



Water Resource Engineering

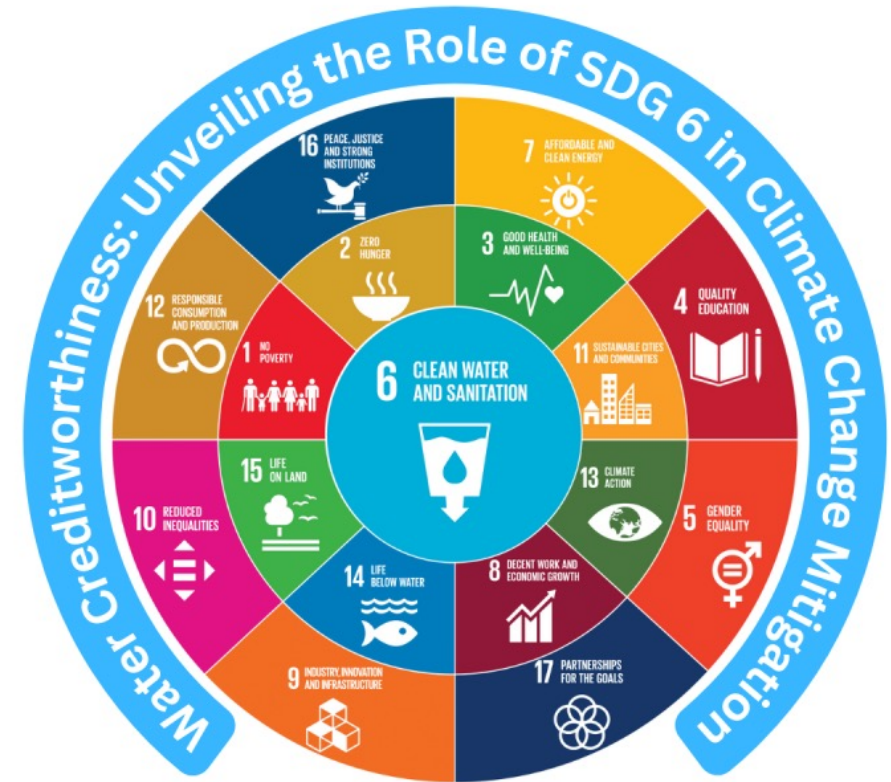
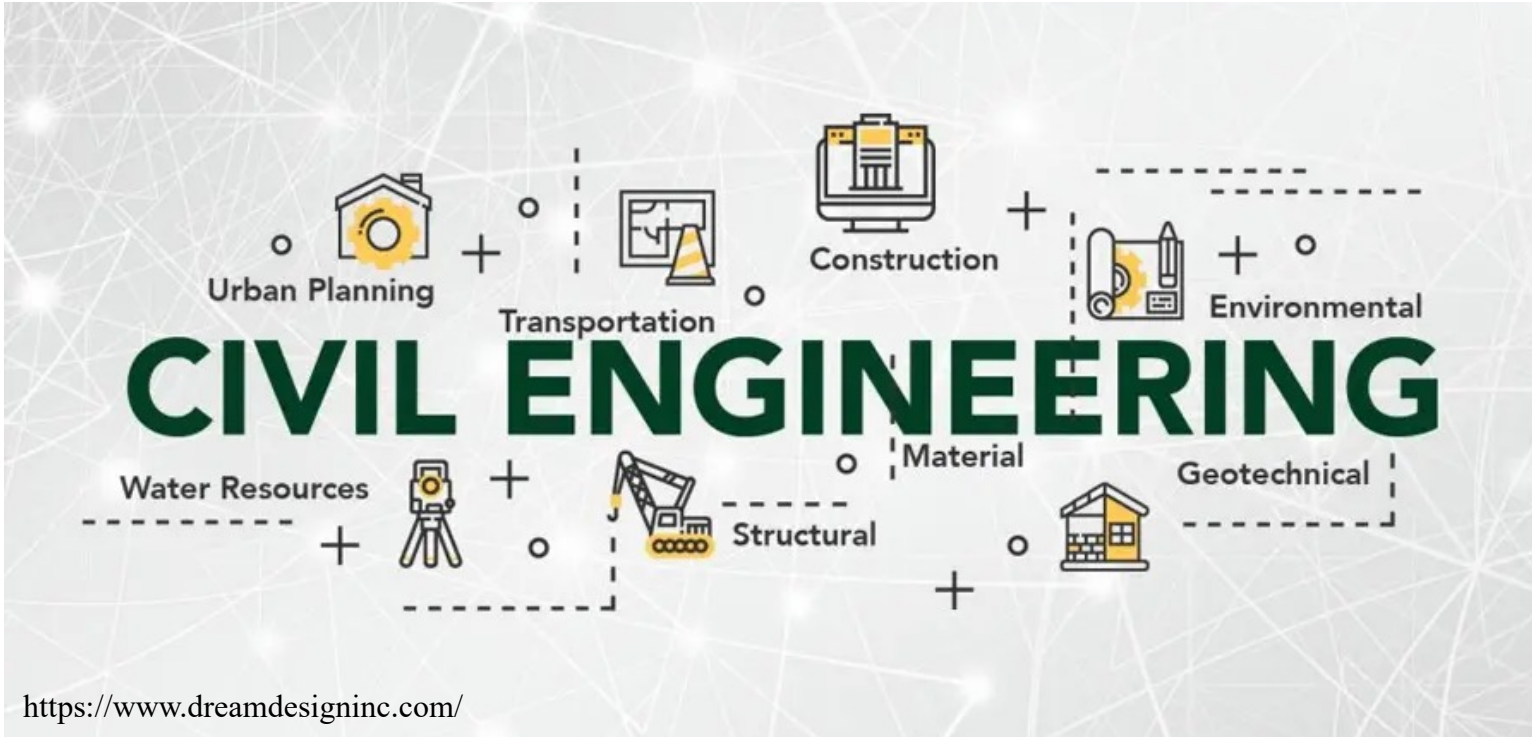
Nantawoot Inseeyong

Ph.D. candidate, Department of Hydraulic Engineering, School of Civil Engineering, Tsinghua University

Researcher, Department of Water Resources Engineering, Faculty of Engineering, Chulalongkorn University



Water Resources Engineering Under Civil Engineering



Water Resources Engineering is a huge field which involves managing available water resources from the standpoint of both water quantity and water quality to meet the water needs of humanity and habitats at the local, regional, national or international level.

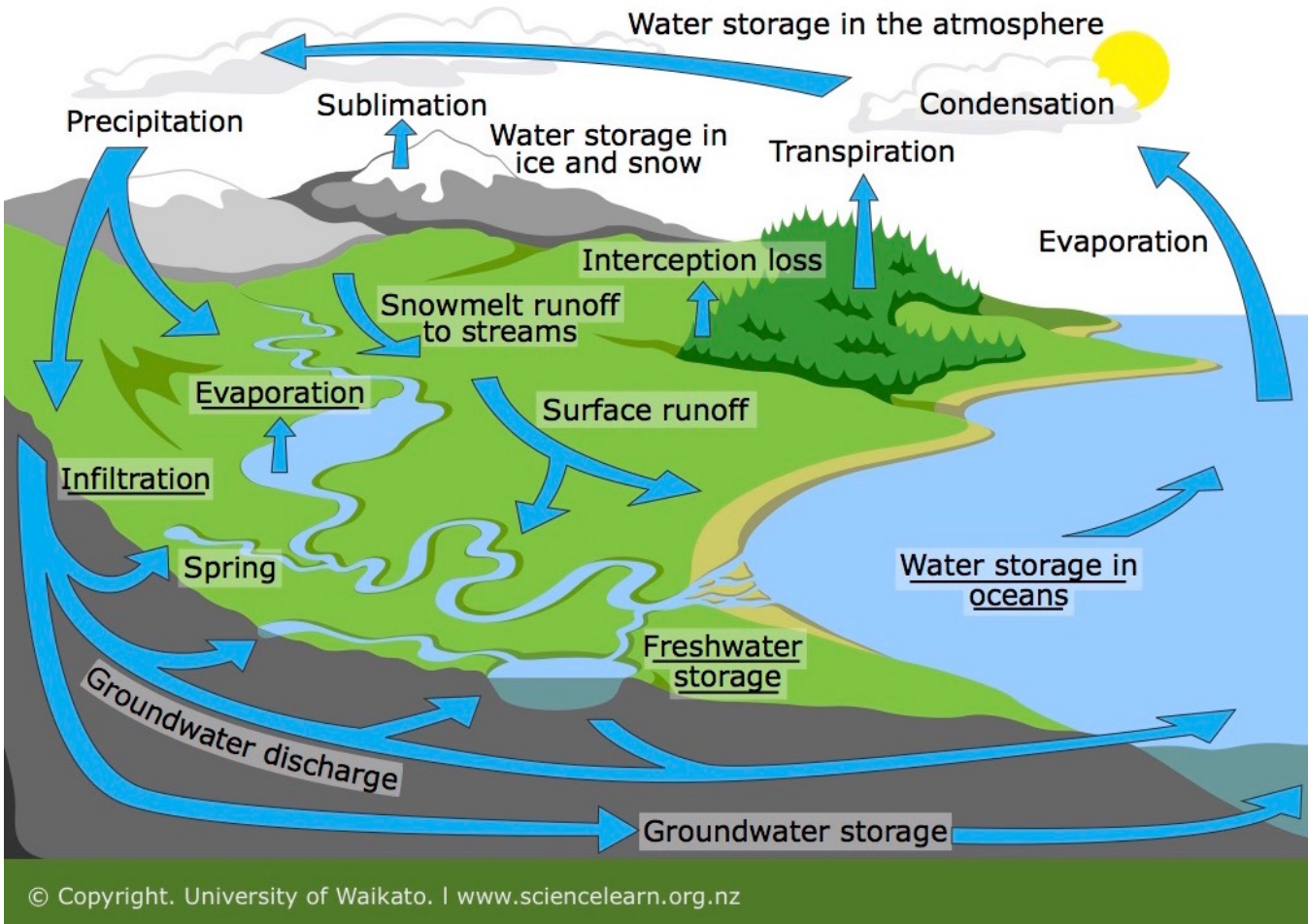


Water Resources Engineering

Hydrology vs Hydraulic



DYNAMIC AND COMPLEX: THE GLOBAL WATER CYCLE



Hydrology

- The study or science of transforming rainfall amount into quantity of runoff.
 - Climate change
 - Precipitation, Evaporation, Transpiration, Melting, Condensation, Sublimation, Infiltration, Atmosphere storage, Groundwater, Discharge

Hydraulics

- The study or science of the motion of liquids in relation to disciplines such as fluid mechanics and fluid dynamics.
 - River Engineering
 - Hydropower Engineering
 - Sediment dynamics
 - Coastal Engineering
 - Ecohydraulics****

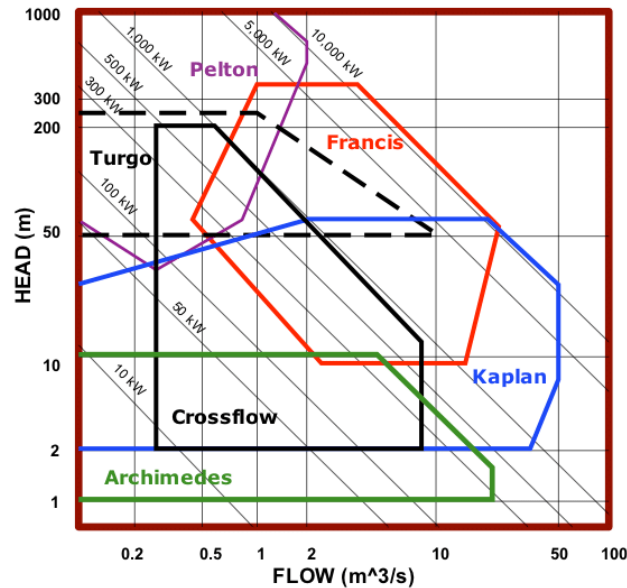
Research Interested (Hydraulics)

Bachelor & Master



- **Bachelor degree: Hydropower Engineering (Chula)**

- Title: Assesment of Hydro Screw Turbine Efficiency



- **Master degee: Coastal Engineering (Chula)**

- Title: Wave Reflection and Transmission of Partial Breakwater

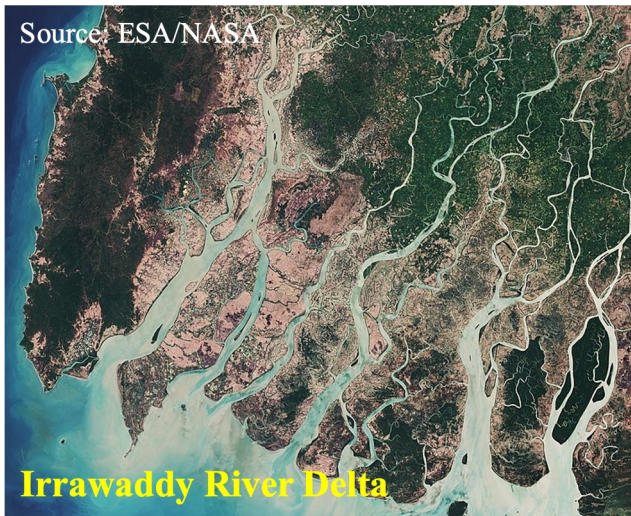


Research Interested Ph.D.

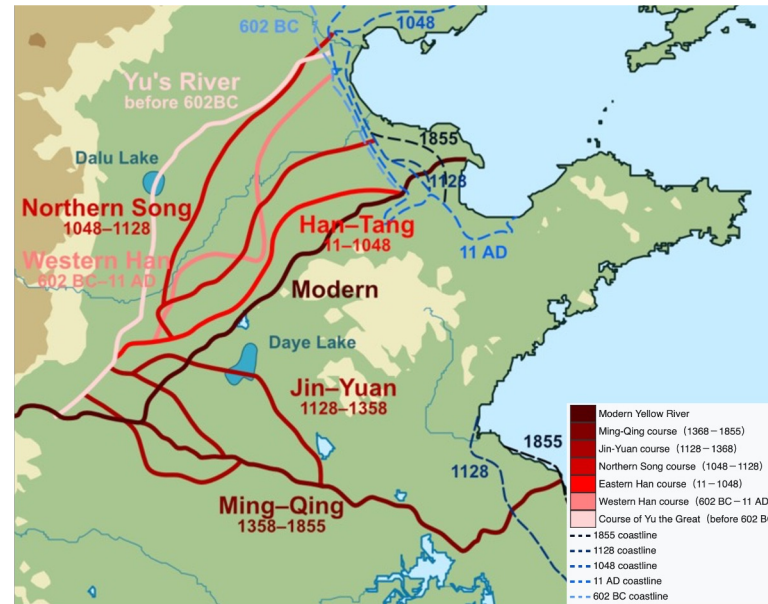


Doctoral degree: River Engineering + Sediment Dynamics (THU)

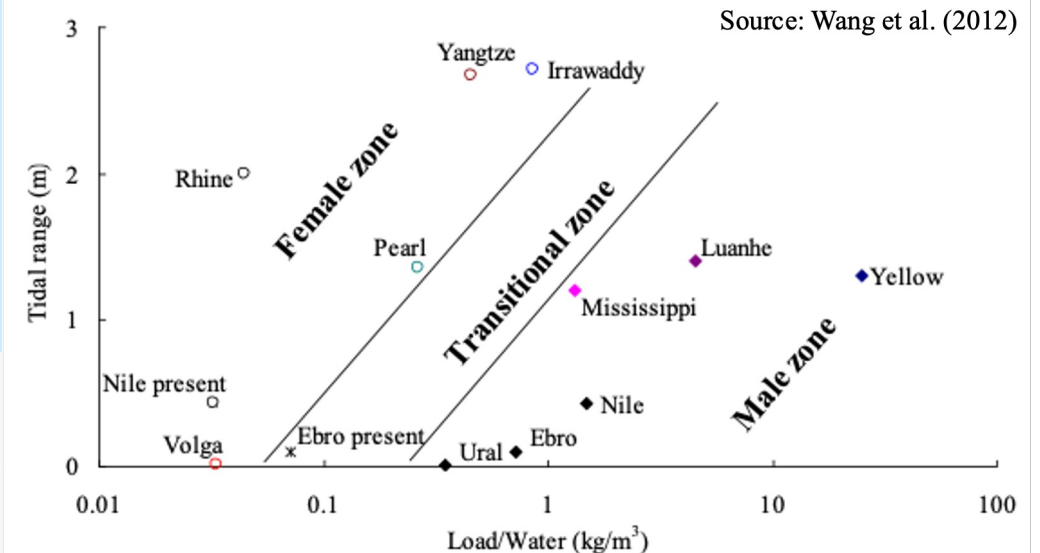
- Title: Methodological Framework for enhancing streamflow and sediment data to support assesment of delta gender



- ✓ The gender of deltas depends on the ratio of annual sediment load to the annual water.
- ✓ River delta has 2 gender : Male >> Male deltas extend into the sea, **unstable** and has only one or two channels in general.
Female >> Female deltas are **stable** and have multiple channels and numerous islands.
- ✓ Thus, streamflow, sediment load, and tidal data is important.



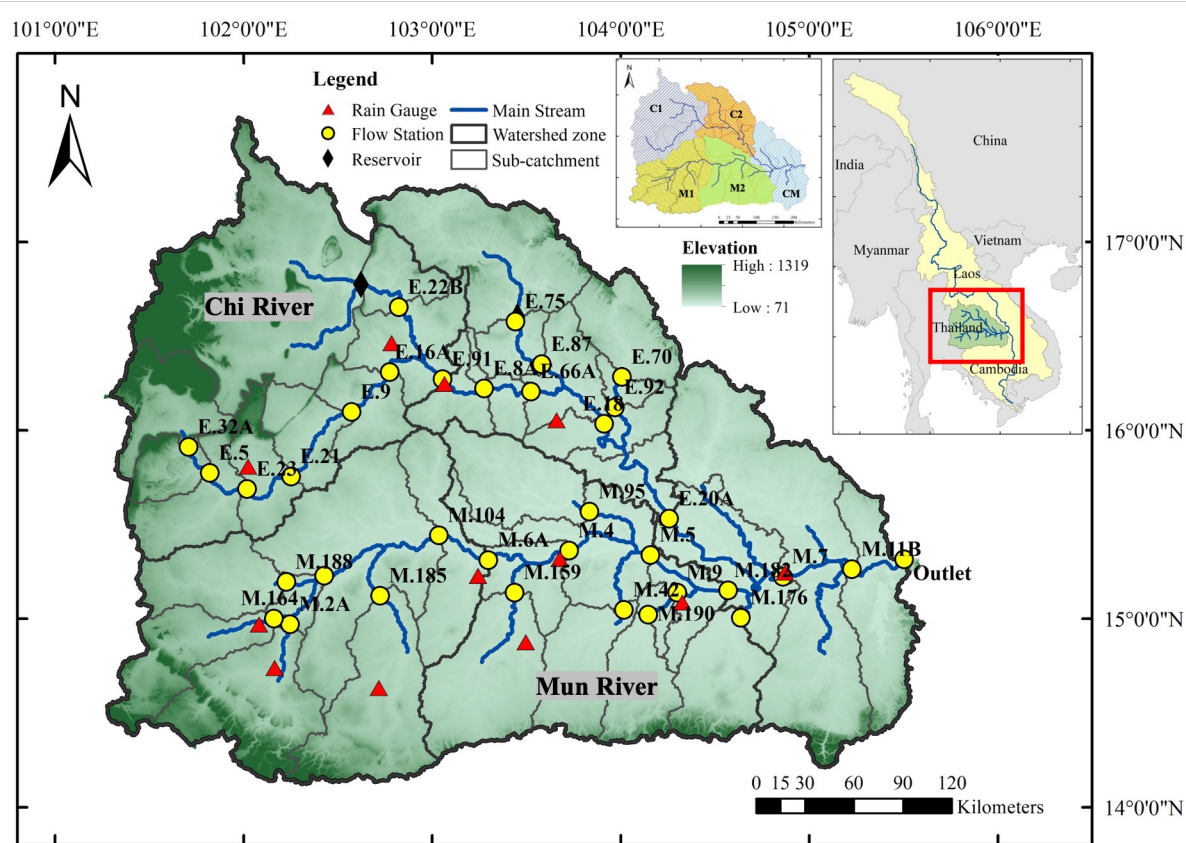
<https://forums.ageofempires.com/t/more-asian-maps/192262>



Methods & Materials

Study area & methodology

Mun-Chi River Basin

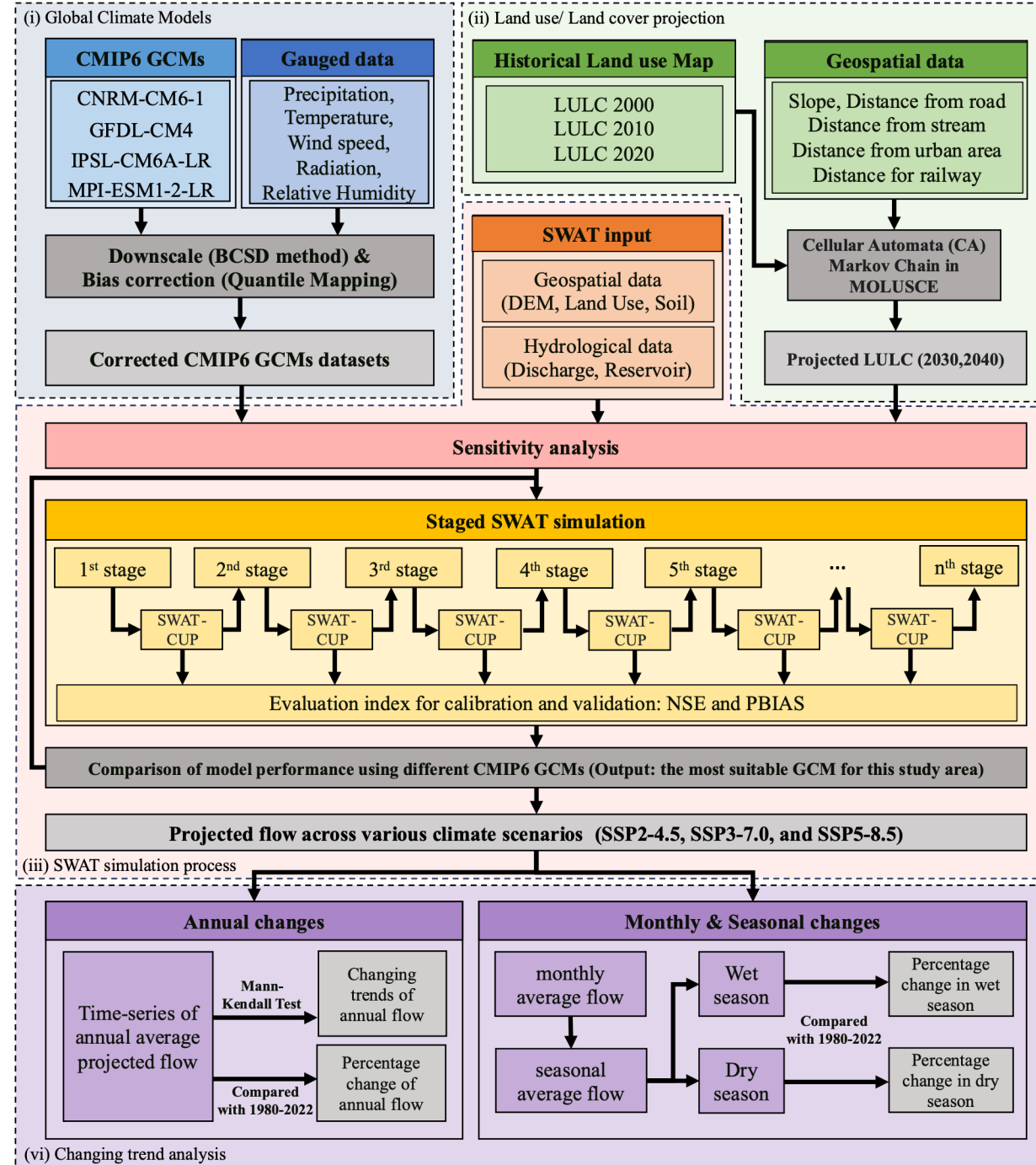


20% of LMK's watershed area

10% of flow supply to LMK

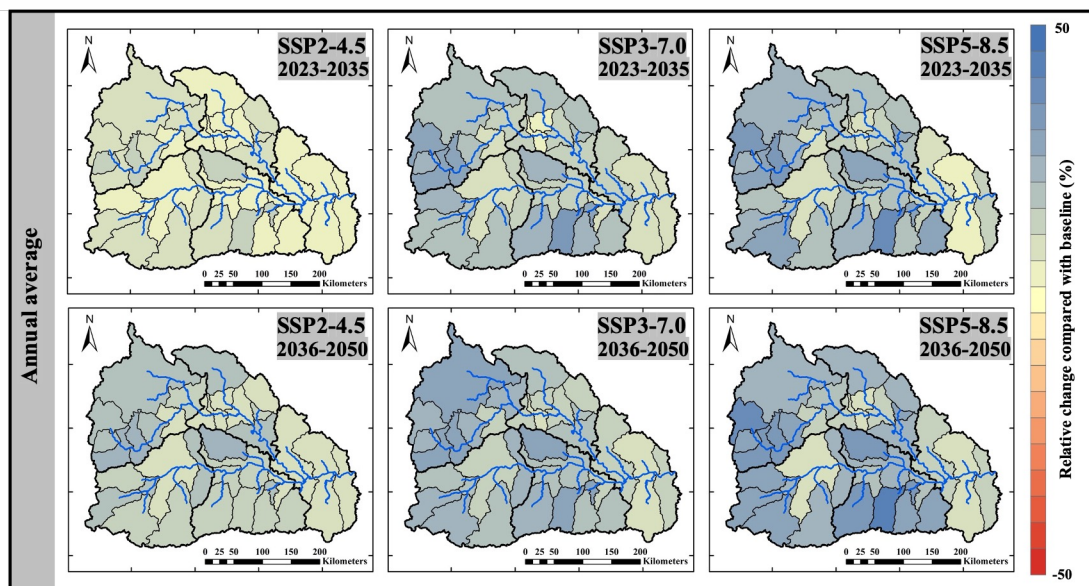
3.1 Mt/year of sediment supply to LMK

High rice production

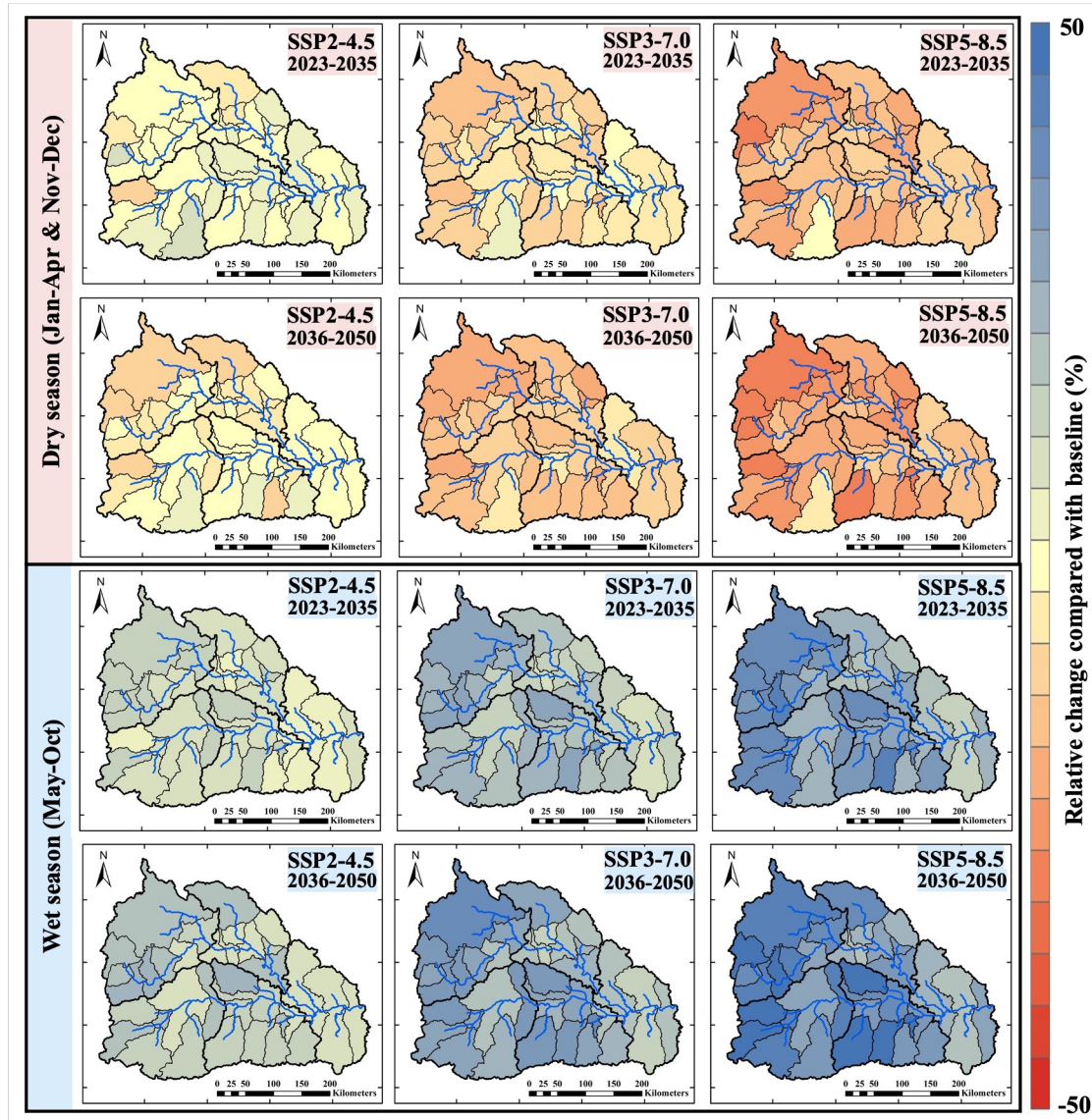


Impact of climate and land use changes on streamflow

- ✓ Higher sensitivity to climate and LULC changes on streamflow in this tributary compared to the entire Mekong River (5%-16%) (Hoang et al., 2019; Lauri et al., 2012).
- ✓ The annual streamflow contributing to the Lower Mekong River is expected to increase by 1% to 3% in 2023-2035 and 2% to 4% in 2036-2050, with 67% attributed to climate change and 33% to land-use change.
- ✓ Temporal variations in the future flow regime reveal a wetter wet season and a drier dry season in this catchment.



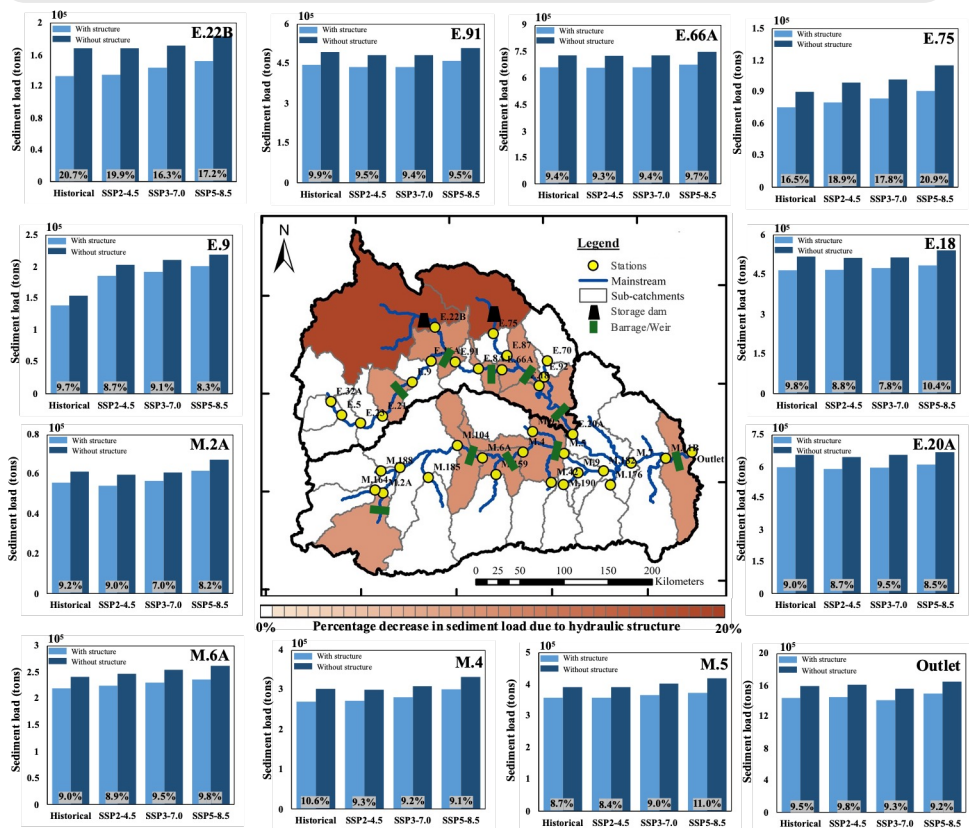
A comparison of the projected annual average flow for spatial dimension encompasses all future periods (2023-2035 and 2036-2050) across all climate scenarios (SSP2-4.5, SSP3-7.0, and SSP5-8.5).



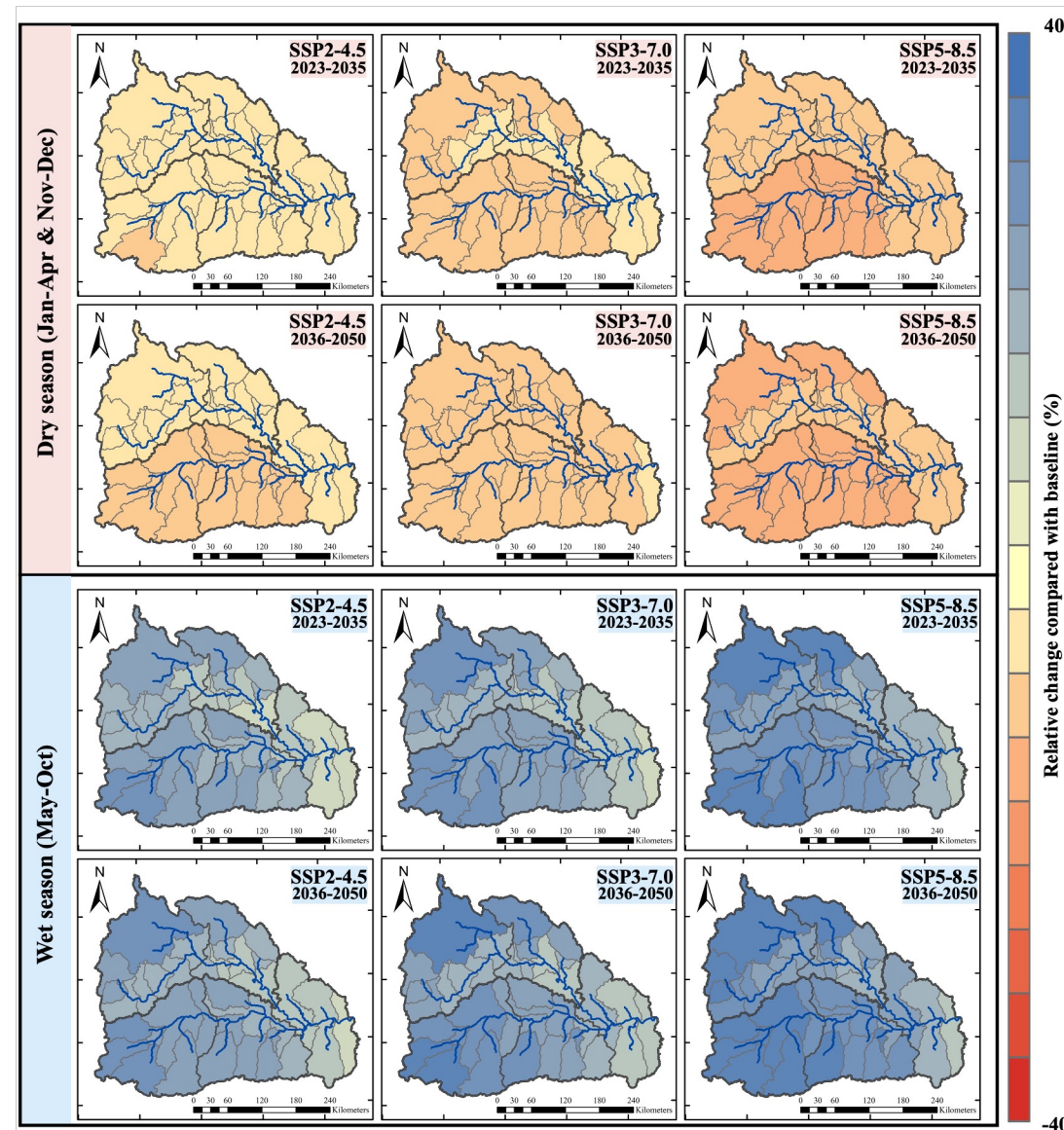
A comparison of the spatial distribution of projected seasonal flow encompasses all future periods (2023-2035 and 2036-2050) across all climate scenarios (SSP2-4.5, SSP3-7.0, and SSP5-8.5).

Impact of climate and land use changes on sediment load

- ✓ Wet season >> sediment increased
- ✓ Dry season >> sediment decreased
- ✓ Storage dam >> 19% reduction
- ✓ Barrages >> 9% reduction



Comparison of annual sediment load with and without the effect of hydraulic structures in sub-catchments



A comparison of the spatial distribution of projected seasonal sediment encompasses all future periods (2023-2035 and 2036-2050) across all climate scenarios (SSP2-4.5, SSP3-7.0, and SSP5-8.5).

Tsinghua University Tsinghua environment



ขอบคุณครับ

Q & A



nantawootlt@gmail.com