

**The Interrelationship between ISTN lake,
Babakan lake and the surrounding wells
of shallow groundwater using stable
isotopes δ ²H and δ ¹⁸O for the LakeBank
Filtration potential**

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- For a better understanding of the lakebank filtration process in the shallow groundwater system, research was conducted around the ISTN lake and Babakan lake basin, with random sampling techniques for stable isotopes ($\delta^{18}\text{O}$ and $\delta^2\text{H}$) analysis in conjunction with pH and TDS evaluations which can explain the interrelationship between the lakes water and the shallow groundwater around lakes
- *The objective of this research is to study the lakebank filtration potential of shallow groundwater as a sustainable drinking water resource for urban and rural areas*



Fig. 1. Sampling locations for ISTN lake, Babakan lake and surrounding shallow groundwater

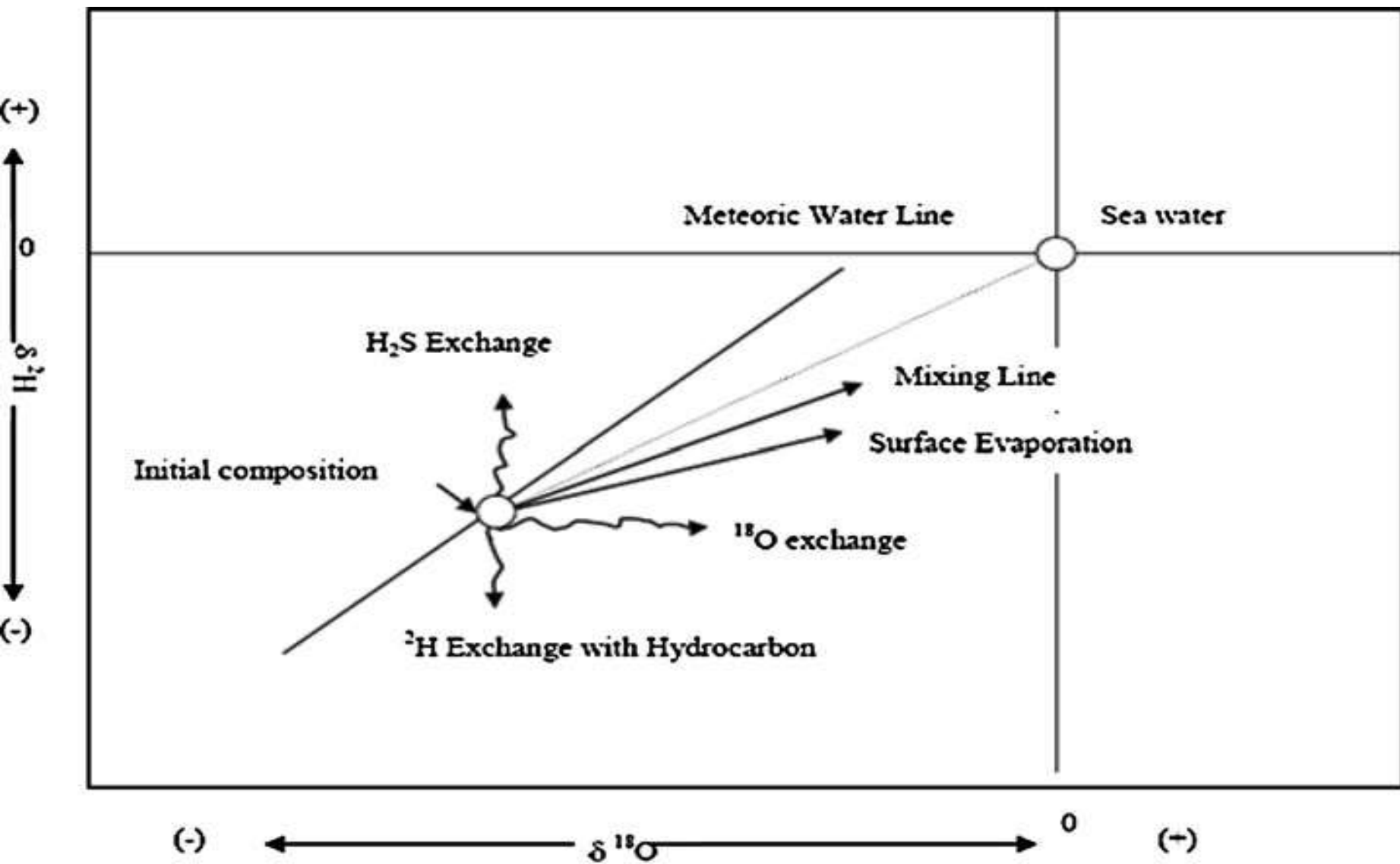


Fig. 2. Isotope exchange processes that modify the isotopic composition of meteoric water[8]

Table 1. Results of $\delta^{18}\text{O}$ and $\delta^2\text{H}$ & Water Quality Analysis for ISTN lake, Babakan lake and the shallow groundwater of the area surrounding ISTN and Babakan lakes

Sample Code	Sampling Time	pH	EC ($\mu\text{S}/\text{cm}$)	TDS (ppm)	$\delta^2\text{H}$ ‰	$\delta^{18}\text{O}$ ‰
D1	06-Jan-17	7.08	328	175	-47.0 \pm 2.0	-6.23 \pm 0.19
D2	06-Jan-17	7.10	330	173	-44.2 \pm 1.7	-6.16 \pm 0.20
D3	06-Jan-17	7.09	335	174	-42.7 \pm 1.2	-6.38 \pm 0.57
S1	29-Dec-16	7.08	337	175	-36.6 \pm 0.8	-5.56 \pm 0.17
S2	29-Dec-16	7.08	333	176	-37.4 \pm 0.2	-5.02 \pm 0.23
S3	29-Dec-16	7.08	334	177	-39.8 \pm 2.7	-4.32 \pm 0.24
R1	29-Dec-16	4.87	430	280	-43.7 \pm 1.1	-5.23 \pm 0.22
R2	29-Dec-16	4.76	210	137	-40.4 \pm 0.5	-5.42 \pm 0.18
R3	29-Dec-16	4.46	370	237	-37.4 \pm 0.8	-4.89 \pm 0.39
R4	29-Dec-16	5.48	120	78	-43.6 \pm 1.6	-5.73 \pm 0.33
R5	29-Dec-16	6.83	340	218	-40.2 \pm 2.2	-6.25 \pm 0.05
R6	06-Jan-17	6.01	410	267	-42.4 \pm 0.3	-7.25 \pm 0.20
R7	06-Jan-17	6.46	270	120	-48.9 \pm 0.7	-8.67 \pm 0.32
R8	06-Jan-17	7.02	90	59	-39.7 \pm 1.0	-7.11 \pm 0.12
R9	06-Jan-17	4.68	240	155	-41.4 \pm 1.9	-6.72 \pm 0.35
R10	06-Jan-17	4.74	200	128	-45.5 \pm 1.9	-7.18 \pm 0.30

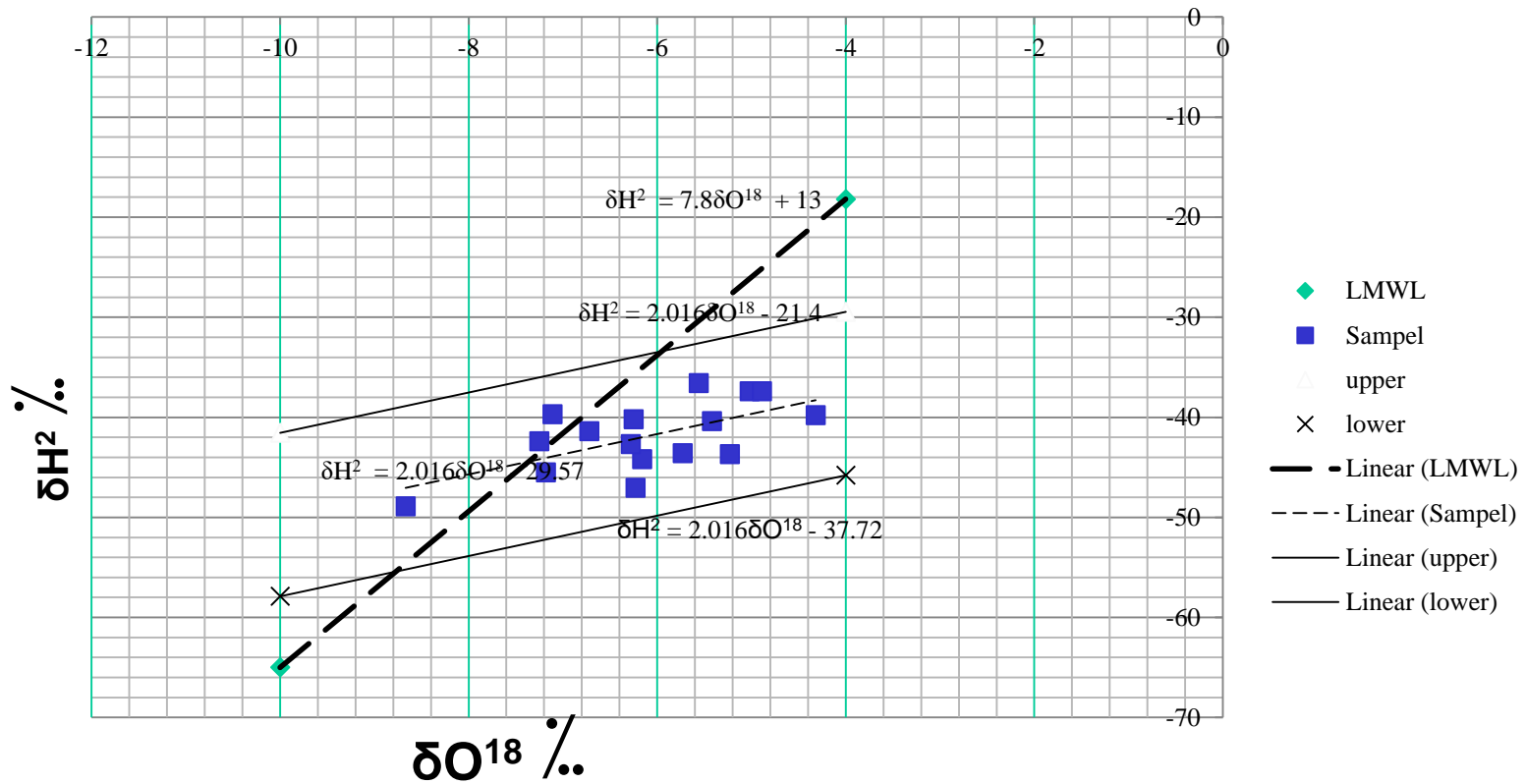


Fig. 3. Correlation δ^2H and $\delta^{18}O$ from water Samples of ISTN lake, Babakan lake and the area surrounding shallow groundwater of ISTN lake and Babakan lake

Conclusions

1. From the stable isotopes $\delta^2\text{H}$ and $\delta^{18}\text{O}$ show a favorable relationship between the water of lakes and the water from the wells of the residents surrounding the lake. This clearly shows that the well water (shallow groundwater) of the area surrounding ISTN lake and Babakan lake is from the two lakes and so should be protected from environmental pollution.
2. For water quality analysis indicated by TDS samples which have total dissolved solids in range of fresh water (less than 1000 ppm) and very good for drinking water criteria.
3. And from pH evaluation of some samples, the well water needs to be improved by doing advanced processing before consumption.