**Supplementary file**

**Table S1**. Water demand for Urmia’s consumption areas (m3).

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **March** | **February** | **January** | **December** | **November** | **October** | **September** | **August** | **July** | **June** | **May** | **April** |  |
| 948566 | 868969 | 578661 | 868969 | 689733 | 732546 | 1002153 | 1328323 | 999899 | 768215 | 565450 | 689998 | Zone1 |
| 289766 | 187899 | 274271 | 187899 | 258976 | 189312 | 315478 | 412533 | 269842 | 284564 | 274271 | 259776 | Zone2 |
| 314589 | 298953 | 328807 | 298953 | 298656 | 336466 | 415783 | 500658 | 300055 | 312846 | 328807 | 299356 | Zone3 |
| 277899 | 169832 | 273603 | 169832 | 249835 | 187989 | 287535 | 315000 | 259865 | 254566 | 273603 | 250535 | Zone4 |
| 825987 | 785935 | 474701 | 785935 | 548653 | 665604 | 875622 | 987520 | 825656 | 688975 | 474701 | 549493 | Zone5 |
| 121519 | 81682 | 98061 | 81682 | 66598 | 106261 | 75284 | 175950 | 107669 | 69240 | 98061 | 67298 | Zone6 |
| 658923 | 612587 | 409061 | 612587 | 499634 | 525466 | 700154 | 774782 | 658989 | 543866 | 409061 | 500423 | Zone7 |
| 499999 | 489864 | 374701 | 489864 | 379825 | 417466 | 599999 | 600258 | 599699 | 460898 | 374701 | 380525 | Zone8 |
| 300157 | 289833 | 298784 | 289833 | 287925 | 330266 | 398569 | 485623 | 298323 | 310565 | 298784 | 288673 | Zone9 |
| 234587 | 145646 | 258950 | 145646 | 220165 | 150463 | 100253 | 250368 | 256898 | 120335 | 258950 | 222875 | Zone10 |

**Table S2.** Capacity of water reservoirs of Urmia city (m3).

|  |  |
| --- | --- |
| 10000 | Reservoir 1 |
| 10000 | Reservoir 2 |
| 10000 | Reservoir 3 |
| 2000 | Reservoir 4 |
| 5600 | Reservoir 5 |
| 2000 | Reservoir 6 |
| 10000 | Reservoir 7 |
| 10000 | Reservoir 8 |
| 5000 | Reservoir 9 |
| 5000 | Reservoir 10 |
| 1000 | Reservoir 11 |
| 2000 | Reservoir 12 |
| 8000 | Reservoir 13 |
| 2000 | Reservoir 14 |
| 2000 | Reservoir 15 |
| 2000 | Reservoir 16 |
| 300 | Reservoir 17 |

|  |
| --- |
| **Table S3.** Wastewater transfer cost (Rial). |
| March | February | January | December | November | October | September | August | July | June | May | April |  |  |
| 3981 | 3981 | 3981 | 3981 | 3981 | 3981 | 3981 | 3981 | 3981 | 3981 | 3981 | 3981 | 1 | Zone1 |
| 3052 | 3052 | 3052 | 3052 | 3052 | 3052 | 3052 | 3052 | 3052 | 3052 | 3052 | 3052 | 1 | Zone2 |
| 3185 | 3158 | 3158 | 3158 | 3158 | 3158 | 3158 | 3158 | 3158 | 3158 | 3158 | 3158 | 1 | Zone3 |
| 2919 | 2919 | 2919 | 2919 | 2919 | 2919 | 2919 | 2919 | 2919 | 2919 | 2919 | 2919 | 1 | Zone4 |
| 2654 | 2654 | 2654 | 2654 | 2654 | 2654 | 2654 | 2654 | 2654 | 2654 | 2654 | 2654 | 1 | Zone5 |
| 3185 | 3185 | 3185 | 3185 | 3185 | 3185 | 3185 | 3185 | 3185 | 3185 | 3185 | 3185 | 1 | Zone6 |
| 3450 | 3450 | 3450 | 3450 | 3450 | 3450 | 3450 | 3450 | 3450 | 3450 | 3450 | 3450 | 1 | Zone7 |
| 2710 | 2710 | 2710 | 2710 | 2710 | 2710 | 2710 | 2710 | 2710 | 2710 | 2710 | 2710 | 1 | Zone8 |
| 3291 | 3291 | 3291 | 3291 | 3291 | 3291 | 3291 | 3291 | 3291 | 3291 | 3291 | 3291 | 1 | Zone9 |
| 3052 | 3052 | 3052 | 3052 | 3052 | 3052 | 3052 | 3052 | 3052 | 3052 | 3052 | 3052 | 1 | Zone10 |

**Table 4.** Water supply chain literature review.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Approach** | **Defining the problem** | **Uncertainty parameter** | **Model type** | **Objective Function**  | **Supply chain layers** |  |
| Certain | Stochastic | Fuzzy | Simulation | Single period | Multi-period | Two stages | Multi stages | Demand | Capacity | Cost of transportation | Variable cost | Supply Resources | MILP | MINLP | FSTP | Scenario-Base | IMSLP | IMSCMIP | FMSP | IFPDA | ILP | TSP | CCP | CD | MITMNLP | Cost | Profit | Satisfaction of consumption | Others | Supply Source | Water Treatment | Reservoir | Consumption area | Wastewater Treatment  | Lake | Reference |
|  | ● | ● |  |  |  | ● |  |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |  |  | ● |  |  |  | ● |  |  |  |  |  | Guo et al. |
| ● |  |  |  |  | ● |  |  |  |  |  |  | ● | ● |  |  |  |  |  |  |  |  |  |  |  |  | ● |  |  |  | ● | ● | ● |  |  |  | Saif and Almansoori |
|  | ● | ● |  |  | ● | ● |  | ● |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |  | ● |  |  |  | ● |  |  | ● | ● |  | Naderi and Pishvaee |
|  |  | ● |  |  |  |  |  | ● |  |  |  | ● |  |  |  | ● |  |  |  |  |  |  |  |  |  |  |  |  | ● | ● |  |  |  |  |  | Safavi et al. |
|  |  | ● |  |  |  |  | ● | ● |  |  |  | ● |  |  |  |  | ● |  |  |  |  |  |  |  |  |  | ● |  |  | ● |  |  |  |  |  | Li et al. |
|  |  |  |  |  |  |  |  |  |  |  |  | ● |  |  |  |  |  |  | ● |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  | Zhou et al. |
| ● |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | ● |  |  |  | ● | ● |  | ● | ● |  | Babayan et al |
|  |  | ● |  | ● |  |  |  | ● | ● | ● |  |  |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |  | ● | ● | ● | ● |  |  | Xu and Qin |
|  |  | ● |  |  |  | ● |  |  |  |  |  | ● |  |  |  | ● |  |  |  |  | ● | ● | ● |  |  |  | ● |  | ● |  |  |  | ● |  |  | Wang and Huang |
| ● |  |  |  | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | ● |  |  |  |  | ● |  | ● |  | ● | ● | ● | ● |  |  | Fattahi and Fayyaz |
| ● |  |  |  | ● |  |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |  |  |  |  | ● |  |  |  | ● | ● | ● | ● |  |  | Liu et al. |
| ● |  |  |  |  | ● |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | ● |  | ● |  |  |  | ● |  |  |  |  |  | Zarghami et al. |
| ● |  |  |  |  | ● |  |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |  |  |  | ● |  |  |  | ● | ● | ● | ● |  |  | Lari and Pishvaee |
|  |  |  | ● |  | ● |  |  |  |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |  |  |  |  | ● |  |  |  | ● |  |  | Darbandsari et al |
| ● |  |  |  |  | ● |  |  |  |  |  |  |  | ● |  |  |  |  |  |  |  |  |  |  |  |  | ● |  |  |  | ● | ● | ● | ● | ● | ● | This paper |