**Supplementary material**

# Hydrological impacts of climate change on rice cultivated riparian wetlands in the Upper Meghna River Basin (Bangladesh and India)

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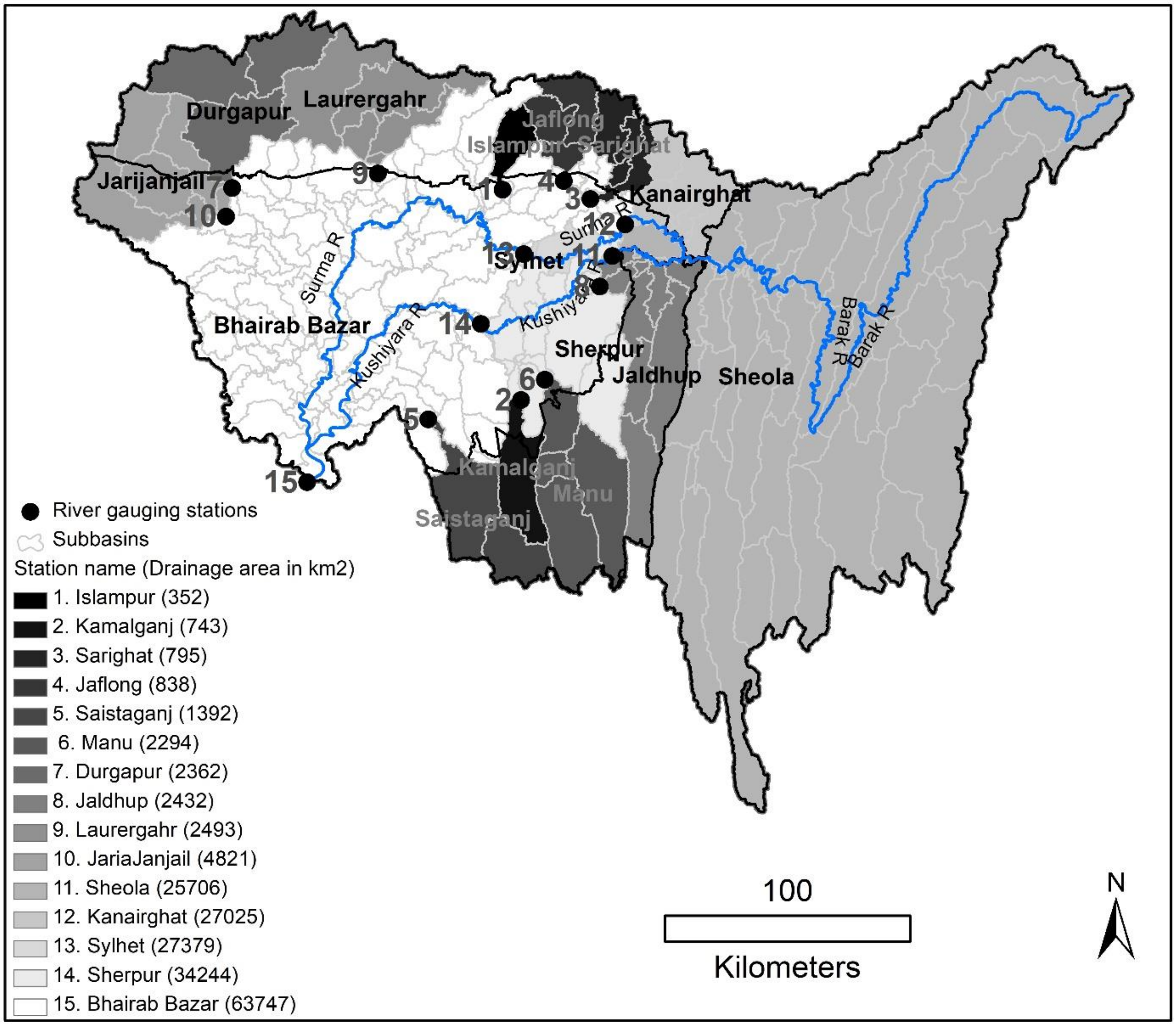


**Figure S1.** Delineated sub-basins within the UMRB and the total drainage area for each of the 15 gauging stations used in model calibration / validation.

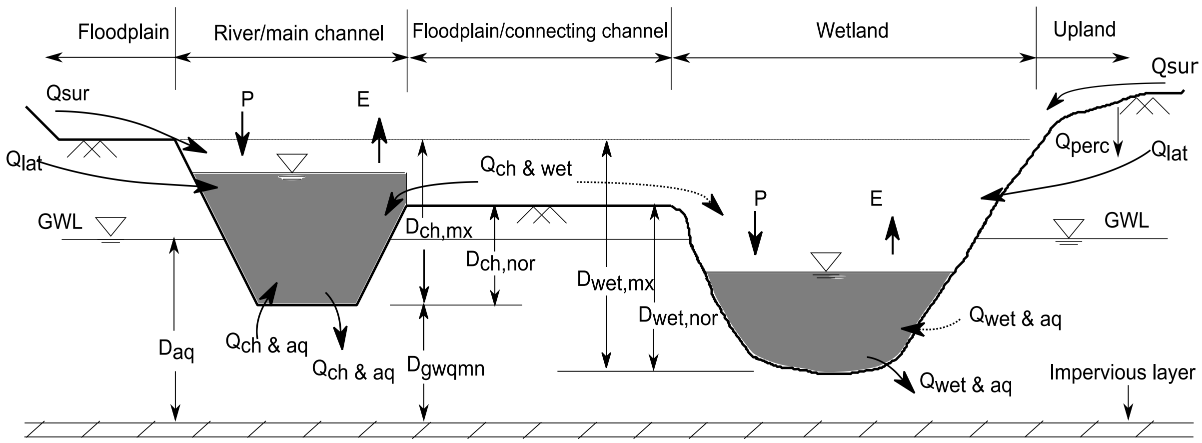


**Figure S2.** Hydrological interactions between a river, riparian wetland and aquifer in SWATrw. The extent of wetland shown with the double-headed horizontal arrow line is the extent at maximum wetland capacity. P= precipitation, E= evaporation, $Q_{perc}$ = percolation, $Q_{sur}$ = surface runoff, $Q_{lat}$ = lateral/inter flow, $Q_{ch\ \&\ aq}$ = exchange between river/main channel and aquifer, $Q_{ch\ \&\ wet}$ = exchange between the river/main channel and wetland, $Q_{wet\ \&\ aq}$ = exchange between the wetland and aquifer either over the floodplain or through the connecting channel, GWL = groundwater level, $D_{aq}$ = height of groundwater level above the aquifer's impervious layer, $D_{gwqmn}$ = height of river's bottom above the aquifer's impervious layer, $D_{ch,mx}$ = maximum channel depth, $D_{ch,nor}$ = channel depth from the normal level which is the elevation of river bank at connecting channel, $D_{wet,mx}$ = maximum wetland depth and $D_{wet,nor}$ = normal depth of wetland. Processes drawn with the dotted lines ($Q_{ch\ \&\ wet}$ and $Q_{wet\ \&\ aq}$) are not currently modelled in SWAT but are included in SWATrw (Rahman et al., 2016).

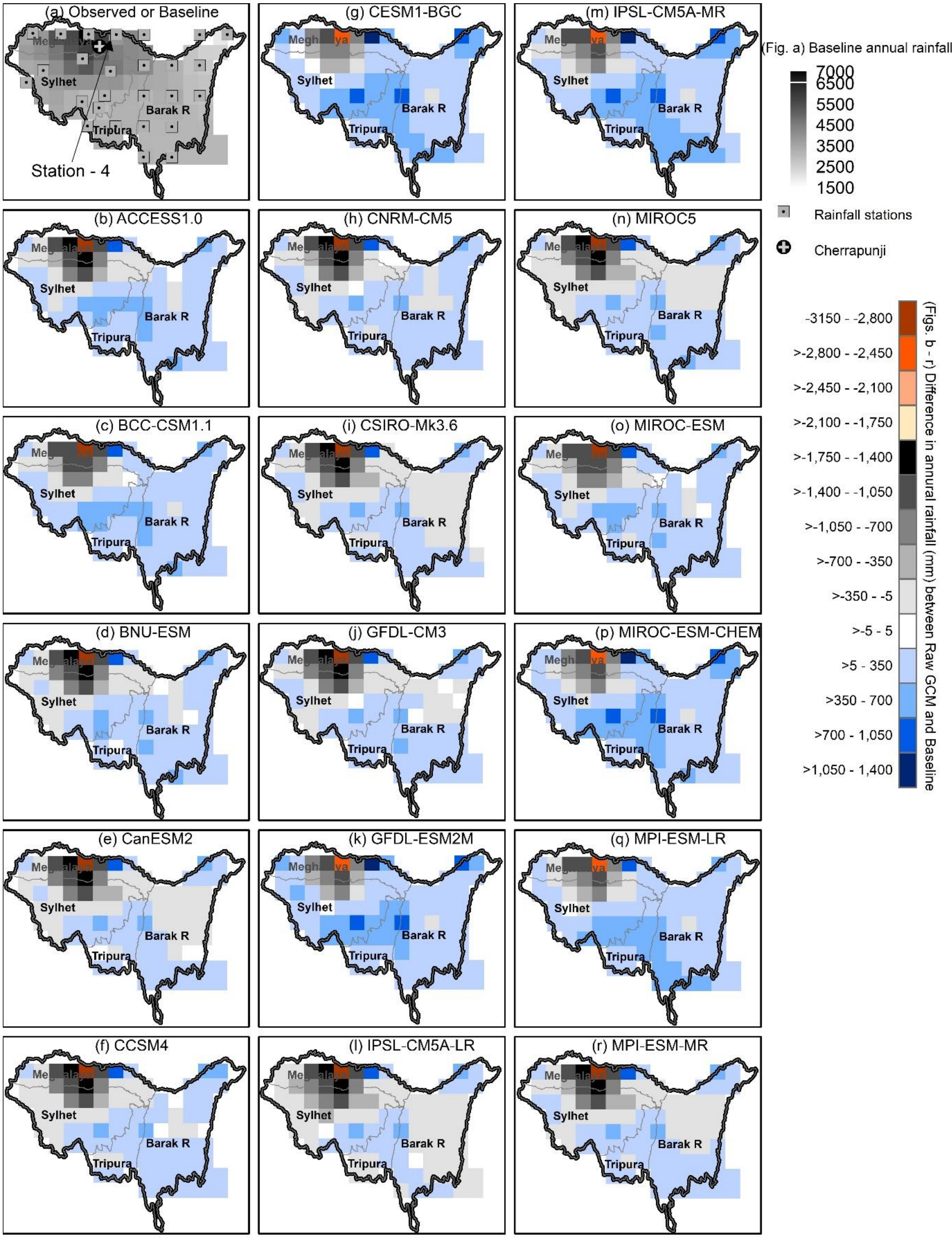


**Figure S3.** Anomalies between raw GCM data (NEX-GDDP) and observed mean annual rainfall for the baseline period (1981–2000). Subplots (b)–(r) are derived by subtracting gridded observed mean annual rainfall from the corresponding value of respective raw GCMs. The deterministic Inverse Distance Weighted (IDW) spatial interpolation method was used to produce the gridded maps from mean annual rainfall at the 26 meteorological stations in the UMRB.

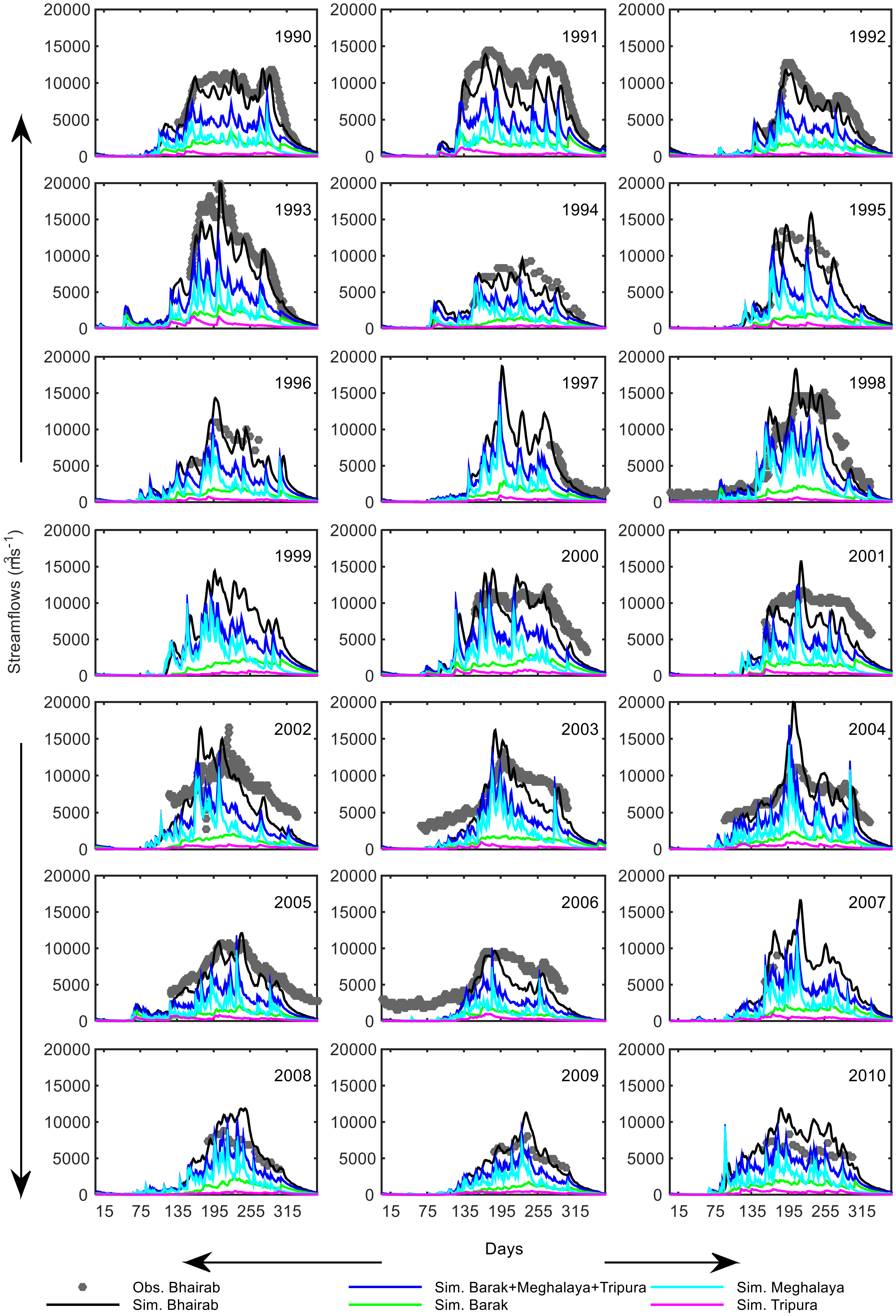


**Figure S4.** Comparison of daily discharges at Bhairab (the outlet of the UMRB) on the Meghna River with those from three large upstream catchments; Barak, Meghalaya and Tripura (see Fig. 1). For each of the last two catchments, daily discharge is calculated by summing simulated daily outflows of all transboundary rivers entering the lower Sylhet catchment in Bangladesh. Similarly, the total hydrograph of the three upper catchments is derived by summing their individual hydrograph ordinates for a particular day. The difference between the hydrographs of the UMRB and the combined three large upstream catchments is the potential runoff generated from the lower Sylhet catchment.

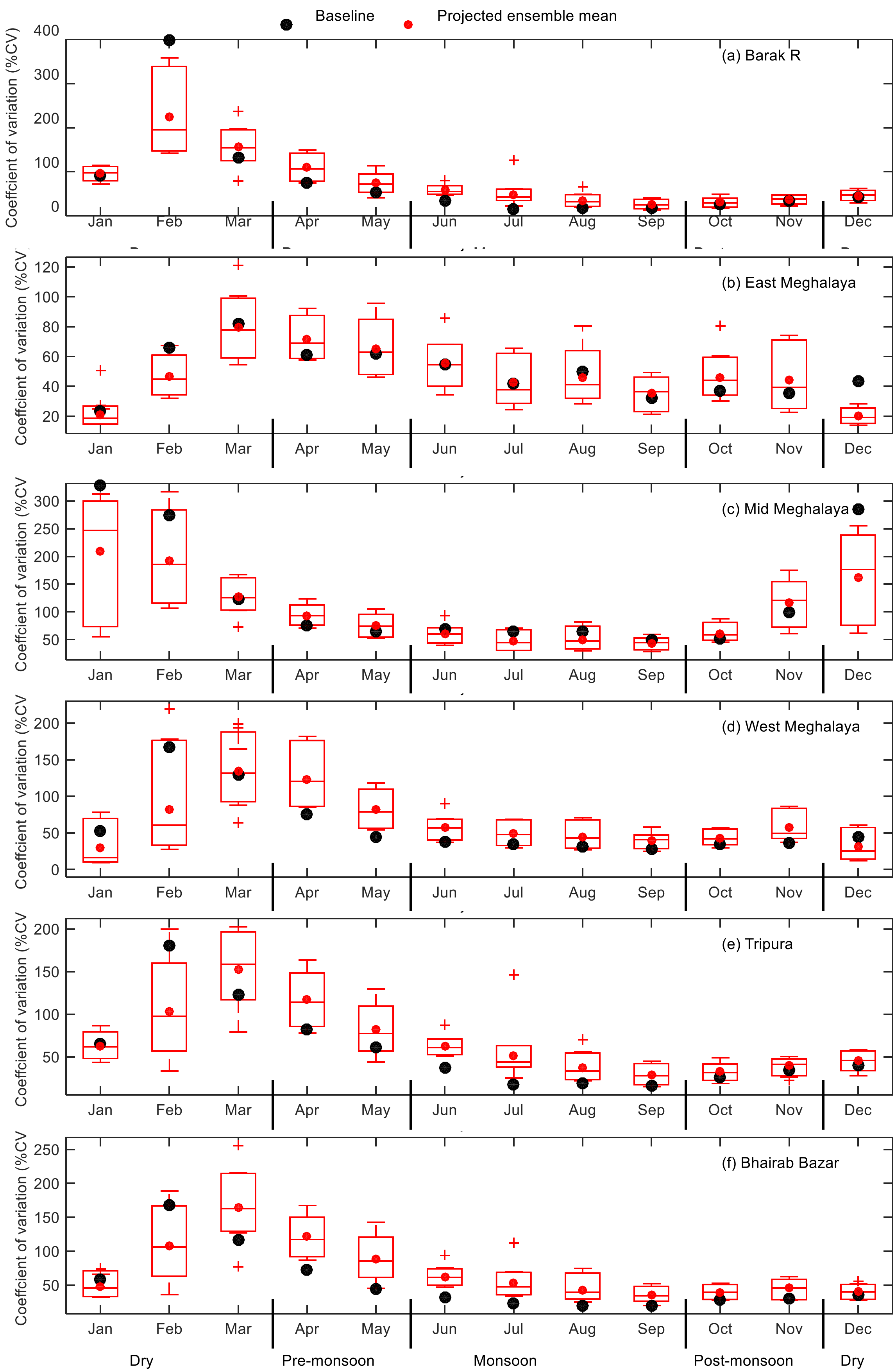


**Figure S5.** Baseline (1981–2000) and projected (2031–2050) coefficient of variation (CV) of mean monthly discharge at the outlet of major sub-basins within the UMRB. The box-whisker plots are generated using the mean monthly discharges projected by the 17 GCMs. The upper and lower limits of each box represent the 90th and 10th percentiles.

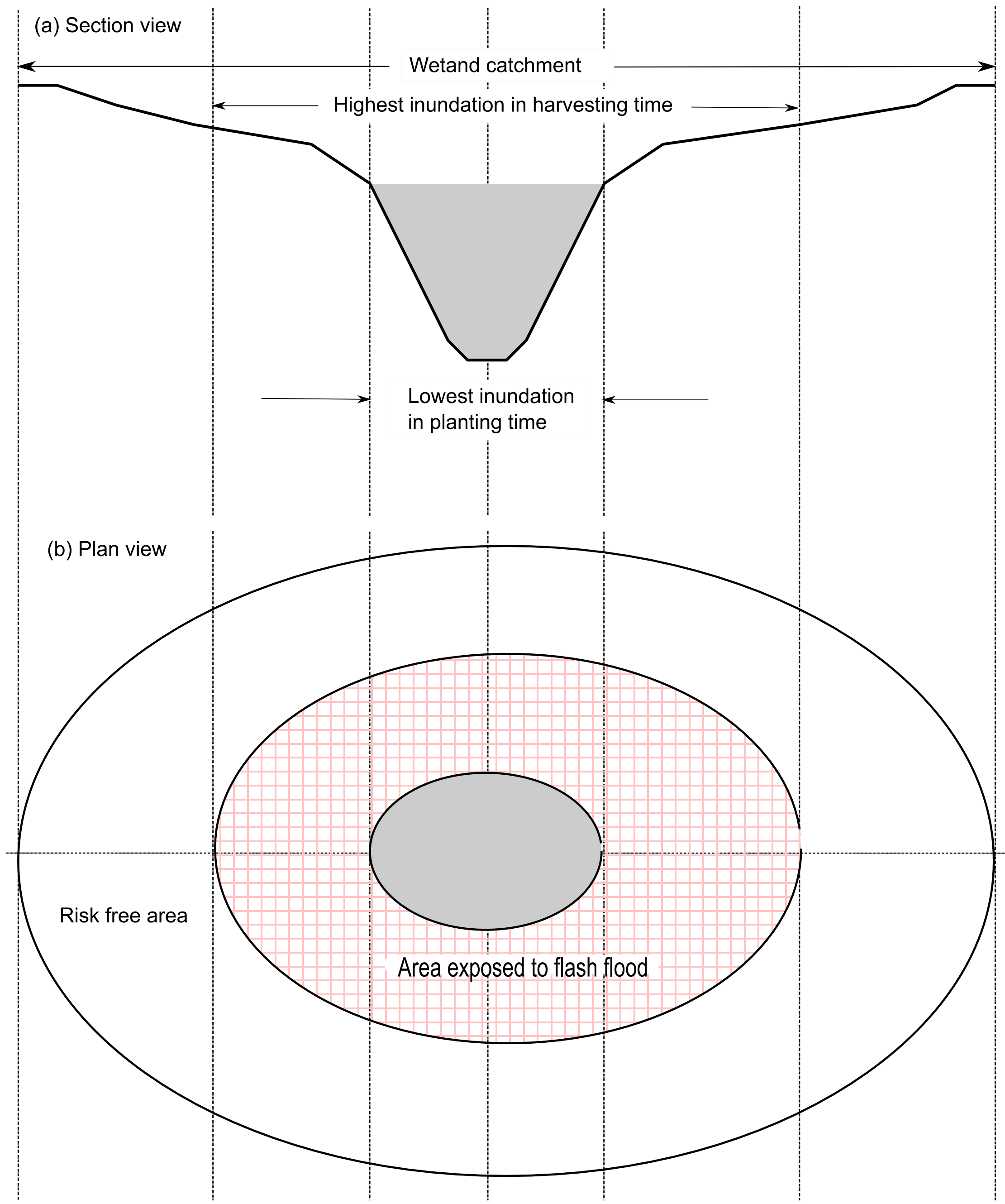


**Figure S6.** Potential wetland area exposed to flash flooding during harvesting time with respect to planting time. Any area above the highest inundation level is flood-risk free during harvesting time.