

Climate Change Impact on Water & Water Use Sectors in Asian River Basins

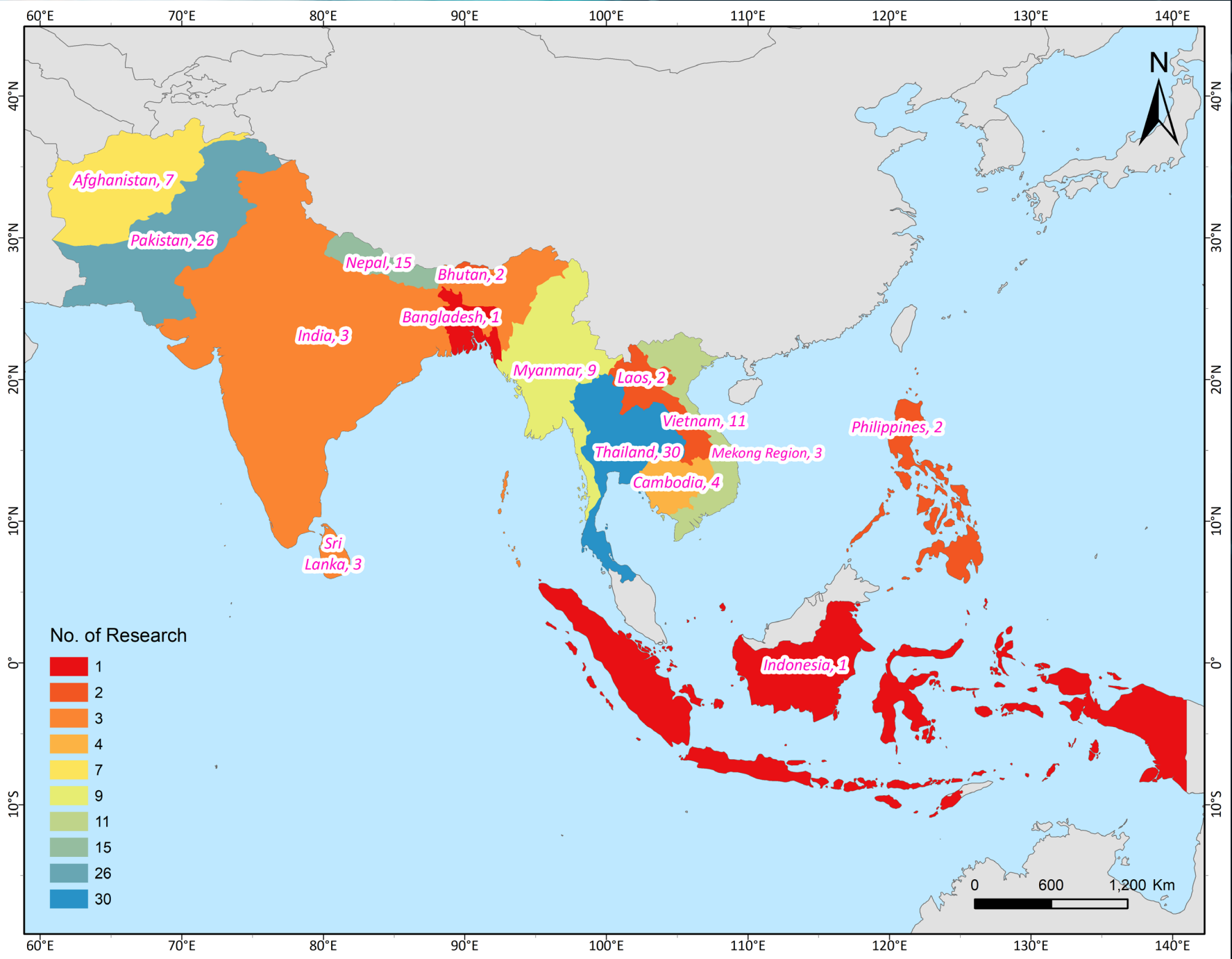
Dr. Sangam Shrestha
Asian Institute of Technology



Climate Change Research

Water Engineering & Management, AIT

SN	Country	Research
1	Afghanistan	7
2	Bangladesh	1
3	Bhutan	2
4	Cambodia	4
5	Canada	1
6	India	3
7	Indonesia	1
8	Kenya	2
9	Laos	2
10	Mekong Region	3
11	Myanmar	9
12	Nepal	15
13	Pakistan	26
14	Philippines	2
15	Sri Lanka	3
16	Thailand	30
17	Vietnam	11
Total		122



Climate Change & Water

Hydrology



Groundwater



Hydropower



Agriculture



Irrigation



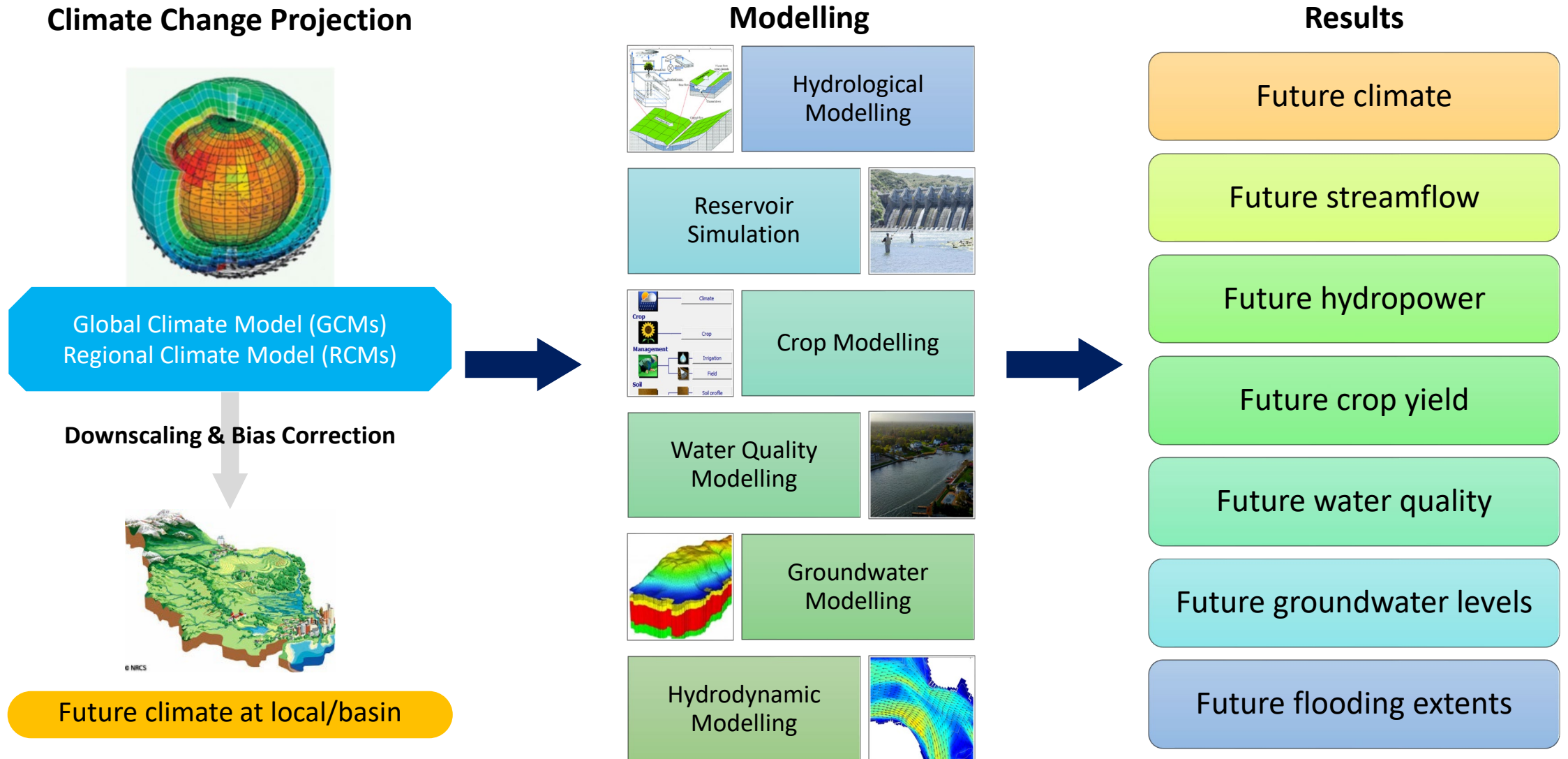
Floods



Droughts

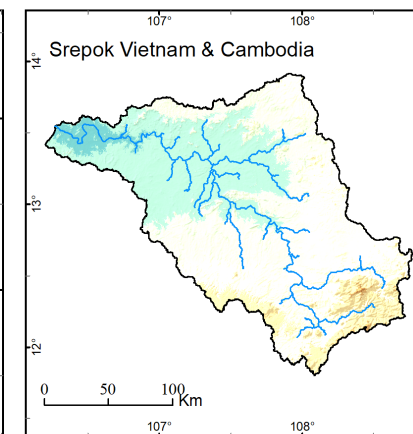
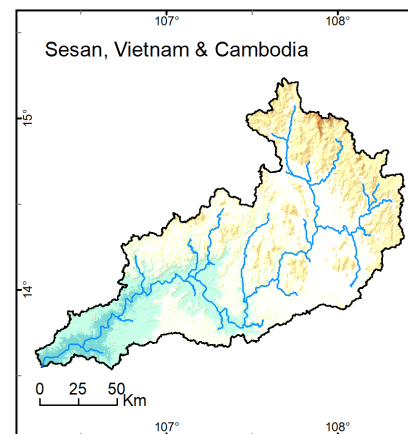
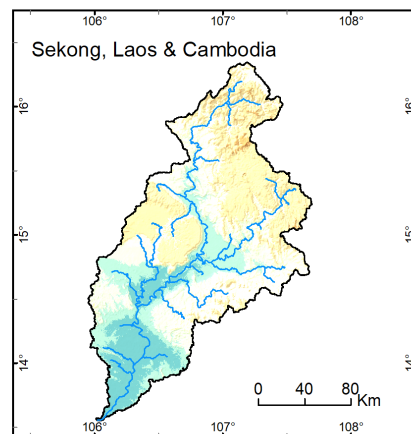
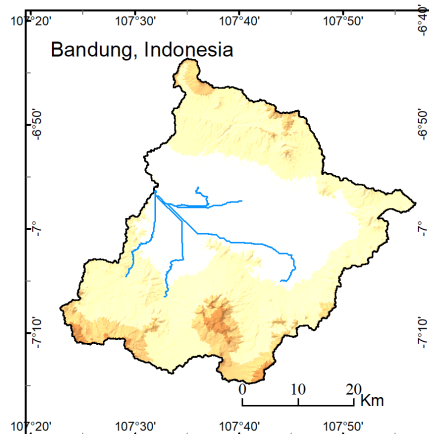
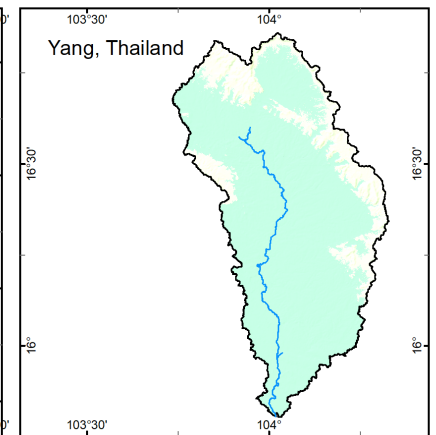
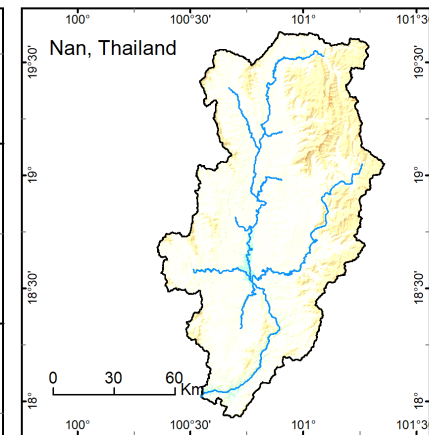
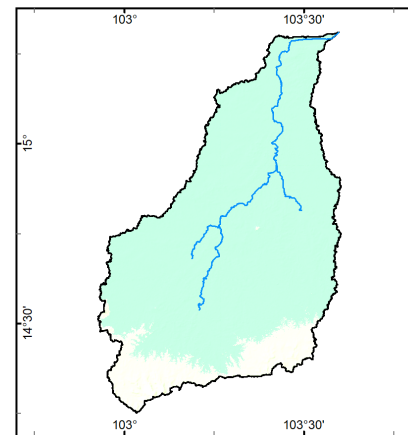
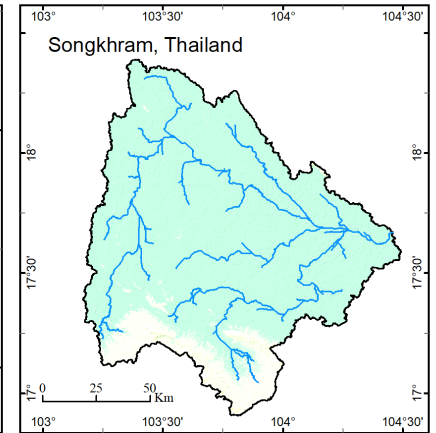
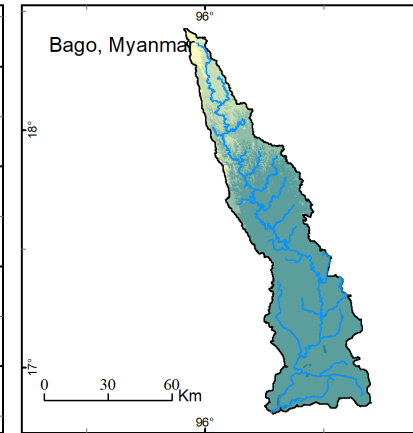
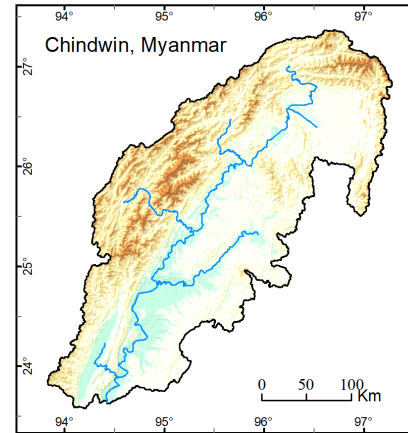
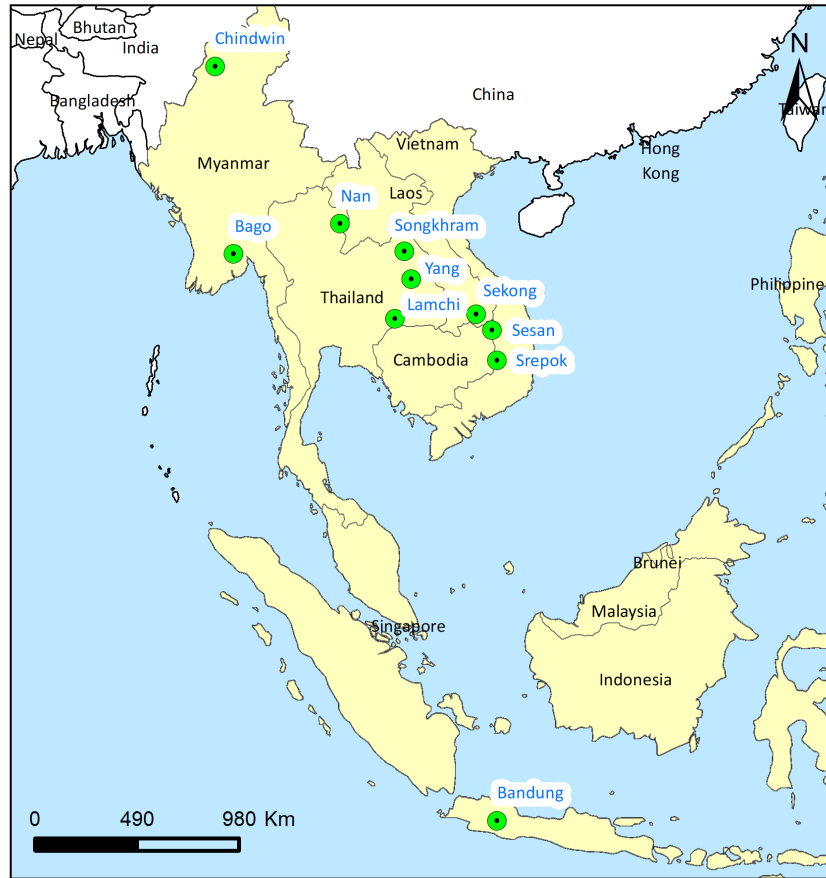


Methodology

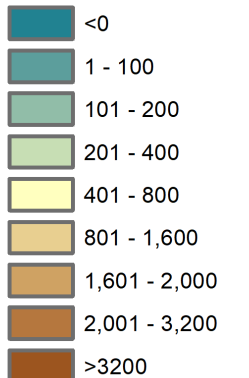


CLIMATE CHANGE: SOUTH-EAST ASIAN PERSPECTIVE

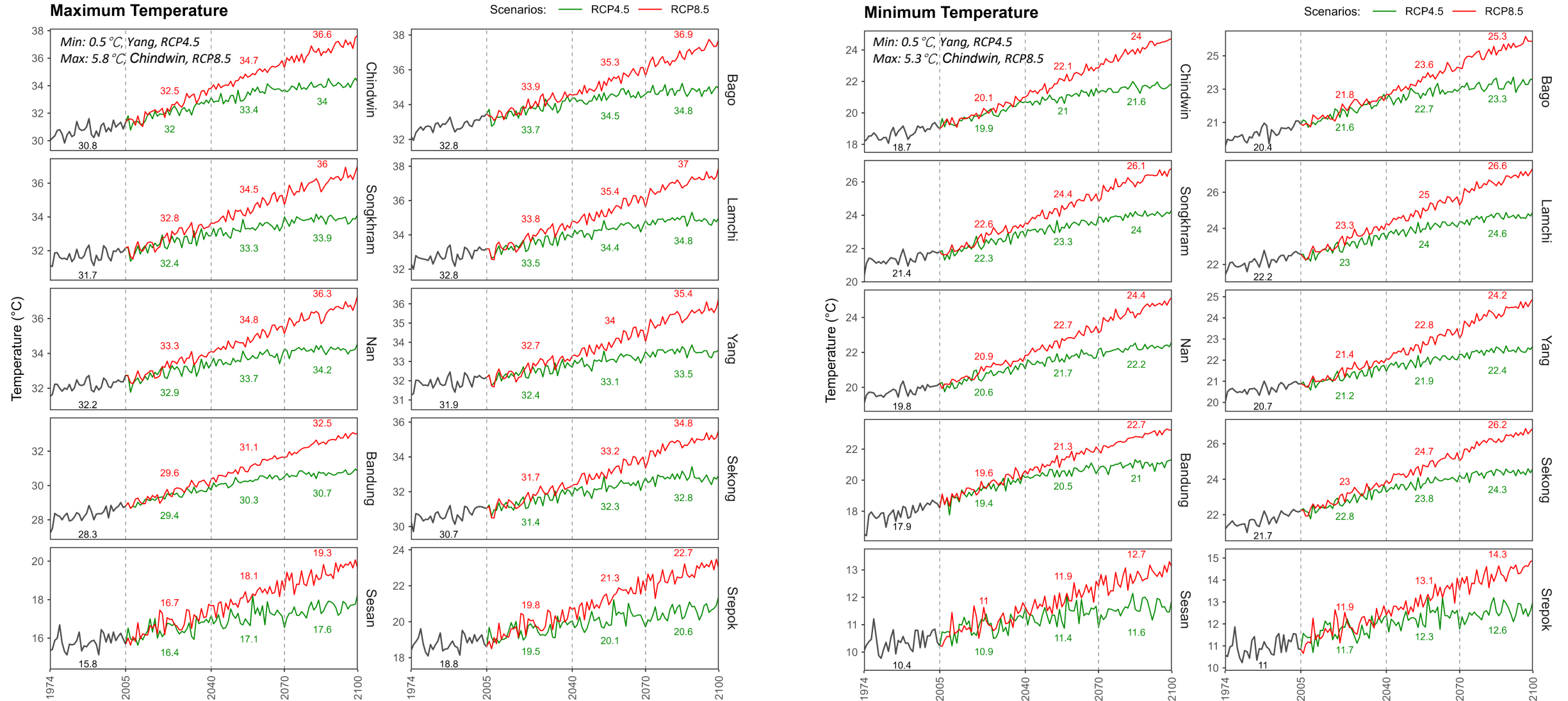
STUDY BASINS



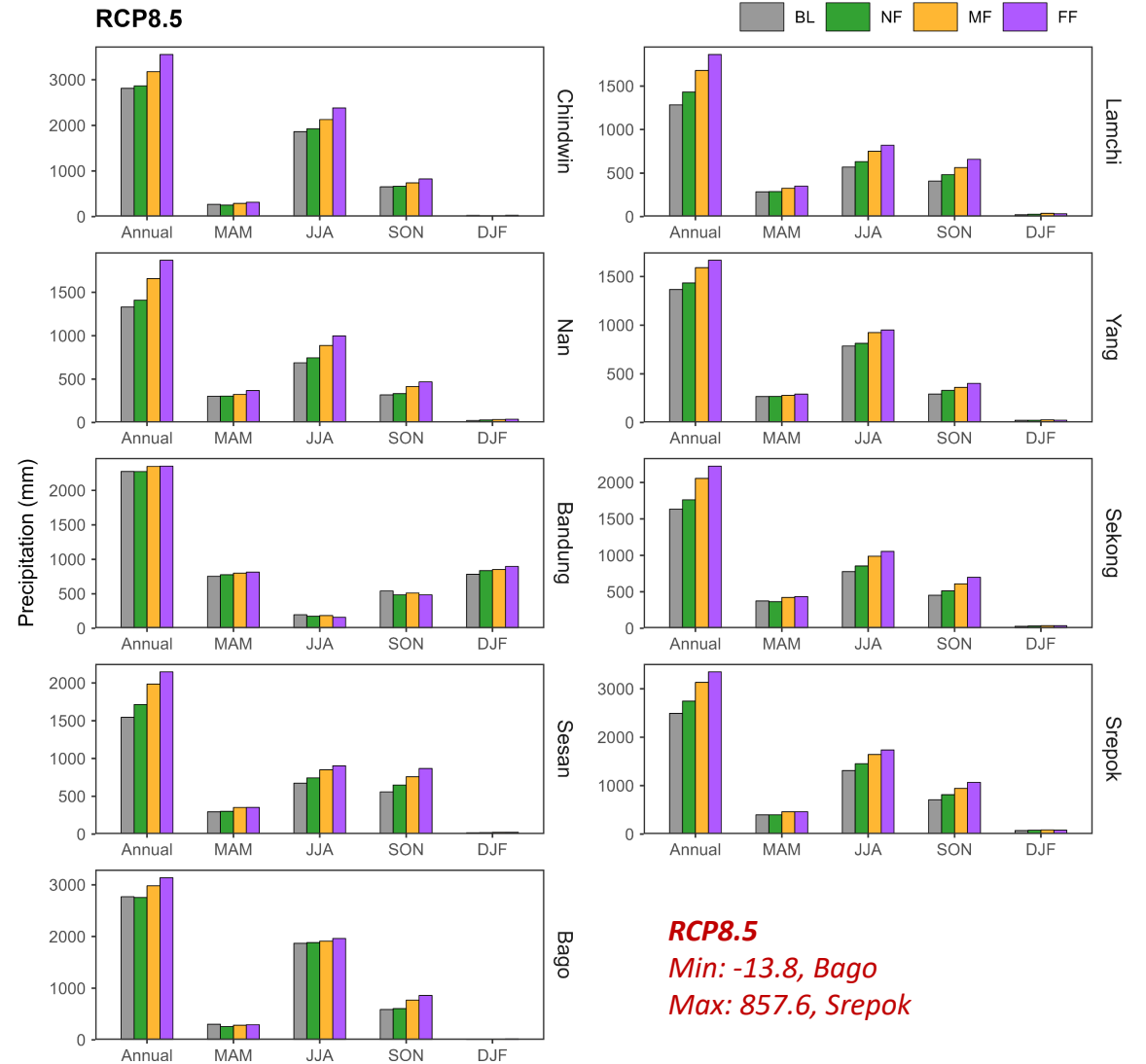
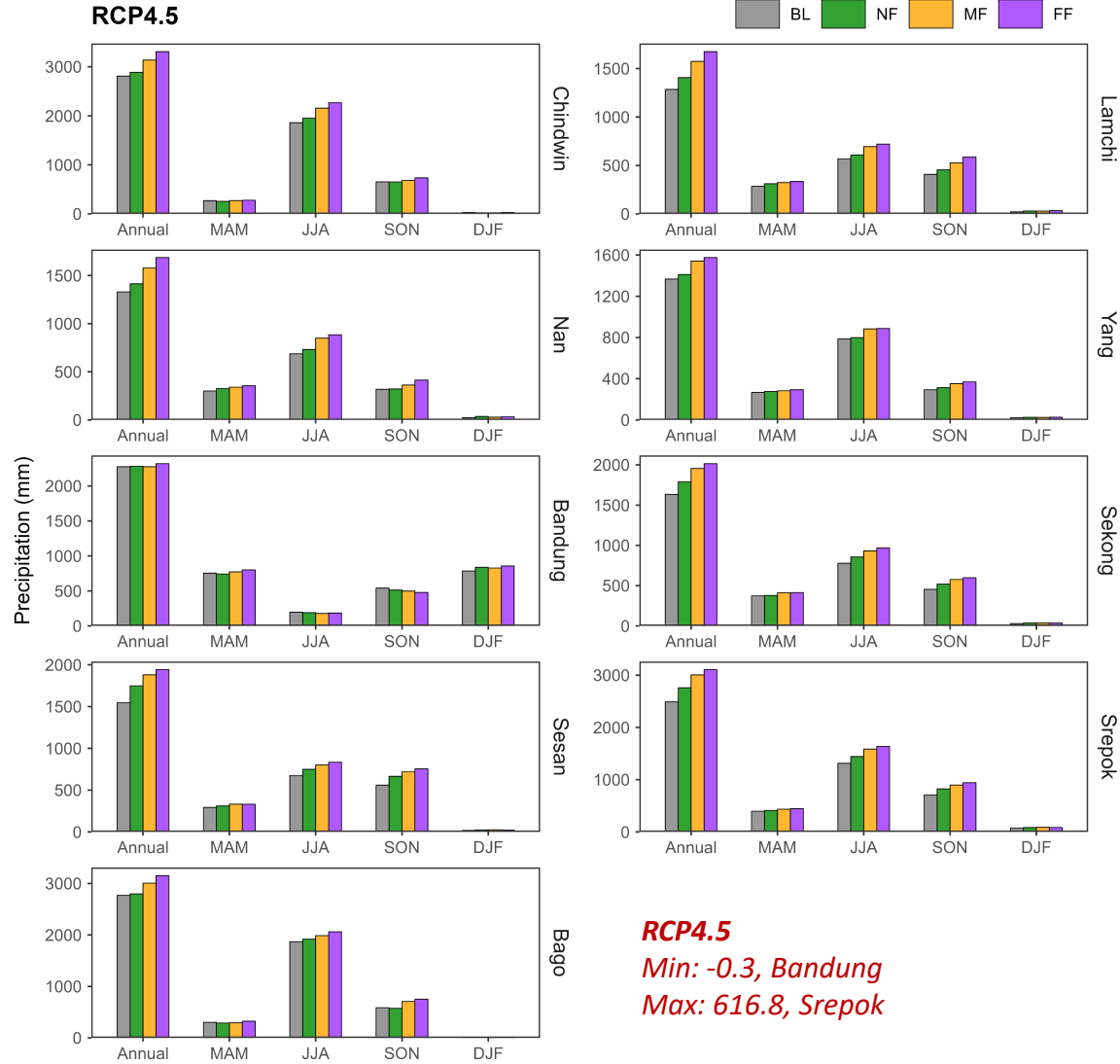
Elevation (Masl)



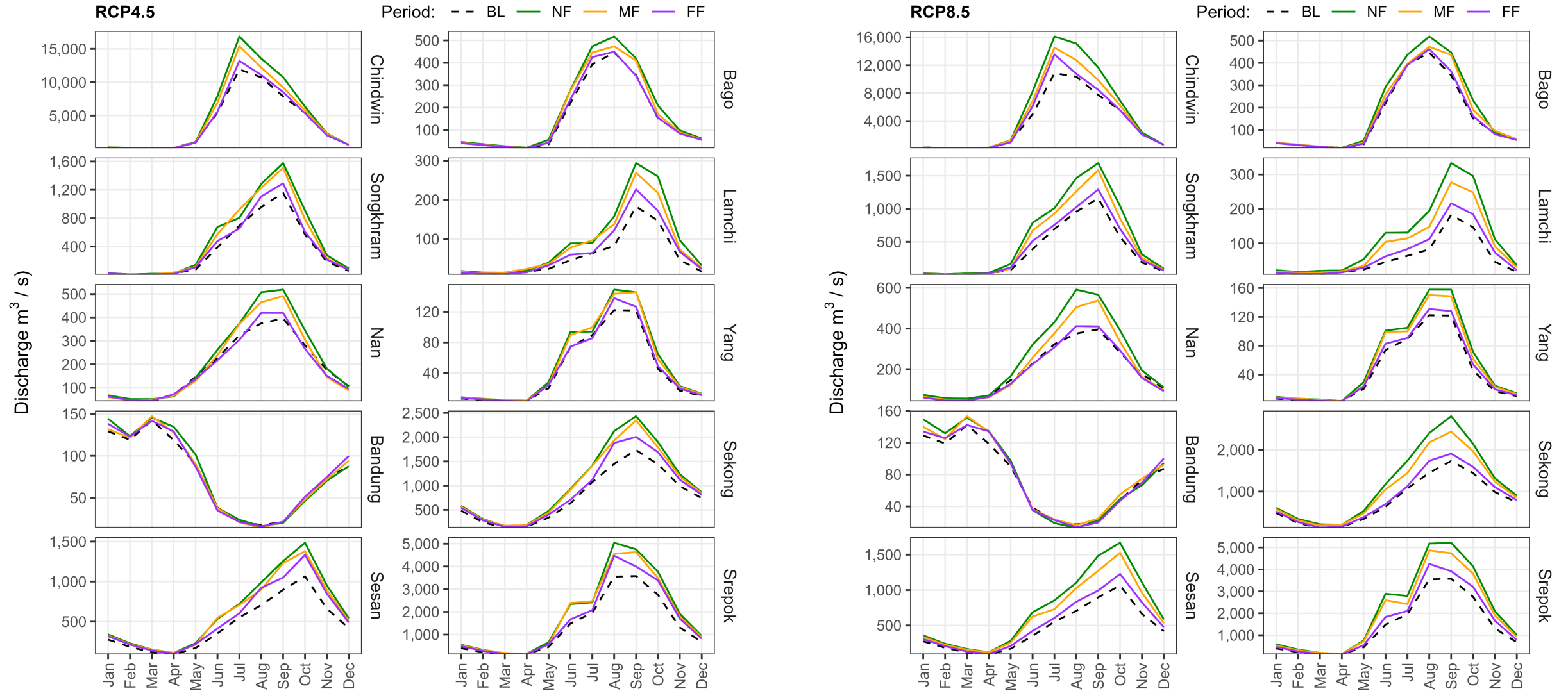
Projected Future Temperature



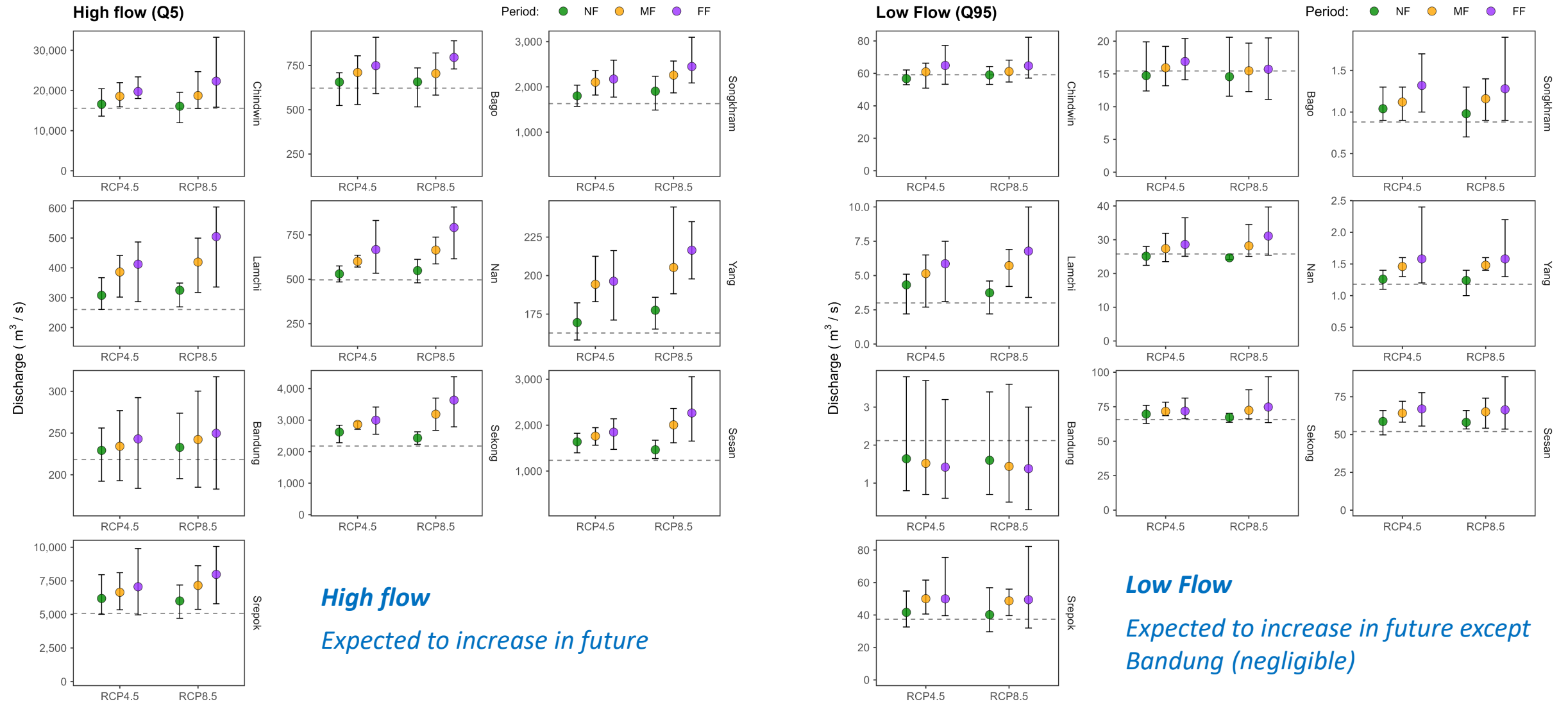
Projected Future Precipitation



Projected Future Hydrology



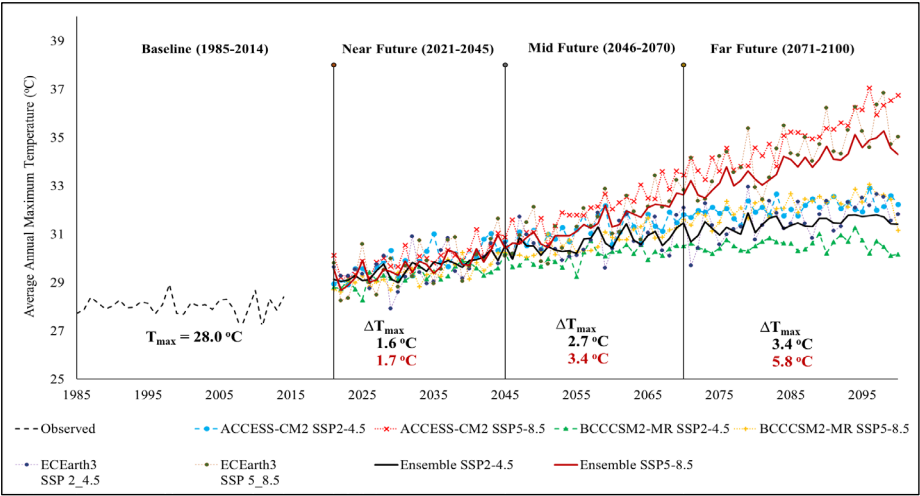
Projected Future Hydrological Extremes



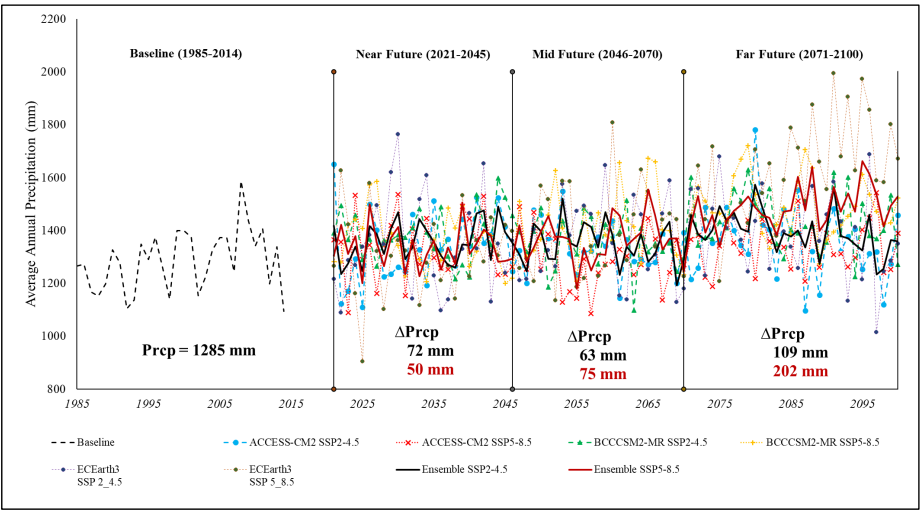
Climate Change Impact on Hydrology & Flood Hazard in the Lancang Mekong River Basin



Lancang Mekong River Basin



Future
 T_{max}



Future
Precipitation

Flood Hazard Mapping in Cambodian Mekong Floodplain (27,760 km²)

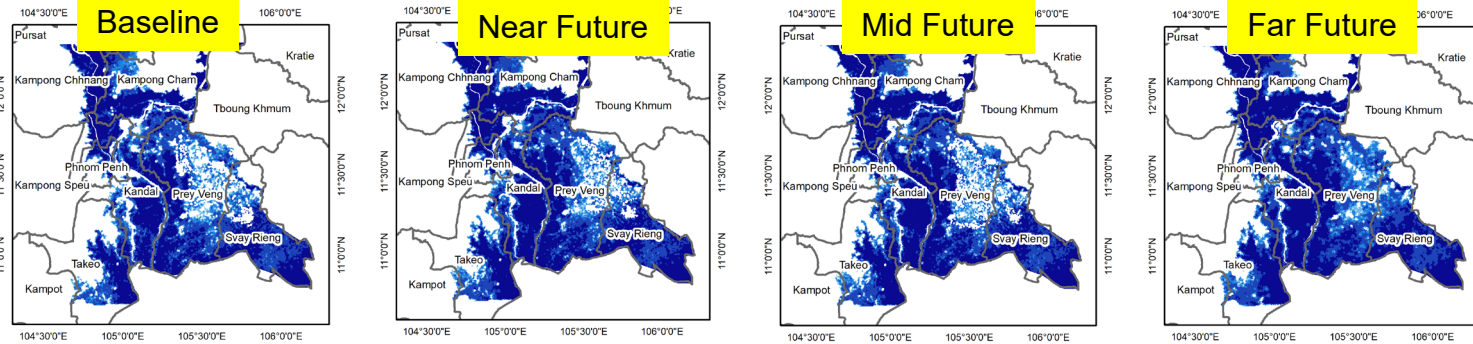
Baseline

Near Future

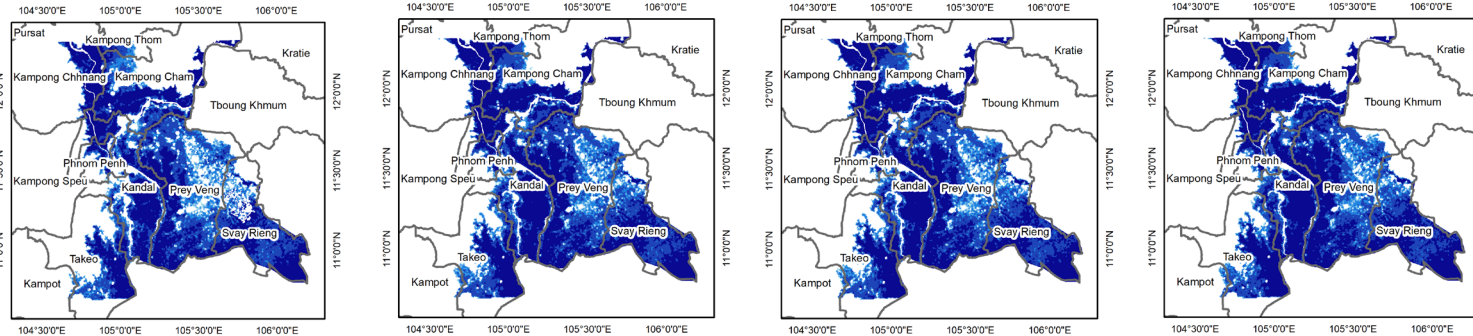
Mid Future

Far Future

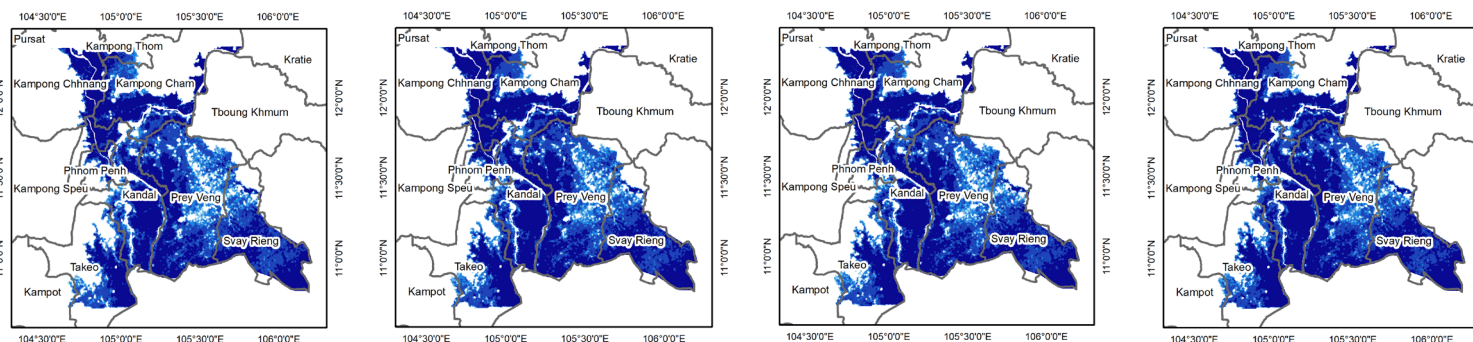
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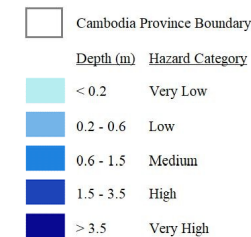
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100



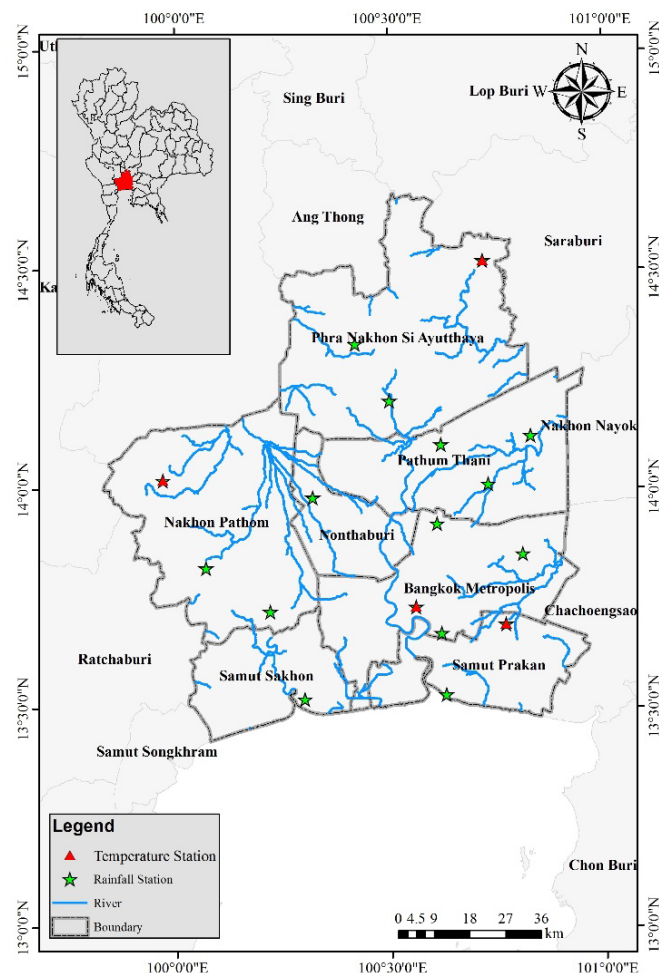
Time period	Return Period	Flood Hazard Area (km ²)					
		Very Low	Low	Medium	High	Very High	Total
Baseline (1988–2014)	25	263	645	1,621	4,110	6,195	12,832
	50	278	687	1,712	4,295	6,338	13,311
	100	262	654	1,697	4,428	6,731	13,772
SSP2-4.5							
Near Future (2021–2045)	25	232	582	1,481	4,137	7,367	13,799
	50	227	585	1,608	4,391	7,501	14,312
	100	221	567	1,596	4,370	7,620	14,375
Mid Future (2046–2070)	25	241	598	1,459	4,048	7,267	13,612
	50	239	603	1,640	4,432	7,308	14,221
	100	240	603	1,635	4,428	7,336	14,242
Far Future (2071–2100)	25	244	570	1,515	4,434	8,062	14,425
	50	192	529	1,540	4,254	8,119	14,634
	100	188	517	1,533	4,235	8,192	14,665



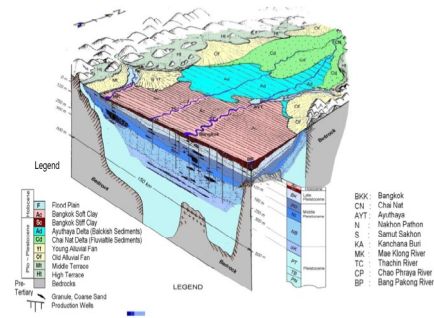
SSP2-4.5

Flood extent>>increasing
Very high flood hazard (>3.5m)
area>> increasing by 10 to 30%

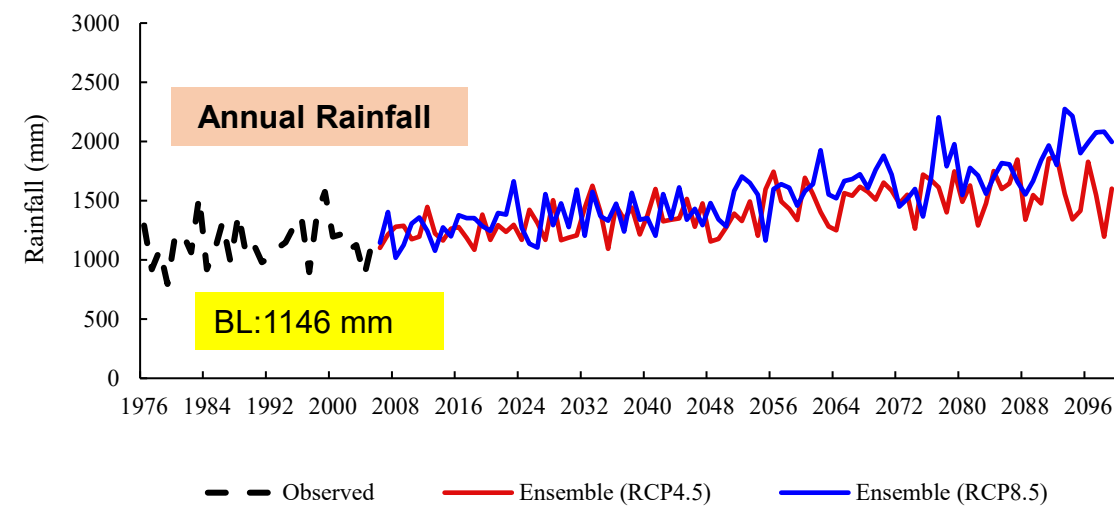
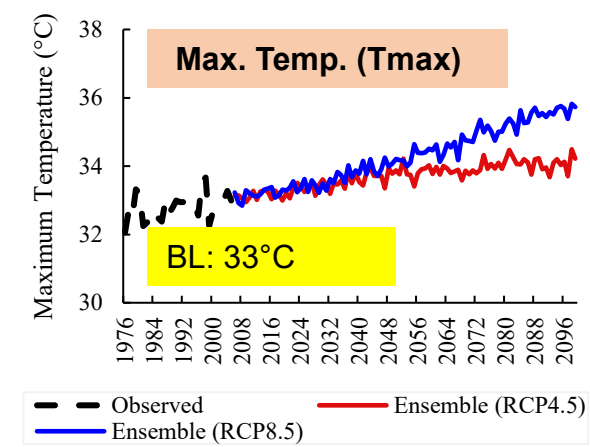
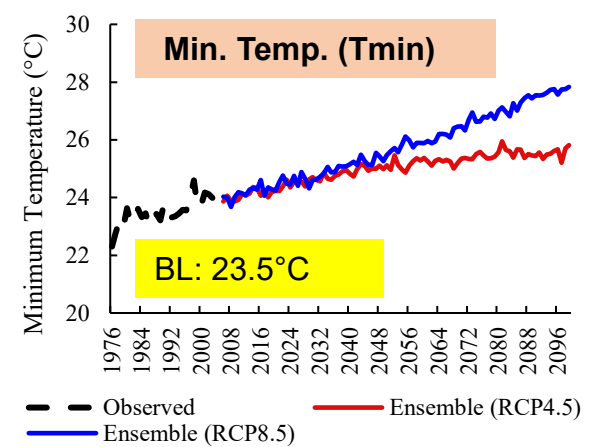
Climate change, land use change, and abstraction impacts on groundwater resources in Bangkok & Vicinity



Bangkok and its vicinity



Hydrogeological setting in Lower Chao-phraya River Basin

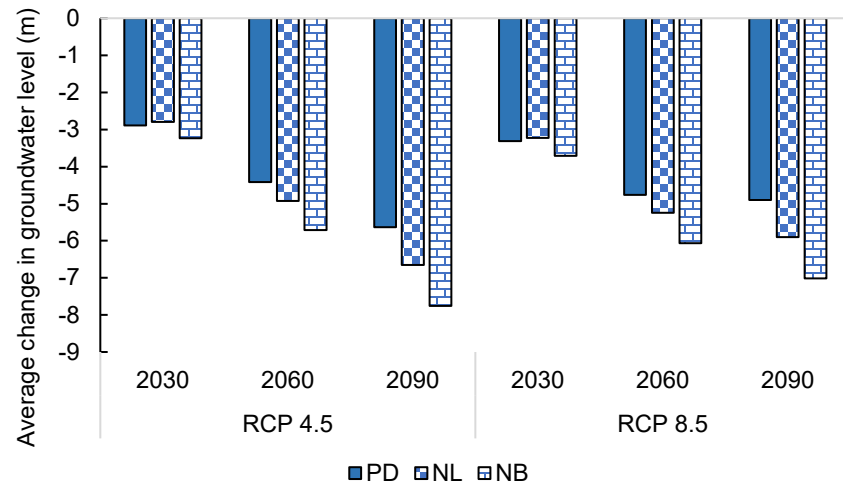


Baseline: 1976–2005; NF: 2010–2039; MF: 2040–2069; FF: 2070–2099

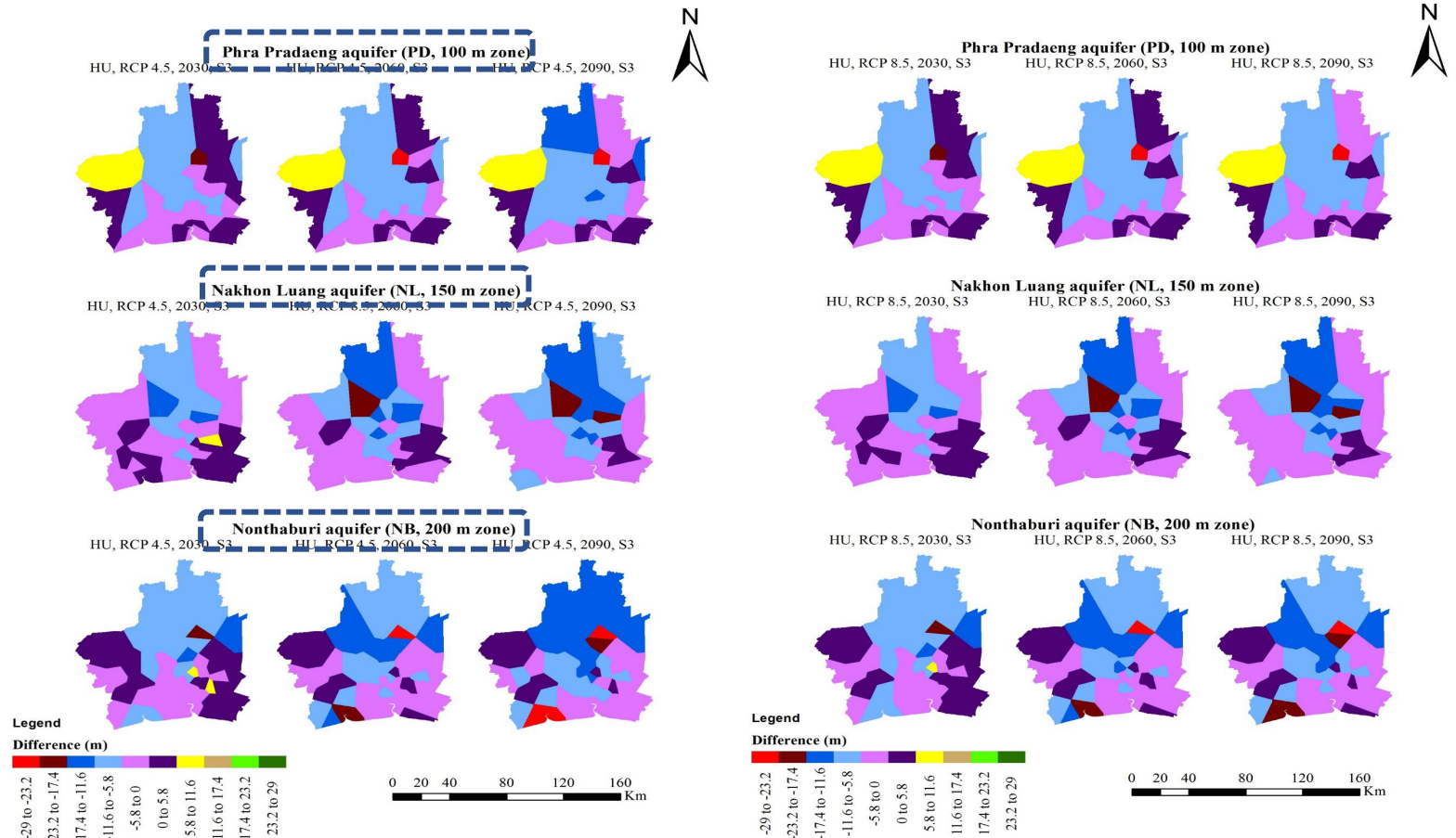
Climate change, land use change, and abstraction impacts on groundwater resources in Bangkok & Vicinity

Future groundwater level: Climate change + high urbanization + pumping scenario 3

High Urbanization and Pumping Scenario (S3)



- Scenario 3: The pumping rate was assumed to increase by 20%, 40% and 60% in 2030, 2060 and 2090 respectively (Pessimistic scenario).



Absolute change in future groundwater level with respect to observed groundwater level (2001) in 2030, 2060 and 2090 for PD, NL and NB aquifer layers under High Urbanization scenario (HU) (Built up area 15>>52% by 2100) and RCP 4.5 and 8.5 scenario for pumping scenario 3

Thank you!