

These supplementary materials (Tables S1–S2 and Figures S1–S2) are adopted from Lee (2018), Ph.D thesis of Yonsei University.

The modified water-table fluctuation (WTF) method based on hydrologic parameters, such as groundwater table fluctuation and cumulative precipitation, was used to calculate the recharge at the five monitoring wells.

$$R = \frac{\Delta h}{\sum P} \times S_y$$

where R is recharge, Δh is the water-level increase, $\sum P$ is the amount of accumulated rainfall and S_y is the specific yield.

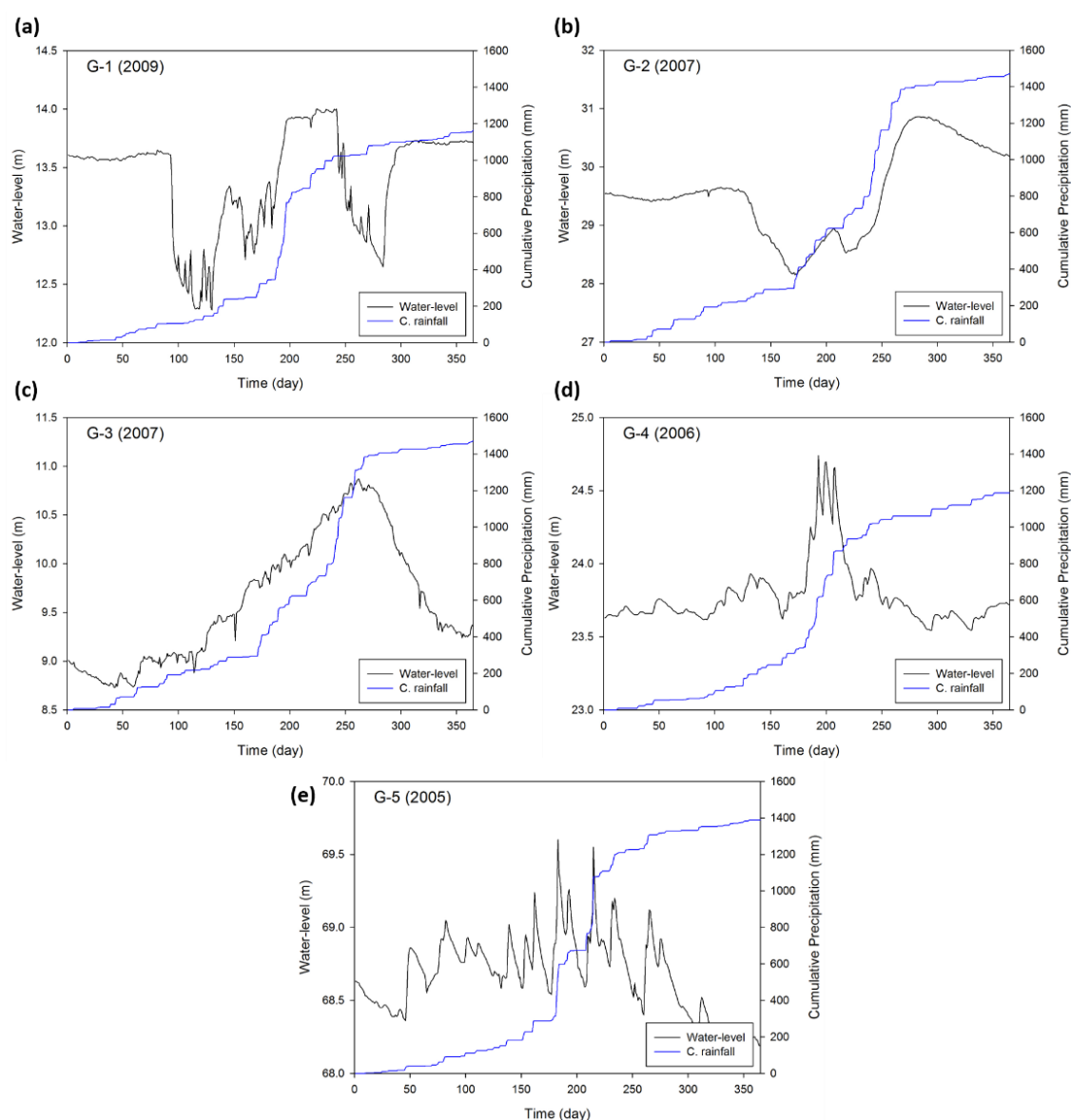


Figure S1. Representative patterns of water-level fluctuations and cumulative precipitation at monitoring wells in the Mangyeong River Basin, Korea: (a) G-1, (b) G-2, (c) G-3, (d) G-4 and (e) G-5. .

Table S1. Estimated groundwater recharge and annual precipitation over 11 years in the Mangyeong River Basin, Korea.

Station	Recharge rate calculated using the WTF method (recharge ratio) and precipitation												S _y
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Mean	
G-1	0.19	0.14	0.17	0.15	0.09	0.15	0.10	0.29	0.16	0.16	0.15	0.16	0.0556
G-2	0.15	0.16	0.15	0.11	0.15	0.11	0.18	0.16	0.11	0.14	0.18	0.15	0.0596*
G-3	0.06	0.04	0.05	0.07	0.07	0.05	0.04	0.05	0.05	0.06	0.06	0.05	0.0342
G-4	0.29	0.20	0.11	0.25	0.18	0.12	0.18	0.22	0.19	0.19	0.10	0.18	0.0596*
G-5	0.19	0.19	0.15	0.22	0.16	0.12	0.11	0.12	0.14	0.14	0.30	0.19	0.0596*
Annual rainfall (mm)	1390.0	1187.5	1471.7	1000.0	1163.9	1462.3	1621.8	1359.7	1264.7	1206.8	813.5	1267.4	-
Recharge (Mm ³ yr ⁻¹)	397	280	221	396	251	223	281	275	255	246	202	275	-

Note: S_y analyzed by pumping test is derived from the K-Water, and ** is the average value of the Geum River Basin.

Table S2. Summary of the characteristics of precipitation recorded in the Jeonju station for 11 years.

Year	Amount of rainfall (mm)				Rainy day (day)			Rainfall intensity (wet season, mm d ⁻¹)	Net P.*	Recharge (10 ⁶ m ³ yr ⁻¹)	
	Annual	Wet season	Dry season	Ratio (wet/annual)	Annual	Wet season	>50 (mm d ⁻¹)				>100 (mm d ⁻¹)
2005	1390.0	1130.0	260.0	81.3	128	55	6	2	20.5	401.2	397
2006	1187.5	815.0	372.5	68.6	118	52	2	1	15.7	169.1	280
2007	1471.7	1106.2	365.5	75.2	127	62	5	1	17.8	532.6	237
2008	1000.0	683.0	317.0	68.3	113	57	3	0	12.0	-46.6	287
2009	1163.9	841.6	322.3	72.3	115	46	5	0	18.3	72.7	251
2010	1462.3	983.7	478.6	67.3	136	61	8	1	16.1	451.1	223
2011	1621.8	1167.8	454.0	72.0	123	58	4	2	20.1	581.7	281
2012	1359.7	992.0	367.7	73.0	123	49	6	0	20.2	257.4	275
2013	1264.7	818.1	446.6	64.7	119	49	5	0	16.7	198.5	255
2014	1206.8	755.5	451.3	62.6	124	57	4	0	13.3	18.5	246
2015	813.5	332.3	481.2	40.8	119	38	0	0	8.7	-375.5	202

*: Net precipitation, precipitation (mm) – evaporation (mm)

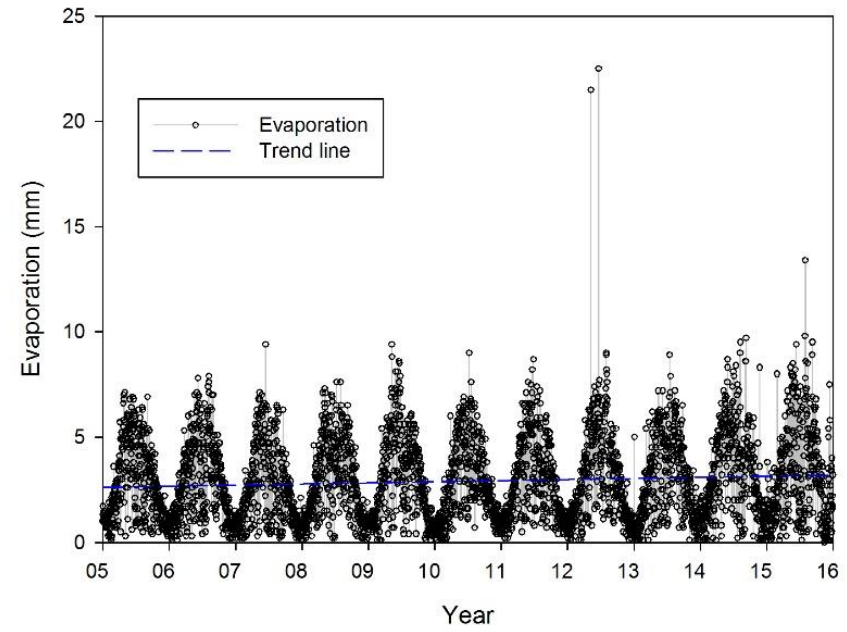
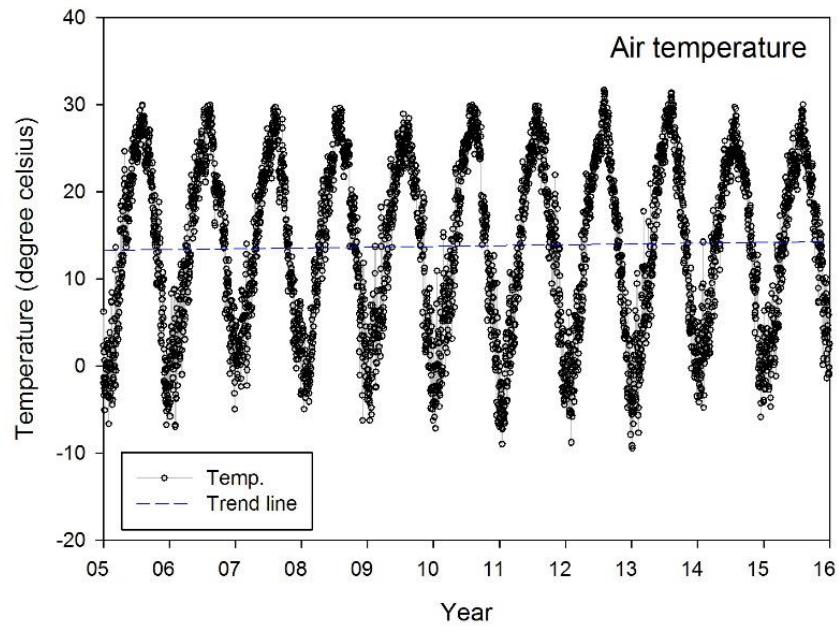


Figure S2. Time series of air temperature and evaporation of the Jeonju weather station.