



*Supplement of*

## **Can the combining of wetlands with reservoir operation reduce the risk of future floods and droughts?**

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1 **Supplement**

2 Table S1. Median values of historical (His) and projected flood characteristics (duration, peak flow, volume,  
 3 and flashiness) at the Nenjiang and Dalai stations under different Socioeconomic Pathways (SSP) scenarios  
 4 in the near-future (IV), mid-century (II) and end-century (III).

|                 | Duration |        |        | Peak flow<br>(m <sup>3</sup> /s) |        |        | Volume<br>(m <sup>3</sup> ) |        |        | Flashiness |        |        |
|-----------------|----------|--------|--------|----------------------------------|--------|--------|-----------------------------|--------|--------|------------|--------|--------|
|                 | SSP126   | SSP370 | SSP585 | SSP126                           | SSP370 | SSP585 | SSP126                      | SSP370 | SSP585 | SSP126     | SSP370 | SSP585 |
| <i>Nenjiang</i> |          |        |        |                                  |        |        |                             |        |        |            |        |        |
| His             | 14.5     | 14.5   | 14.5   | 2499.2                           | 2499.2 | 2499.2 | 24.1                        | 24.1   | 24.1   | 356.5      | 356.5  | 356.5  |
| I               | 14       | 15     | 14     | 2697.8                           | 3570.8 | 3872.6 | 21.8                        | 29.34  | 26.9   | 571.6      | 575.5  | 382.4  |
| II              | 18       | 13.5   | 14     | 4133.1                           | 4326.5 | 3693.9 | 36.8                        | 28.9   | 31.3   | 290.2      | 797.5  | 276.9  |
| III             | 14       | 14     | 15     | 3724.8                           | 3678.5 | 5525.6 | 27.1                        | 30.3   | 29.9   | 588.5      | 633.7  | 793.2  |
| <i>Dalai</i>    |          |        |        |                                  |        |        |                             |        |        |            |        |        |
| His             | 15       | 15     | 15     | 4498.9                           | 4498.9 | 4498.9 | 41.7                        | 41.7   | 41.7   | 377        | 377.1  | 377.1  |
| I               | 30       | 11     | 11     | 2661.3                           | 4450.9 | 3925.2 | 50.3                        | 32.6   | 32.3   | 251.3      | 513.1  | 527.7  |
| II              | 16       | 13     | 12     | 4259.3                           | 5111.1 | 4179.3 | 46.7                        | 48.3   | 33.9   | 763        | 686.2  | 473.2  |
| III             | 11.5     | 14.5   | 13     | 4171.8                           | 5859.3 | 6762.5 | 30.4                        | 48.3   | 48.1   | 781.4      | 605.1  | 990.4  |

6 Table S2. Median values of historical (His) and projected of the projected number of droughts, annual  
7 drought days, duration, and deficit of each drought at the Nenjiang and Dalai stations under different  
8 Socioeconomic Pathways (SSP) scenarios in the near-future (I), mid-century (II) and end-century (III).

|                 | Number of droughts |        |        | Annual drought days<br>(days) |        |        | Drought duration<br>(days) |        |        | Drought deficit<br>(m <sup>3</sup> ) |        |        |
|-----------------|--------------------|--------|--------|-------------------------------|--------|--------|----------------------------|--------|--------|--------------------------------------|--------|--------|
|                 | SSP126             | SSP370 | SSP585 | SSP126                        | SSP370 | SSP585 | SSP126                     | SSP370 | SSP585 | SSP126                               | SSP370 | SSP585 |
| <i>Nenjiang</i> |                    |        |        |                               |        |        |                            |        |        |                                      |        |        |
| His             | 2                  | 2      | 2      | 20                            | 20     | 20     | 10.5                       | 10.5   | 10.5   | -115.6                               | -115.6 | -115.6 |
| I               | 1                  | 2      | 2      | 11                            | 33     | 24     | 8                          | 8      | 8      | -136.8                               | -153.5 | -163.3 |
| II              | 4                  | 2      | 3      | 58                            | 38     | 29     | 9                          | 9      | 10     | -158.5                               | -159.8 | -143.4 |
| III             | 3.5                | 4      | 5      | 49                            | 41     | 58     | 9                          | 9      | 9      | -186.7                               | -158.3 | -164.6 |
| <i>Dalai</i>    |                    |        |        |                               |        |        |                            |        |        |                                      |        |        |
| His             | 2                  | 2      | 2      | 15                            | 15     | 15     | 8                          | 8      | 8      | -154.4                               | -154.4 | -154.4 |
| I               | 1                  | 2      | 2      | 7                             | 33     | 27     | 8                          | 10     | 9      | -337.6                               | -503.4 | -449.1 |
| II              | 3.5                | 2      | 2      | 57.5                          | 19     | 20     | 11                         | 10     | 10     | -639.1                               | -360   | -464   |
| III             | 3                  | 4      | 3      | 41                            | 37     | 38     | 10                         | 9      | 10     | -629.1                               | -394.2 | -591   |

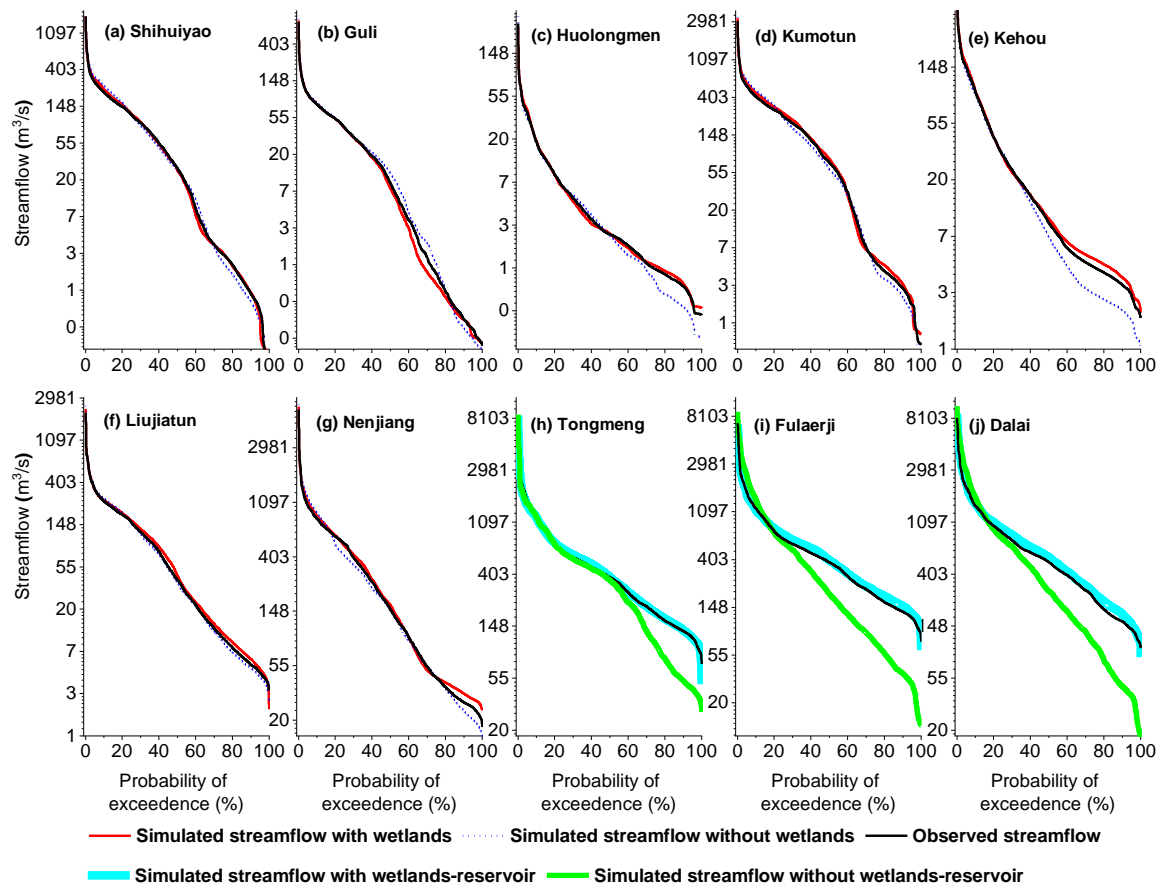


Figure. S1. Comparison of daily flow duration curves at ten hydrological stations in the Nenjiang River Basin. The simulated streamflow used in Fig. A1 a-g were calibrated with/without wetlands whereas the simulated streamflow used in Fig. A1 h-j were calibrated with/without wetlands and Nierji reservoir.

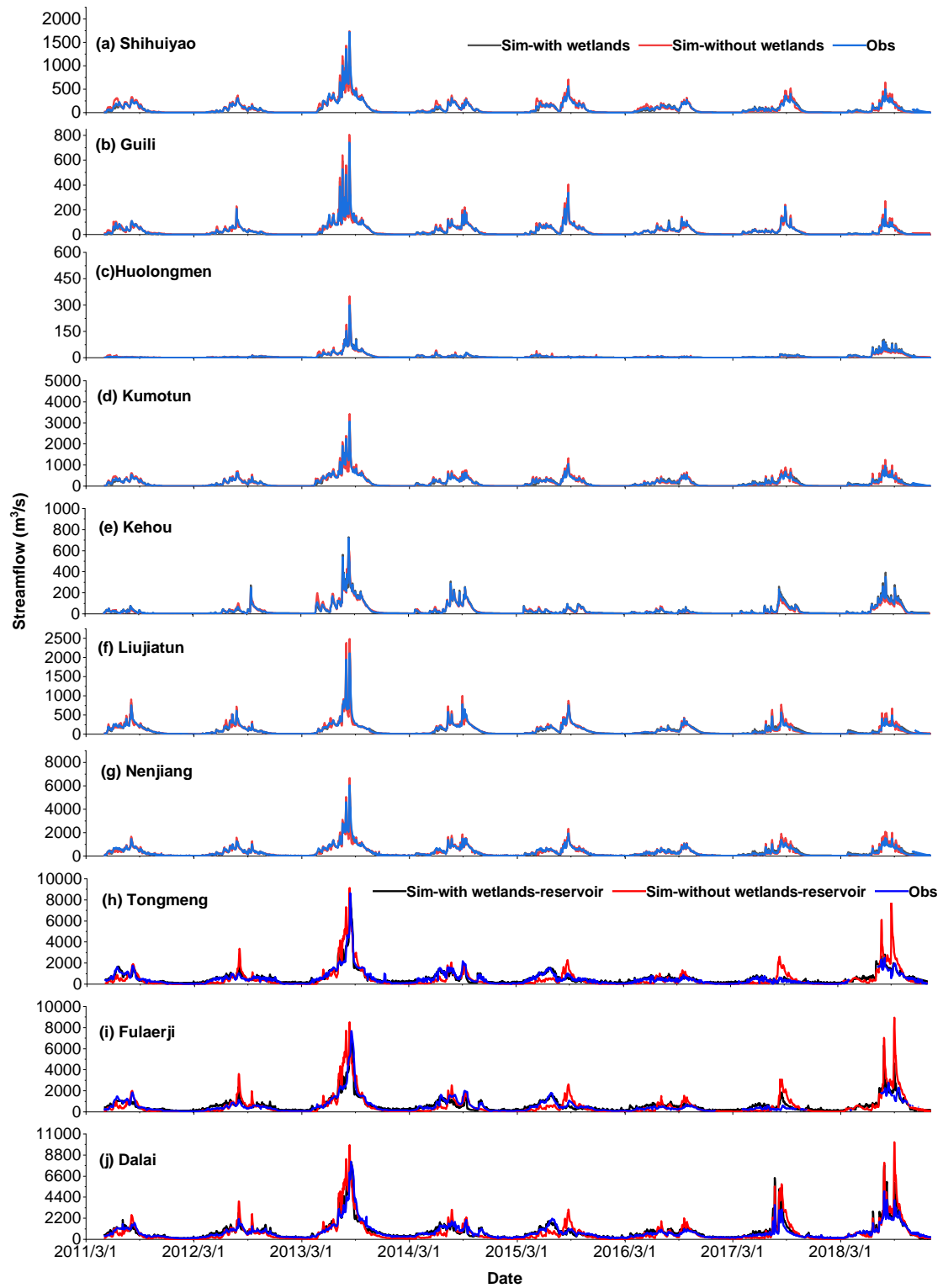


Figure. S2. Comparison of daily simulated and observed streamflow at ten hydrological stations in the Nenjiang River Basin. The simulated streamflow used in Fig. A2 a-g were calibrated with/without wetlands whereas the simulated streamflow used in Fig. A2 h-j were calibrated with/without wetlands and Nierji reservoir.

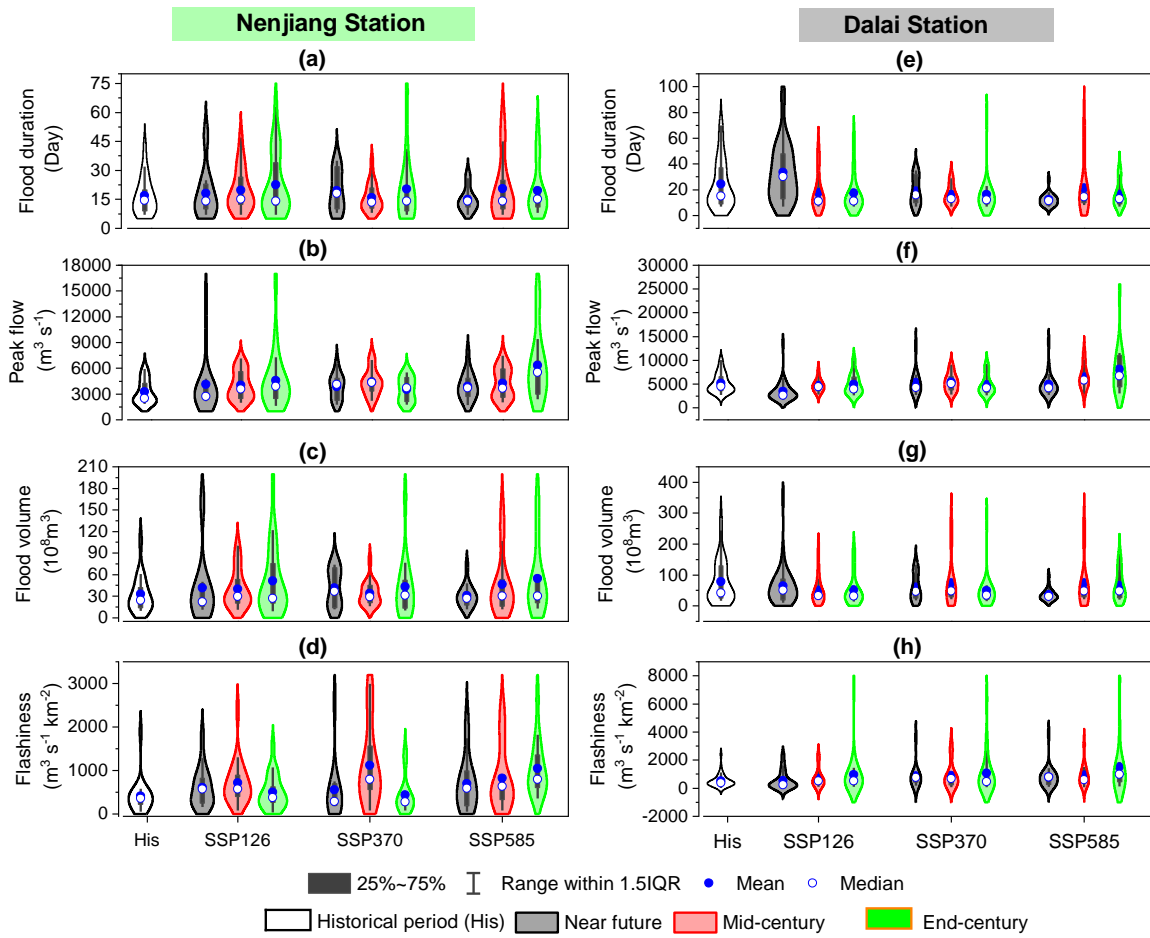


Figure. S3. Historical and projected flood duration, peak flow, volume and flashiness at the Nenjiang (the left column) and Dalai (the right column) Station. The historical period refers to 1971-2020 and the near-future, mid-century and end-century refer to the 2026-2050, 2051-2075 and 2076-2100 under the Socioeconomic Pathways (SSP) 126, SSP370 and SSP585 scenarios. Note that the wider the violin plot, the higher the density.

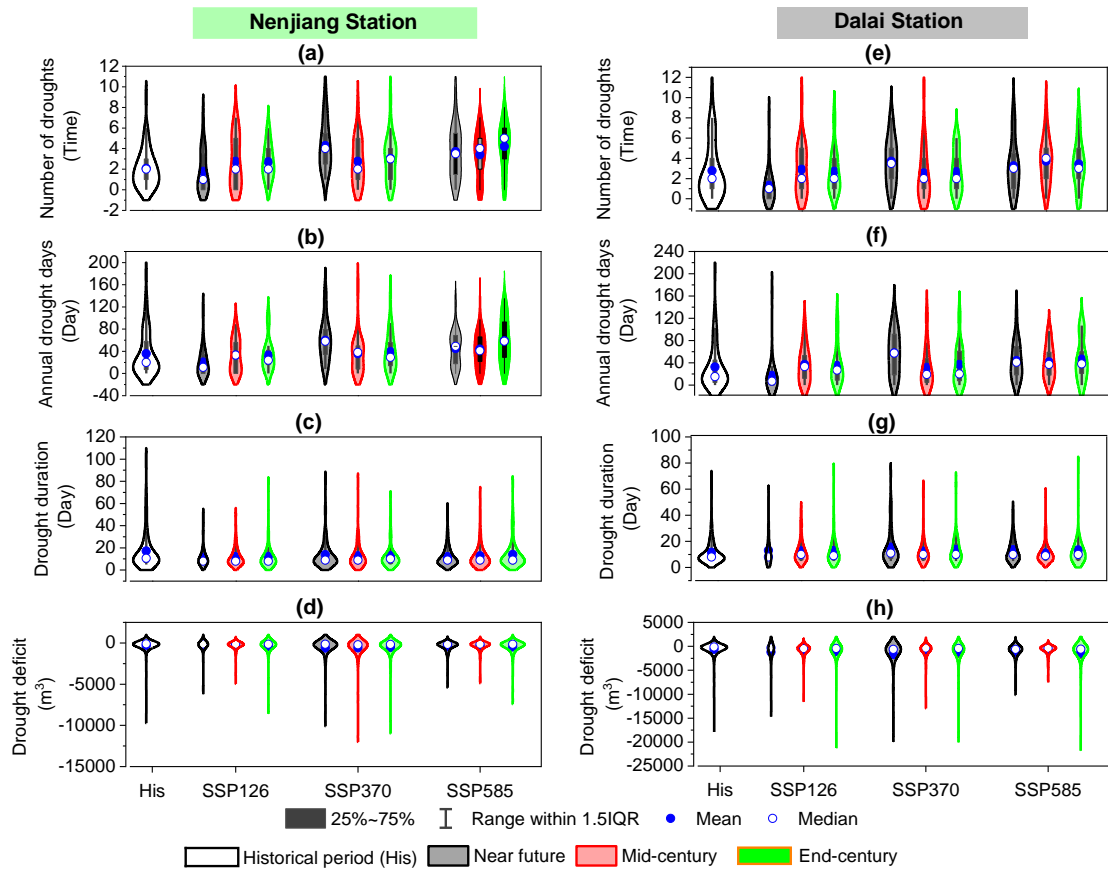


Figure. S4. Historical and projected hydrological drought characteristics (the number of droughts, annual drought days, duration, and deficit) at the Nenjiang (the left column) and Dalai (the right column) Station. The historical period refers to 1971-2020 and the near-future, mid-century and end-century refer to the 2026-2050, 2051-2075 and 2076-2100 under the Socioeconomic Pathways (SSP) 126, SSP370 and SSP585 scenarios. Note that the wider the violin plot, the higher the density.