

Supplementary Materials (SM)

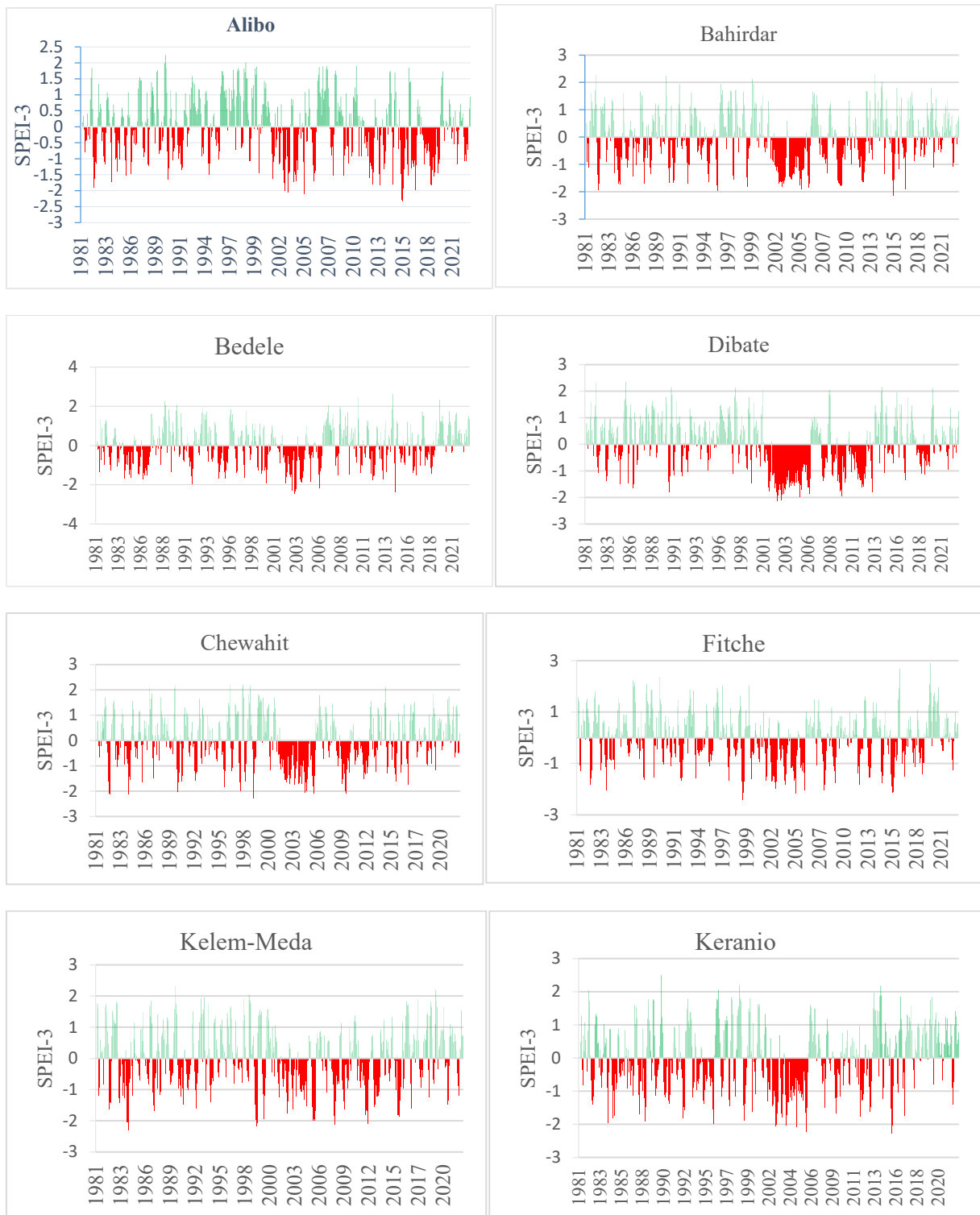
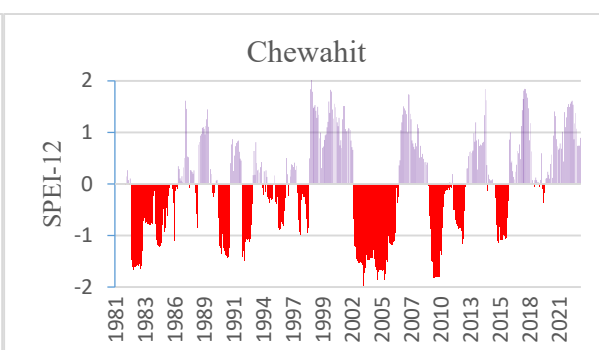
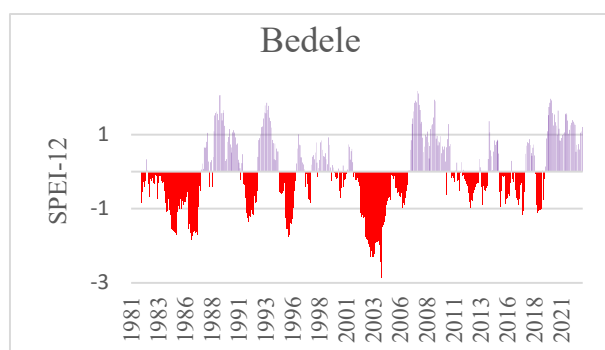
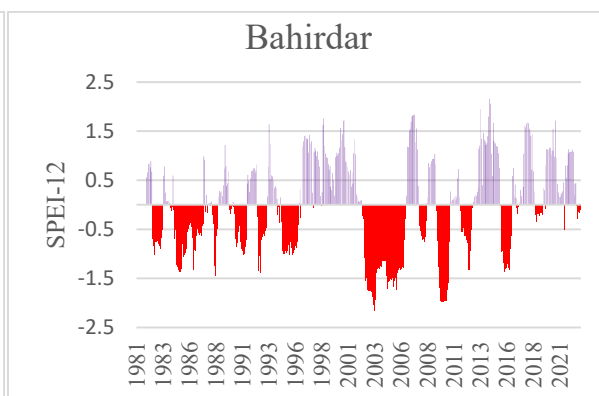
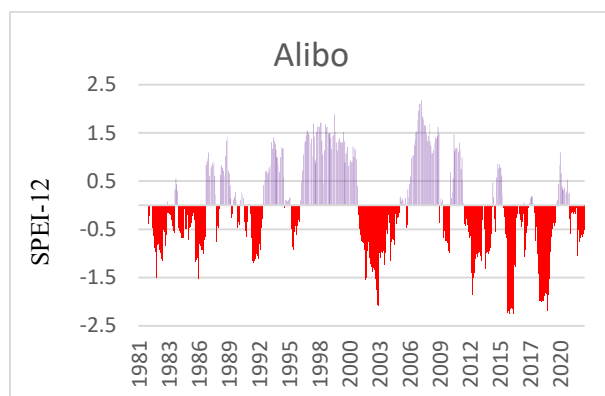


Figure S1: Supplementary Materials (SM Figure 1): SPEI at three month timescales in the selected station in the Abbay basin between 1981 and 2022.

Table S1: Supplementary Material (SM Table 1) spatial coverage of drought severity index in the Abbay basin

| Year | Drought severity classes | Area (km2) | Area (%) |
|------|--------------------------|------------|----------|
| 2003 | Extreme | 44.6 | 0.02 |
| | Severe | 40022.3 | 20.00 |
| | Moderate | 157099.2 | 78.49 |
| | Mild | 2920.3 | 1.46 |
| | No | 66.5 | 0.03 |
| | Total | 200152.9 | 100 |
| 2005 | Extreme | 44.5 | 0.02 |
| | Severe | 11691.6 | 5.84 |
| | Moderate | 177199.9 | 88.53 |
| | Mild | 11017.5 | 5.50 |
| | No | 199.4 | 0.10 |
| | Total | 200152.9 | 100 |
| 2009 | Extreme | 77.9 | 0.04 |
| | Severe | 46636.7 | 23.30 |
| | Moderate | 152837.2 | 76.36 |
| | Mild | 535.4 | 0.27 |
| | No | 65.6 | 0.03 |
| | Total | 200152.9 | 100 |
| 2010 | Extreme | 108.3 | 0.05 |
| | Severe | 12143.4 | 6.07 |
| | Moderate | 180585.0 | 90.22 |
| | Mild | 7181.7 | 3.59 |
| | No | 134.4 | 0.07 |
| | Total | 200152.9 | 100 |
| 2012 | Extreme | 4957.2 | 2.48 |
| | Severe | 90865.4 | 45.40 |
| | Moderate | 103083.8 | 51.50 |
| | Mild | 1062.0 | 0.53 |
| | No | 184.5 | 0.09 |
| | Total | 200152.9 | 100 |
| 2013 | Extreme | 354.1 | 0.18 |
| | Severe | 62338.0 | 31.15 |
| | Moderate | 135292.6 | 67.59 |
| | Mild | 1819.4 | 0.91 |
| | No | 348.8 | 0.17 |
| | Total | 200152.9 | 100 |
| 2015 | Extreme | 88.5 | 0.04 |
| | Severe | 22463.0 | 11.22 |

| | | | |
|------|----------|----------|-------|
| 2018 | Moderate | 171184.4 | 85.53 |
| | Mild | 5884.9 | 2.94 |
| | No | 532.1 | 0.27 |
| | Total | 200152.9 | 100 |
| | Extreme | 492.7 | 0.25 |
| | Severe | 50974.7 | 25.47 |
| | Moderate | 144998.8 | 72.44 |
| | Mild | 3018.8 | 1.51 |
| 2022 | No | 667.8 | 0.33 |
| | Total | 200152.9 | 100 |
| | Extreme | 1490.2 | 0.74 |
| | Severe | 72692.4 | 36.32 |
| | Moderate | 123438.5 | 61.67 |
| | Mild | 2339.6 | 1.17 |
| | No | 192.2 | 0.10 |
| | Total | 200152.9 | 100 |



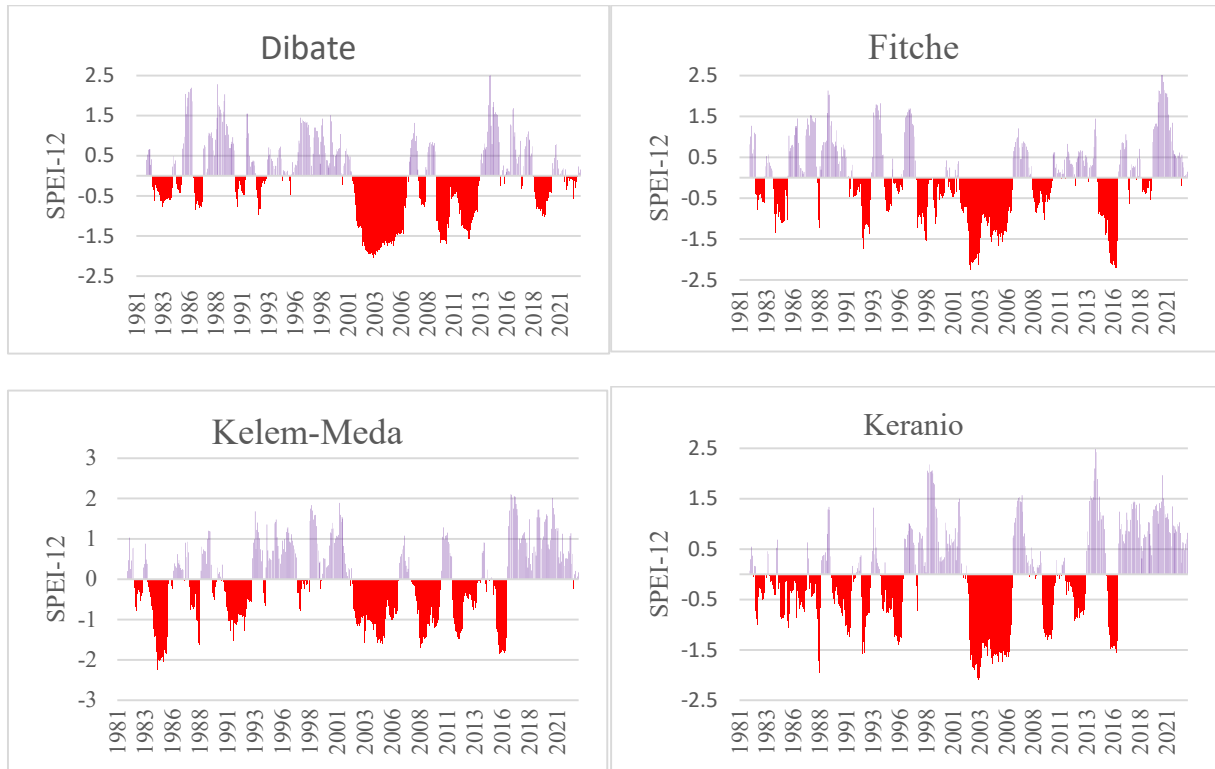


Figure S2: Supplementary Materials (SM Figure 2): SPEI at 12-month timescales in the selected station in the Abbay basin between 1981 and 2022.