**Supplementary material**

**A combined methodology for estimating the potential natural aquifer recharge in an arid environment**

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**Table S1.** Statistical analysis related to the estimation of the average runoff (*R*) and the effective infiltration (*Ie*), calculated on the basis of the rainfall events generating a water surplus, for the sub-basins of the Koutine watershed for the reference period (2003–2012).

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sub-basin | AWC(mm) | AWCclass | *Ck* | *Ck*class | Mean *R*(mm) | SD*R* | Mean *Ie*(mm) | Std Dev.*Ie* | Ave. rainfall (mm) | *N* eventstot | Average*N* days | *N* events of 1 day |
| K1 | 190.99 | 4 | 0.185 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0 |
| K2 | 152.03 | 4 | 0.178 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0 |
| K3 | 124.99 | 3 | 0.228 | 2 | 0.55 | 0.00 | 1.86 | 0.00 | 111.00 | 1 | 4.00 | 0 |
| K4 | 113.18 | 3 | 0.202 | 2 | 2.13 | 0.66 | 8.41 | 2.60 | 90.43 | 3 | 3.33 | 1 |
| K5 | 34.77 | 1 | 0.234 | 2 | 4.43 | 5.06 | 14.47 | 16.55 | 36.62 | 34 | 1.79 | 18 |
| K6 | 215.47 | 4 | 0.167 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0 |
| K7 | 161.92 | 4 | 0.174 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0 |
| K8 | 41.45 | 1 | 0.244 | 2 | 5.79 | 5.16 | 17.94 | 16.00 | 46.68 | 24 | 2.38 | 9 |
| K9 | 178.80 | 4 | 0.217 | 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0 |
| K10 | 193.31 | 4 | 0.231 | 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0 |
| K11 | 38.72 | 1 | 0.150 | 1 | 3.51 | 3.18 | 19.89 | 18.05 | 43.32 | 27 | 2.31 | 10 |
| K12 | 120.37 | 3 | 0.205 | 2 | 0.68 | 0.67 | 2.65 | 2.59 | 99.48 | 3 | 4.33 | 1 |
| K13 | 35.42 | 1 | 0.209 | 2 | 4.11 | 4.53 | 15.60 | 17.19 | 40.20 | 32 | 2.13 | 13 |
| K14 | 31.21 | 1 | 0.137 | 1 | 2.32 | 2.94 | 14.63 | 18.58 | 32.96 | 42 | 2.17 | 17 |
| K15 | 111.31 | 3 | 0.135 | 1 | 1.68 | 0.44 | 10.72 | 2.81 | 90.51 | 3 | 4.00 | 1 |
| K16 | 123.55 | 3 | 0.290 | 2 | 1.12 | 0.00 | 2.73 | 0.00 | 137.92 | 1 | 6.00 | 0 |
| K17 | 130.01 | 3 | 0.164 | 1 | 3.39 | 0.00 | 17.30 | 0.00 | 137.92 | 1 | 6.00 | 0 |
| K18 | 92.81 | 2 | 0.320 | 3 | 4.77 | 3.32 | 10.15 | 7.06 | 65.58 | 6 | 2.17 | 4 |
| K19 | 84.96 | 2 | 0.258 | 2 | 3.88 | 3.16 | 11.18 | 9.11 | 68.08 | 9 | 2.78 | 5 |
| K20 | 117.65 | 3 | 0.302 | 3 | 1.83 | 0.98 | 4.23 | 2.27 | 90.43 | 3 | 3.67 | 1 |
| K21 | 134.52 | 3 | 0.340 | 3 | 5.50 | 0.00 | 10.68 | 0.00 | 137.92 | 1 | 6.00 | 0 |
| AWC classification: Class 1 - AWC < 50; Class 2 - 50 < AWC < 100; Class 3 - 100 < AWC < 150; Class 4 - AWC > 150 |

**Table S2.** Statistical analysis related to the estimation of the average runoff (*R*) and the effective infiltration (*Ie*), calculated on the basis of the rainfall events generating a water surplus, for the sub-basins of the Megarine-Arniane watershed for the reference period (2003–2012).

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sub-basin | AWC(mm) | AWCclass | *Ck* | *Ck*class | Mean *R*(mm) | SD*R* | Mean *Ie*(mm) | Std Dev.*Ie* | Ave. rainfall (mm) | *N* eventstot | Average*N* days | *N* events of 1 day |
| M1 | 101.58 | 3 | 0.236 | 2 | 2.59 | 2.43 | 8.38 | 7.86 | 70.05 | 5 | 2.60 | 2 |
| M2 | 69.21 | 2 | 0.233 | 2 | 4.09 | 3.63 | 13.49 | 11.97 | 64.23 | 15 | 2.40 | 7 |
| M3 | 76.78 | 2 | 0.308 | 3 | 4.79 | 4.24 | 10.77 | 9.53 | 66.48 | 13 | 2.31 | 6 |
| M4 | 29.50 | 1 | 0.316 | 3 | 4.79 | 6.62 | 10.34 | 14.31 | 31.26 | 45 | 1.93 | 19 |
| M5 | 107.46 | 3 | 0.300 | 2 | 4.87 | 0.98 | 11.38 | 2.28 | 99.48 | 3 | 4.33 | 1 |
| M6 | 91.09 | 2 | 0.295 | 2 | 4.19 | 3.21 | 9.99 | 7.66 | 70.10 | 7 | 2.14 | 5 |
| M7 | 118.56 | 3 | 0.289 | 2 | 1.49 | 0.94 | 3.66 | 2.31 | 90.43 | 3 | 3.67 | 1 |
| M8 | 82.16 | 2 | 0.264 | 2 | 4.22 | 3.27 | 11.77 | 9.12 | 70.88 | 10 | 2.80 | 4 |
| M9 | 98.32 | 2 | 0.174 | 1 | 2.36 | 1.64 | 11.18 | 7.77 | 70.05 | 5 | 2.60 | 2 |
| M10 | 107.10 | 3 | 0.199 | 1 | 2.50 | 1.71 | 10.07 | 6.88 | 80.84 | 4 | 3.00 | 2 |
| M11 | 67.15 | 2 | 0.144 | 1 | 2.58 | 2.36 | 15.40 | 14.06 | 64.23 | 15 | 2.40 | 7 |
| M12 | 87.37 | 2 | 0.161 | 1 | 2.78 | 1.71 | 14.46 | 8.88 | 70.10 | 7 | 2.14 | 4 |
| M13 | 69.77 | 2 | 0.212 | 2 | 4.14 | 3.08 | 15.41 | 11.49 | 66.46 | 14 | 2.50 | 6 |
| M14 | 241.09 | 4 | 0.286 | 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0 |
| M15 | 218.01 | 4 | 0.265 | 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0 |
| M16 | 128.94 | 3 | 0.186 | 1 | 4.06 | 0.00 | 17.70 | 0.00 | 137.92 | 1 | 6.00 | 0 |
| M17 | 107.36 | 3 | 0.201 | 2 | 2.48 | 1.73 | 9.83 | 6.85 | 87.57 | 4 | 3.25 | 2 |
| M18 | 126.82 | 3 | 0.223 | 2 | 0.13 | 0.00 | 0.45 | 0.00 | 111.00 | 1 | 5.00 | 0 |
| M19 | 155.58 | 4 | 0.220 | 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0 |
| M20 | 95.52 | 2 | 0.235 | 2 | 3.71 | 2.06 | 12.05 | 6.71 | 70.05 | 5 | 2.60 | 2 |
| M21 | 196.89 | 4 | 0.237 | 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0 |
| M22 | 90.96 | 2 | 0.235 | 2 | 3.39 | 2.58 | 10.89 | 8.29 | 70.10 | 7 | 2.14 | 4 |
| M23 | 112.41 | 3 | 0.236 | 2 | 2.67 | 0.77 | 8.63 | 2.48 | 90.43 | 3 | 3.67 | 1 |
| M24 | 198.41 | 4 | 0.212 | 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0 |
| M25 | 149.18 | 3 | 0.232 | 2 | 0.35 | 0.00 | 1.16 | 0.00 | 137.92 | 1 | 6.00 | 0 |
| M26 | 126.34 | 3 | 0.290 | 2 | 0.31 | 0.00 | 0.75 | 0.00 | 111.00 | 1 | 5.00 | 0 |
| M27 | 147.73 | 3 | 0.291 | 2 | 0.86 | 0.00 | 2.10 | 0.00 | 137.92 | 1 | 6.00 | 0 |
| AWC classification: Class 1 - AWC < 50; Class 2 - 50 < AWC < 100; Class 3 - 100 < AWC < 150; Class 4 - AWC > 150 |

**Table S3.** Statistical analysis related to the estimation of the average runoff (*R*) and the effective infiltration (*Ie*), calculated on the basis of the rainfall events generating a water surplus, for the sub-basins of the Hajar watershed for the reference period (2003–2012).

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Sub-basin | AWC(mm) | AWCclass | *Ck* | *Ck*class | Mean *R*(mm) | Std Dev.*R* | Mean *Ie*(mm) | Std Dev.*Ie* | Ave. rainfall (mm) | *N* eventstot | Average*N* days | *N* events of 1 day |
| H1 | 70.32 | 2 | 0.290 | 2 | 5.98 | 4.05 | 14.64 | 9.91 | 64.31 | 13 | 2.31 | 7 |
| H2 | 106.81 | 3 | 0.199 | 1 | 2.55 | 1.71 | 10.29 | 6.87 | 80.84 | 4 | 3.00 | 2 |
| H3 | 214.90 | 4 | 0.208 | 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0 | 0.00 | 0 |
| H4 | 129.26 | 3 | 0.197 | 1 | 4.21 | 0.00 | 17.23 | 0.00 | 137.92 | 1 | 7.00 | 0 |
| H5 | 140.43 | 3 | 0.237 | 2 | 2.43 | 0.00 | 7.83 | 0.00 | 137.92 | 1 | 6.00 | 0 |
| AWC classification: Class 1 - AWC < 50; Class 2 - 50 < AWC < 100; Class 3 - 100 < AWC < 150; Class 4 - AWC > 150 |