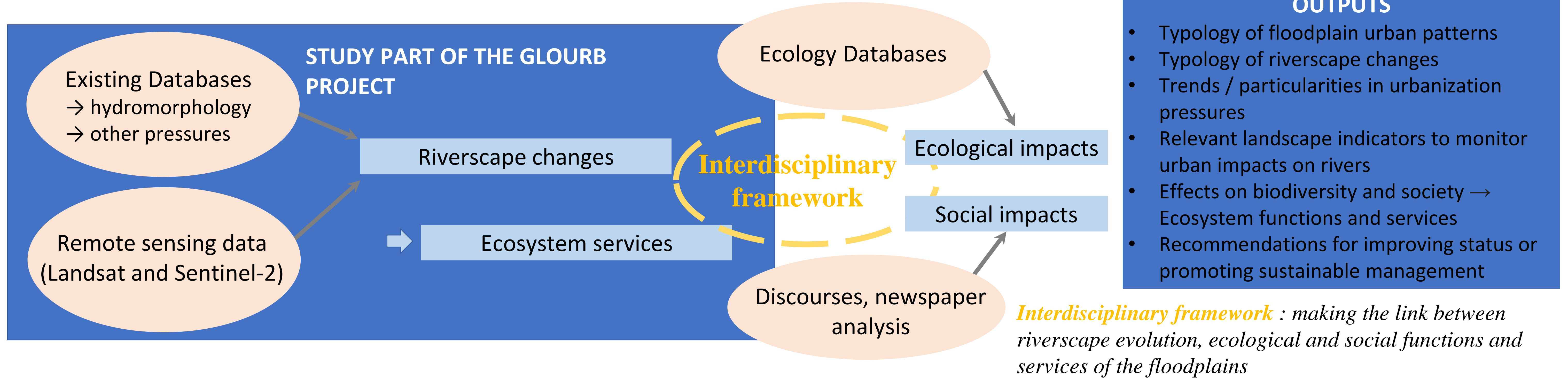
- Characterize the range of floodplain urbanization patterns over the last 40 years,
- Assess socio-environmental consequences of changes induced by floodplain urbanization

The present contribution focuses on the **riverspace effects** of the urbanization on the floodplains and its consequence in terms of ecological functions and services

Key-words :

Global urbanization, floodplain, riverscape changes

2. Structuration of GloUrb



3. Strategy to assess riverscape changes

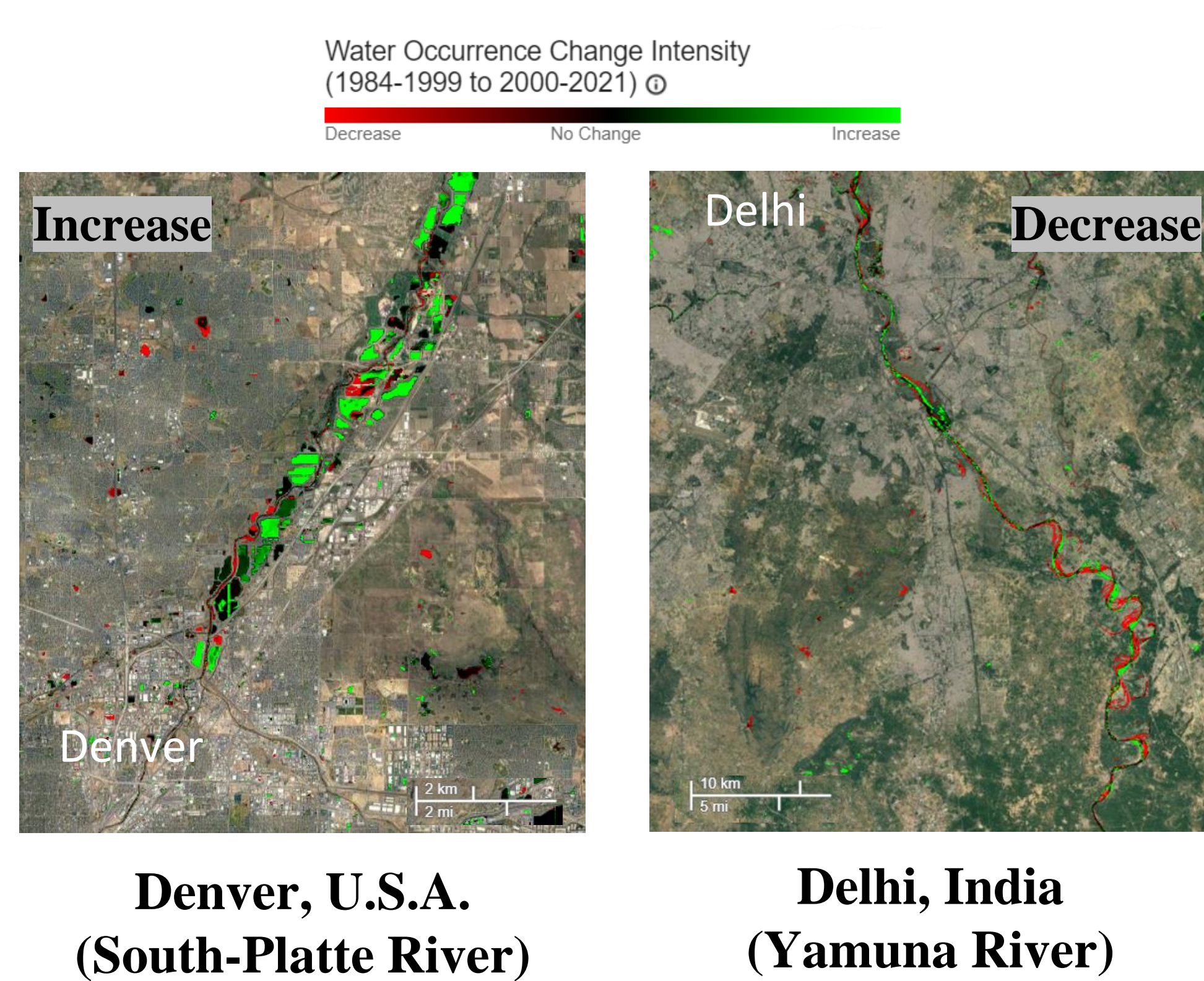
Objectives :

- Assess riverscape changes in time and space for each site
- Detect tendencies or local effects of the urbanization
- Draw up a typology of riverscape changes and their effects on ecosystem functions and services

Method :

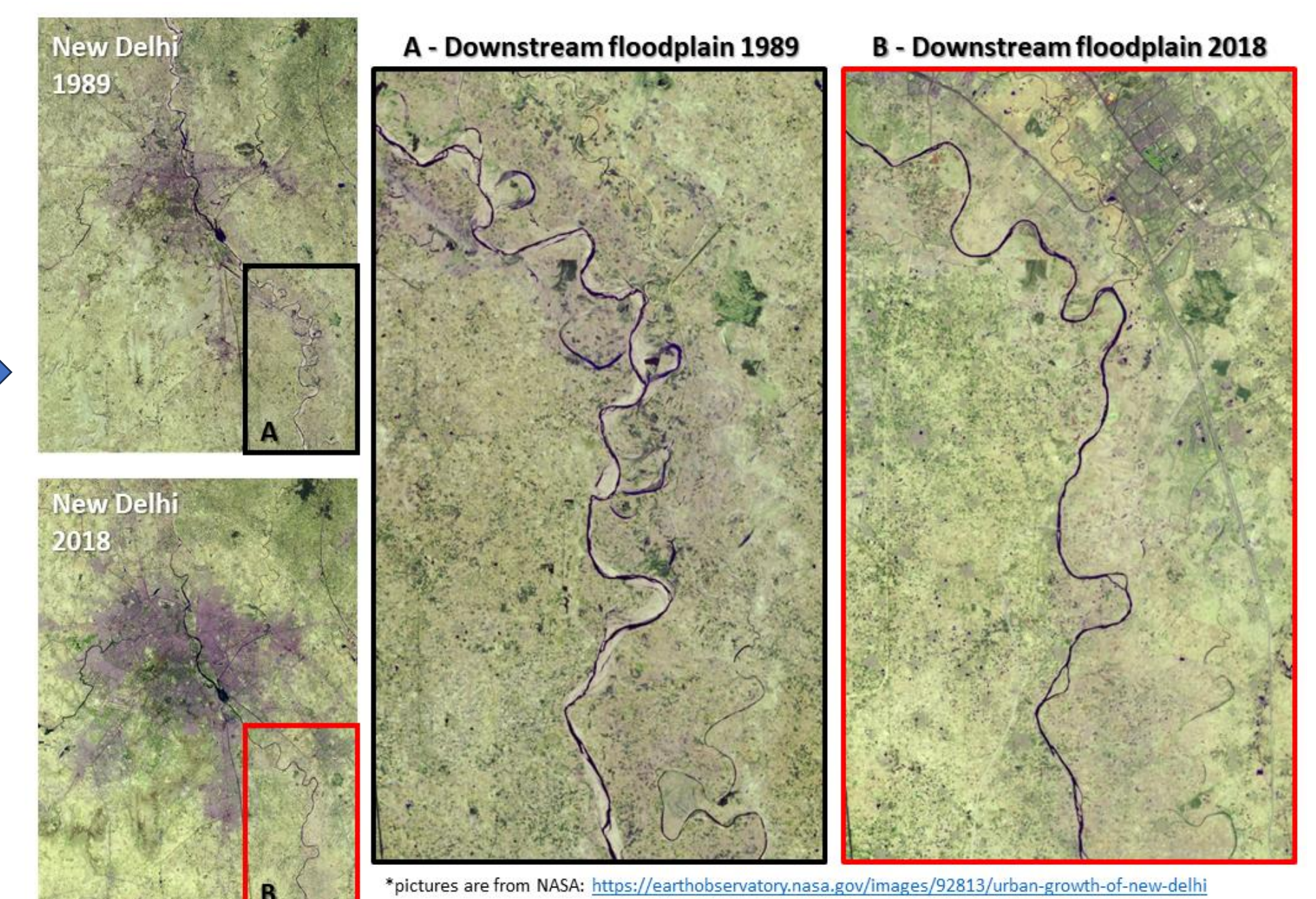
- Working with existing indexes to determine if the riverscape modification is absent / medium / major on 300 cities and river corridor
- On 50 selected cities, working with remotely sensed data (from Landsat and Sentinel-2 images, 30-10m resolution): from the extraction of riverscapes classes, analyzing their evolution in time and space

Working with existing indexes (Global Surface Water³)



4. Focus on two study sites

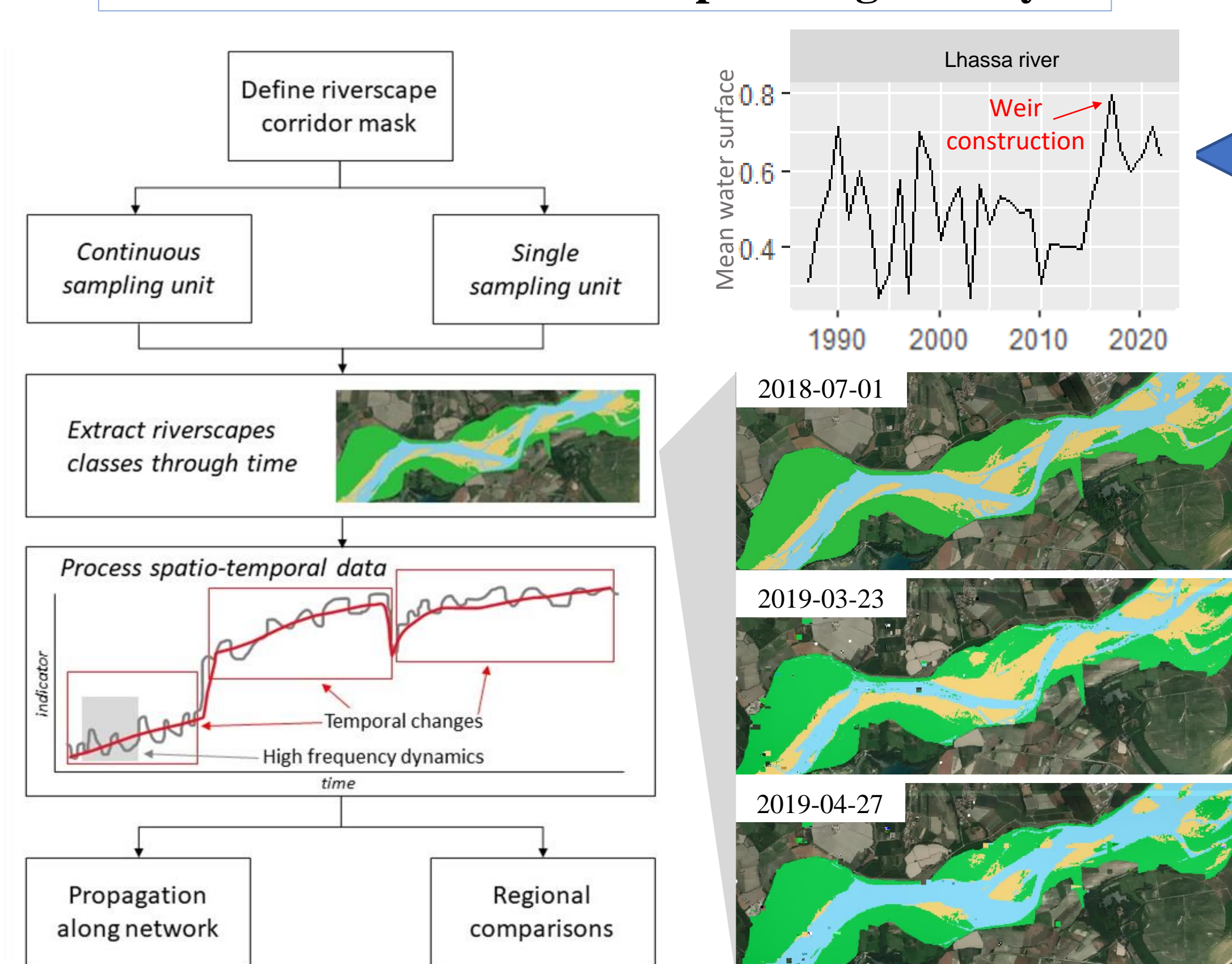
Downstream effects of change in channel planform (sand bars and floodplain wetlands) due to sand mining in New Delhi, India (Yamuna River)



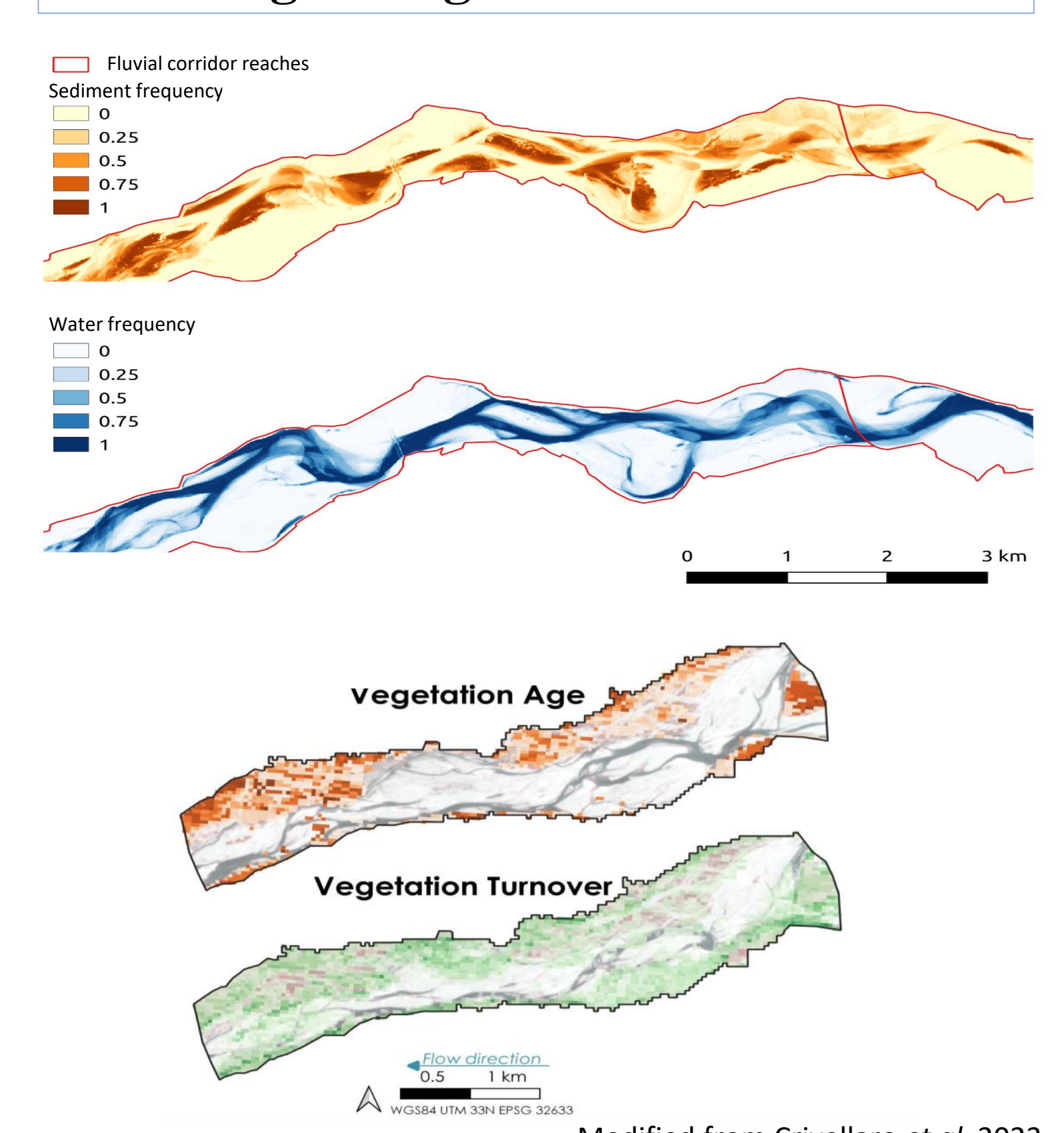
Braided planform shrinking due to progressive diking in Lhasa, China (Lhasa River)



Treatment-chain of riverscape changes analysis



Choosing the right indexes and metrics



References

1. United Nations. World urbanization prospects: 2018 : highlights. (2019).
2. Vörösmarty, C. J. et al. Global threats to human water security and river biodiversity. Nature 467, 555–561 (2010).
3. Pekel, J.-F., Cottam, A., Gorelick, N. & Belward, A. S. High-resolution mapping of global surface water and its long-term changes. Nature 540, 418–422 (2016).
4. Crivellaro M, Bertoldi W., Belletti B., Piégay H., Zolezzi G. High temporal resolution remote sensing improves riparian vegetation dynamics' investigation and the definition of biogeomorphic controls. ICFS 2023