

### **Supplementary material**

The original data of Table 2 are listed in Table S1.

The original data of Table 3 are listed in Table S2.

The original data of Table 4 are listed in Table S3 for the dry season and in Table S4 for the wet season.

The original data of Table 5 are listed in Table S5 for the dry season and in Table S6 for the wet season.

The  $\delta^{15}\text{N}_{\text{nitrate}}$  and  $\delta^{18}\text{O}_{\text{nitrate}}$  values for soil samples are listed in Table S7.

**Table S1 Hydrochemical data in the Shenyang Areas, March 2011**

<b>Point Name</b>	<b>Ec</b>	<b>pH</b>	<b>Ca</b>	<b>Mg</b>	<b>Cl</b>	<b>HCO<sub>3</sub></b>	<b>NH<sub>4</sub></b>	<b>Fe</b>	<b>Na</b>	<b>K</b>	<b>SO<sub>4</sub></b>	<b>NO<sub>3</sub></b>	<b>Mn</b>
<b>BH04</b>	522.70	6.45	35.00	16.00	30.00	171.09	12.11	4.16	32.56	4.64	64.10	1.46	0.91
<b>BH06</b>	511.50	6.73	36.00	16.00	39.00	155.99	10.59	2.07	31.55	5.86	55.69	2.17	0.87
<b>BH07</b>	517.90	7.06	37.00	13.00	37.00	130.84	9.94	3.89	29.92	5.52	72.04	4.60	0.95
<b>HH01</b>	883.60	7.60	70.00	27.00	106.00	193.74	9.54	1.12	57.49	5.82	113.78	9.30	<0.05
<b>HH02</b>	882.10	8.11	83.00	23.00	114.00	213.87	7.91	1.08	58.13	6.24	125.73	9.61	0.15
<b>HH03</b>	881.90	8.07	83.00	22.00	102.00	178.65	7.84	1.75	58.62	6.12	125.38	9.56	0.13
<b>HH05</b>	974.50	7.82	79.00	32.00	103.00	228.97	10.86	4.93	66.89	7.02	150.03	9.70	2.29
<b>HH09</b>	989.60	7.80	87.00	23.00	114.00	191.22	12.60	1.20	70.70	8.36	137.20	7.88	0.27
<b>XH01</b>	1555.00	7.14	91.00	24.00	222.00	266.71	23.18	1.23	158.40	8.36	139.82	7.13	0.27
<b>XH04</b>	1652.00	7.18	76.00	22.00	271.00	246.57	22.67	1.00	175.40	8.48	118.22	18.02	0.27
<b>ZK02</b>	1783.00	6.45	147.00	58.00	172.00	135.86	0.13	23.86	93.13	4.40	172.12	401.02	0.45
<b>ZK03</b>	1283.00	6.67	111.00	44.00	121.00	72.96	0.03	1.16	83.79	3.37	172.77	221.16	<0.05
<b>ZK04</b>	755.00	6.88	34.00	32.00	77.00	211.35	0.99	5.16	61.59	3.48	69.99	4.16	1.24
<b>ZK06</b>	650.60	5.94	55.00	23.00	53.00	70.45	0.03	2.53	39.17	3.94	114.63	73.75	1.90
<b>LG11-2</b>	665.40	6.83	65.00	20.00	58.00	173.61	0.66	1.60	48.45	2.97	85.65	5.14	1.11
<b>LG12-1</b>	592.00	7.40	71.00	16.00	51.00	196.26	0.03	0.32	51.99	2.61	90.02	5.76	0.93
<b>LG12-2</b>	575.00	7.31	66.00	18.00	58.00	198.77	0.05	0.36	51.80	2.97	89.55	1.15	1.51
<b>LG15</b>	719.30	6.63	59.00	21.00	50.00	223.93	6.35	0.79	48.78	4.42	86.12	1.42	1.67
<b>LG17</b>	653.00	7.21	72.00	35.00	69.00	171.09	0.03	0.27	42.13	3.07	107.15	42.14	0.85
<b>LG18</b>	592.00	7.21	71.00	19.00	53.00	188.71	0.03	0.94	44.74	2.84	93.97	15.85	0.75
<b>LG20</b>	582.00	7.38	63.00	14.00	58.00	186.20	1.66	0.07	51.56	3.89	79.63	2.70	2.46
<b>LG2-1</b>	760.30	6.85	69.00	27.00	83.00	166.03	0.58	2.58	41.26	2.63	89.54	29.13	2.33
<b>LG24</b>	600.00	7.32	67.00	17.00	60.00	206.31	0.25	0.06	54.33	2.92	90.51	6.51	2.03

<b>LG3-1</b>	798.70	6.46	57.00	43.00	93.00	150.93	0.12	3.42	41.34	2.32	91.75	43.56	2.13
<b>LG33</b>	543.00	7.37	55.00	23.00	52.00	193.74	0.03	0.07	52.74	2.49	92.80	1.37	1.14
<b>LG36-b</b>	530.20	8.48	38.00	19.00	55.00	213.87	8.78	12.92	38.87	4.80	12.50	0.84	0.63
<b>LG39</b>	1152.00	6.28	134.00	25.00	157.00	236.47	0.03	0.17	50.69	2.48	131.40	13.55	4.04
<b>LG4-1</b>	733.40	6.38	76.00	23.00	86.00	143.39	0.03	0.19	33.43	2.24	75.98	37.67	1.76
<b>LG42-2</b>	540.00	7.39	48.00	23.00	55.00	176.12	2.00	0.09	51.77	3.39	89.39	0.84	1.33
<b>LG44</b>	715.10	7.04	68.00	23.00	54.00	259.16	0.45	0.41	58.15	2.76	84.43	0.71	1.27
<b>LG5-2</b>	778.90	6.36	57.00	47.00	95.00	155.97	0.03	0.25	46.70	2.44	97.64	43.91	2.19
<b>LG6-2</b>	722.60	6.58	63.00	27.00	68.00	191.18	0.09	1.31	50.72	2.91	95.29	10.93	1.12
<b>LG8-1</b>	625.00	7.39	79.00	18.00	64.00	216.39	2.23	0.15	49.03	4.00	77.00	1.68	1.33
<b>LG8-2</b>	562.00	7.41	62.00	20.00	57.00	173.61	0.57	0.21	47.48	3.21	85.17	2.75	1.34
<b>LG22</b>	616.30	6.89	61.00	16.00	57.00	203.80	0.50	0.37	51.11	2.77	83.08	0.80	1.20
<b>LG43</b>	691.50	6.46	79.00	23.00	52.00	244.06	0.64	0.46	31.62	3.02	87.12	0.84	1.73
<b>MJ09</b>	1060.00	6.23	105.00	41.00	145.00	110.71	0.03	0.09	47.76	3.02	125.04	80.61	<0.05
<b>MJ-1</b>	1356.00	6.55	106.00	50.00	136.00	221.37	0.68	0.13	85.04	6.12	127.21	209.38	3.06
<b>MJ11</b>	1451.00	6.53	152.00	47.00	126.00	90.58	0.03	1.34	69.68	6.92	199.25	316.51	1.88
<b>MJ12</b>	1438.00	6.36	152.00	22.00	204.00	105.67	0.03	0.54	113.90	3.49	201.07	135.55	<0.05
<b>MJ17</b>	1318.00	6.18	77.00	76.00	151.00	221.42	0.34	0.26	84.60	5.42	197.46	89.60	1.72
<b>MJ18</b>	1327.00	6.35	46.00	85.00	171.00	201.29	0.03	0.25	84.48	5.36	195.79	30.06	2.31
<b>MJ19</b>	1035.00	6.93	111.00	1.00	83.00	98.13	0.03	1.67	70.83	5.64	154.47	76.27	0.15
<b>MJ20</b>	1262.00	6.75	128.00	18.00	96.00	161.03	0.03	1.48	87.60	4.36	176.87	218.59	<0.05
<b>MJ21</b>	1466.00	6.51	119.00	35.00	157.00	176.12	0.03	1.18	112.20	5.08	174.46	202.52	0.21

**Table S2 Hydrochemical data in the Shenyang Areas, June 2011**

Point Name	EC(us/cm)	pH-feild	pH-indoor	Na	K	Ca	Mg	NH <sub>4</sub>	Fe	HCO <sub>3</sub>	Cl	SO <sub>4</sub>	NO <sub>3</sub>	Mn
BH01	656.10	7.06	6.84	52.86	4.25	64.14	15.94	0.06	1.62	216.88	57.02	99.63	5.36	3.14
BH02	595.60	6.89	6.83	46.19	2.80	64.50	16.50	0.06	2.07	203.49	50.20	99.35	18.41	1.55
BH03	672.00	7.01	7.03	51.99	3.45	68.15	16.65	0.16	0.94	222.24	55.21	104.69	4.08	0.93
BH04	572.60	7.20	7.12	31.18	5.24	48.99	14.37	10.71	3.43	200.82	42.40	75.98	4.22	1.90
BH04-B	561.00	7.32	6.62	33.66	6.05	47.65	15.59	0.06	6.49	149.90	46.03	92.39	10.17	2.56
BH04-C	540.40	7.36	6.88	35.06	5.15	38.48	12.48	9.11	2.86	160.70	42.69	77.95	3.00	10.29
BH05	639.60	6.99	7.11	47.21	3.99	62.54	16.03	0.13	0.58	208.80	50.08	95.10	9.82	1.39
BH06	617.00	7.03	7.03	45.69	4.29	59.48	15.56	0.16	2.57	208.85	48.59	91.05	10.62	3.17
BH07	596.10	7.14	6.83	38.65	5.43	52.17	15.02	16.36	3.28	198.14	47.11	81.84	4.48	2.52
BH08	669.20	7.03	6.78	55.93	3.68	68.81	15.67	0.17	0.98	222.24	58.49	96.31	4.69	1.21
BH09	-	-	6.92	42.60	2.63	69.43	16.11	0.06	1.83	206.17	48.08	96.64	18.51	3.18
BH10	-	-	6.97	54.48	3.55	68.75	16.48	0.75	0.82	224.92	55.61	104.17	5.37	1.34
HH07	535.60	7.41	7.30	30.48	4.99	49.97	11.84	0.07	0.26	136.60	44.71	74.11	7.86	0.80
HH08	539.10	7.45	7.36	29.26	4.97	51.84	11.85	0.06	0.19	123.20	44.63	75.15	19.36	6.39
HH10	613.50	7.44	7.35	35.48	5.38	59.62	15.96	0.07	0.36	179.40	55.33	78.19	10.89	0.43
HH-M	474.80	7.46	7.02	27.61	4.12	54.52	11.77	0.16	0.61	133.88	40.38	73.39	11.26	0.84
JS23-1	778.80	6.71	7.12	50.64	5.58	83.97	25.47	1.67	0.21	246.34	75.49	78.89	89.48	1.13
JS23-2	546.50	6.78	7.18	33.87	5.54	55.77	17.29	4.79	0.05	176.72	45.56	77.74	36.21	1.85
JS25	717.80	6.68	6.85	41.73	5.93	79.11	18.21	1.77	0.08	211.53	59.81	67.95	87.86	2.41
JS26	1033.00	6.63	6.93	62.08	6.77	114.00	27.75	0.16	0.02	257.05	96.54	142.32	100.60	0.41
JS27	896.40	6.69	6.92	56.25	6.03	98.00	23.79	0.29	0.07	232.95	84.28	112.48	82.16	1.00
JS28	1033.00	6.59	6.96	67.34	5.68	112.30	26.64	0.16	0.05	281.14	104.60	112.11	100.77	0.34
JS29	958.30	6.52	7.01	49.22	4.92	114.20	24.70	0.31	0.22	246.34	95.83	115.07	86.08	1.09

LG02-1	638.00	6.95	6.97	46.58	3.75	63.27	13.27	0.05	0.40	187.43	48.44	89.98	24.34	1.71
LG03-1	619.70	6.91	7.25	48.64	5.35	59.93	12.98	3.85	4.92	208.85	48.91	86.76	30.84	1.76
LG04-1	646.30	6.99	6.88	47.09	3.71	63.47	13.33	2.85	0.22	198.10	48.66	89.96	26.19	1.86
LG05-1	789.10	6.64	6.69	45.55	2.25	93.39	17.78	0.11	0.77	136.60	89.71	102.01	108.73	2.10
LG06	-	-	7.01	46.85	3.74	62.65	13.39	2.75	0.16	257.05	26.38	49.02	11.84	1.83
LG1	863.10	6.27	6.79	38.98	1.92	114.90	23.35	0.47	0.22	211.53	88.41	114.95	100.92	3.73
LG10-1	652.00	6.85	6.94	49.80	2.59	68.01	11.92	0.08	2.26	160.65	60.08	86.32	56.94	1.83
LG11-1	-	-	7.16	55.95	5.17	70.46	18.65	0.32	1.10	211.53	56.99	91.13	72.34	1.36
LG11-2	659.80	6.89	7.20	57.73	5.13	80.13	15.89	0.32	0.98	211.53	56.99	92.15	92.61	1.39
LG12-1	670.10	7.15	7.10	49.89	2.11	73.39	15.60	0.07	0.99	238.30	49.77	94.13	5.25	2.36
LG12-2	660.80	6.82	7.05	59.15	5.14	77.24	15.73	1.05	0.72	232.95	62.89	90.15	5.08	1.93
LG15	640.10	7.05	7.09	45.15	3.91	56.44	13.84	4.23	0.61	208.80	45.23	90.12	3.21	2.51
LG18	665.70	6.83	7.05	57.85	5.34	78.48	15.93	0.37	0.42	206.17	59.47	85.97	95.64	2.39
LG21	667.20	6.78	7.15	57.37	5.41	76.09	16.00	0.75	1.43	206.17	59.85	86.15	90.25	2.41
LG22	606.50	6.78	7.28	56.61	4.93	69.67	12.56	0.27	0.68	198.14	60.02	87.03	5.21	1.03
LG220	-	-	7.29	56.13	4.78	70.87	12.15	0.28	0.38	200.82	58.80	86.01	1.77	1.07
LG24	649.60	6.91	7.21	56.64	4.99	73.40	14.78	0.48	0.71	224.92	50.97	100.97	2.58	2.20
LG27	788.90	6.97	6.98	42.58	6.48	79.53	18.73	15.05	0.85	369.50	52.12	50.40	5.31	2.87
LG28	649.20	6.93	7.12	50.02	4.88	60.86	15.82	2.63	1.58	232.95	59.21	72.18	8.55	1.05
LG280	-	-	6.96	50.22	4.83	59.84	15.78	2.68	1.65	232.95	57.94	69.44	4.37	0.92
LG31	661.30	7.06	7.02	55.06	6.90	69.36	17.47	3.92	0.18	224.92	62.19	67.63	60.04	1.90
LG32	668.20	6.96	7.03	59.04	5.70	71.05	16.80	1.61	0.30	267.76	57.86	58.13	13.09	2.83
LG33	595.00	6.84	7.16	52.30	4.35	61.40	12.08	0.40	1.80	200.82	44.88	95.36	3.62	1.12
LG36	621.20	7.31	7.24	39.25	4.91	48.46	13.94	17.43	1.32	246.34	41.97	52.65	4.84	4.57
LG37	1340.00	6.52	6.66	88.61	2.74	137.10	29.45	0.81	0.12	289.18	133.25	185.05	106.07	5.92
LG38	1386.00	6.46	6.82	93.97	2.34	153.70	36.72	0.74	0.20	439.12	133.79	165.89	80.59	7.58

LG39	1130.00	6.52	6.80	54.47	2.22	134.20	28.08	0.48	0.34	265.08	119.55	141.53	95.65	9.48
LG42-2	613.20	7.07	7.17	43.64	3.67	56.62	12.35	3.24	1.70	160.70	56.13	95.09	9.55	1.86
LG48	668.00	6.81	6.68	56.38	5.29	73.62	25.31	1.14	0.12	214.20	62.32	89.74	102.71	2.48
LG8-1	639.00	7.21	7.16	47.31	6.93	39.94	13.89	0.78	13.24	270.43	55.16	14.90	4.74	0.75
LG8-2	642.80	6.81	7.10	55.99	5.05	77.38	14.53	0.30	0.12	211.53	57.42	97.25	9.30	1.27
MJ01	1530.00	6.70	7.01	83.82	6.33	136.10	42.83	0.53	0.09	297.21	137.48	113.78	229.17	3.76
MJ02	1277.00	6.80	7.04	61.04	6.53	142.50	34.46	0.05	0.02	353.44	97.68	131.72	139.27	0.01
MJ03	454.90	6.33	7.06	36.57	3.76	51.13	8.48	0.30	0.11	136.56	32.04	58.54	55.41	2.54
MJ04	638.90	7.21	7.43	48.23	3.32	60.91	11.04	1.17	0.85	179.40	51.77	95.49	4.10	0.28
MJ05	580.80	6.78	7.24	45.72	1.57	66.02	10.57	0.02	0.24	155.30	48.41	75.97	64.53	0.03
MJ06	879.70	6.71	7.20	53.23	1.21	87.45	18.99	0.02	0.07	168.69	49.62	112.08	135.39	0.01
MJ09	1118.00	6.42	6.62	51.28	2.58	129.20	34.21	0.06	0.08	136.56	148.61	153.45	150.63	0.09
MJ10	1254.00	6.77	7.16	68.40	4.42	126.70	31.76	0.10	0.30	227.59	122.56	127.12	178.37	1.04
MJ11	1480.00	6.58	7.12	72.45	7.72	154.70	40.06	0.16	0.04	93.71	127.70	219.57	338.24	2.15
MJ14	1472.00	6.56	7.00	97.62	7.06	123.70	40.14	5.84	2.00	350.76	159.15	189.19	63.14	5.28
MJ140	-	-	6.92	95.49	7.20	122.20	40.44	5.96	2.24	356.12	159.57	178.74	63.91	5.78
MJ15	1882.00	7.06	6.98	132.10	18.05	135.20	48.60	14.46	0.07	500.70	168.70	220.51	80.58	3.04
MJ16	1693.00	7.02	7.23	110.10	16.70	95.32	33.52	3.08	0.13	527.50	154.59	28.56	6.23	0.42
MJ17	1373.00	6.45	6.68	87.15	6.40	120.70	44.07	0.15	0.03	291.85	122.33	189.18	136.07	1.90
MJ18	992.00	6.48	6.64	58.93	3.58	105.00	26.22	0.40	0.04	163.33	115.92	120.32	136.65	3.82
MJ19	641.60	6.15	6.89	55.27	4.26	62.41	14.61	0.73	0.20	123.17	52.94	98.97	98.03	1.48
MJ20	1430.00	6.62	7.14	90.49	3.74	141.70	33.41	0.03	0.07	160.65	150.00	185.21	236.96	0.13
MJ21	1481.00	6.48	6.86	97.39	4.35	150.90	45.29	0.05	1.68	187.43	183.41	177.63	288.60	6.30
MJ22	1145.00	6.99	7.18	48.99	6.90	134.70	33.51	7.25	0.47	554.30	59.92	64.32	19.55	0.54
MJ220	-	-	7.19	49.12	6.97	132.00	32.85	8.67	0.52	581.00	58.99	63.54	14.61	0.59
MJ25	1331.00	6.71	6.85	73.71	5.28	150.60	49.10	0.09	2.17	275.79	139.51	329.28	7.79	1.37

ML12	1499.00	6.50	6.70	109.40	2.96	147.10	34.18	0.04	0.05	216.88	174.13	217.62	179.01	0.05
WS01	603.60	7.47	7.59	45.76	5.68	52.03	21.64	0.17	0.28	155.30	60.01	78.18	65.82	0.15
WS02	476.00	7.16	7.66	36.11	3.85	48.17	15.31	0.43	0.02	149.94	37.24	48.48	69.01	0.08
XH04	1077.00	7.23	7.32	100.30	8.33	71.48	15.61	14.33	1.29	222.20	165.15	96.25	31.60	1.41
XH05	1399.00	7.53	7.39	141.80	8.09	73.35	15.05	11.22	0.43	257.05	157.00	104.94	107.45	0.47
ZK01	2871.00	6.62	6.80	122.00	40.41	270.20	52.64	17.53	11.79	436.44	287.62	500.32	101.05	8.49
ZK02	1575.00	6.22	6.76	87.60	3.76	157.80	49.14	0.09	0.18	176.72	181.19	171.54	315.62	1.27
ZK03	1203.00	6.41	7.05	79.52	2.54	110.80	26.91	0.05	0.23	157.98	101.94	157.42	201.18	0.04
ZK04	643.20	6.97	7.20	51.00	3.72	60.10	14.74	1.76	0.13	208.80	62.06	83.75	4.75	1.83
ZK05	658.80	6.98	7.36	59.71	2.72	60.95	11.77	0.06	0.03	224.92	49.28	86.59	3.52	0.02
ZK07	-	-	7.02	81.67	2.75	105.80	35.92	0.06	0.19	160.65	124.07	158.76	185.73	0.03

**Table S3  $\delta^{18}\text{O}_{\text{water}}$  (‰) and  $\delta^2\text{H}_{\text{water}}$  (‰) values of Groundwater and River water in the study area (June)**

Point Name	$\delta^{18}\text{O}$ (‰)	$\delta^2\text{H}$ (‰)	Point Name	$\delta^{18}\text{O}$ (‰)	$\delta^2\text{H}$ (‰)	Point Name	$\delta^{18}\text{O}$ (‰)	$\delta^2\text{H}$ (‰)
MJ04	-9.14	-65.87	BH01	-8.91	-65.67	HH-M	-9.21	-65.7
MJ22	-9.18	-66.39	BH02	-9.04	-65.16	HH-D	-9.14	-66.92
MJ19	-9.56	-68.23	BH04	-9.66	-69.71	HH-U	-9.39	-66.27
MJ02	-8.98	-65.05	BH04-C	-9.73	-70.24	WS02	-9.02	-66.36
WS01	-8.02	-61.55	BH04-B	-9.56	-69.35	XH04	-8.9	-64.3
MJ09	-7.82	-58.77	BH05	-9.03	-65.8	Rain2	-7.59	-52.44
MJ25	-8.7	-63.66	LG15	-8.95	-65.34	JS28	-8.89	-64.61
MJ20	-9.09	-64.04	LG31	-8.98	-66.45	JS29	-8.64	-63.55
MJ12	-8.4	-62.45	LG29	-9.2	-66.96	LG18	-8.69	-64.98
MJ16	-8.64	-63.37	LG36	-9.5	-67.94	LG11-2	-8.76	-64.82
MJ01	-8.56	-62.26	ZK04	-9.12	-66.78	LG10-1	-8.82	-65.66

LG38	-8.28	-62.05	JS23-2	-9.42	-68.34	LG02-1	-8.89	-66.17
ZK01	-8.51	-63.02	LG08-1	-9.15	-67.84	LG05-1	-8.32	-62.93
LG03-1	-8.96	-65.31	LG48	-8.81	-65.02	LG04-1	-8.86	-65.91
ZK05	-8.49	-63.45						

**Table S4  $\delta^{18}\text{O}_{\text{water}}$  (‰) and  $\delta^2\text{H}_{\text{water}}$  (‰) values of Groundwater and River water in the study area (September)**

Point Name	$\delta^{18}\text{O}$ (‰)	$\delta^2\text{H}$ (‰)	Point Name	$\delta^{18}\text{O}$ (‰)	$\delta^2\text{H}$ (‰)	Point Name	$\delta^{18}\text{O}$ (‰)	$\delta^2\text{H}$ (‰)
MJ01	-8.24	-61.2	BH03	-10.19	-75.2	HH01	-9.79	-72.3
MJ09	-7.56	-58.1	BH04	-13.85	-103.2	HH02	-9.87	-71.9
MJ10	-8.89	-64.4	BH05	-9.13	-68.3	SK01	-7.9	-68.3
MJ12	-8.8	-63.3	JS23-1	-8.8	-64.9	WS01	-8.7	-65.7
MJ18	-8.16	-60.9	JS25	-8.91	-65.9	WS02	-8.43	-64.3
MJ20	-9.13	-65.4	JS26	-9.38	-66.4	XH01	-9.37	-69.2
MJ25	-8.6	-63	JS27	-9.23	-66	XH02	-9.14	-67.6
MJ30	-7.67	-58.5	LG02-1	-8.72	-64.6	Rain	-8.32	-54.9
MJ31	-8.05	-62.7	LG03	-8.65	-64.6	MJ41	-8.77	-65
MJ32	-9.09	-66.4	LG04-1	-8.89	-66.7	MJ43	-10.71	-79.2
MJ33	-9.19	-67.6	LG05-2	-6.9	-55.3	MJ44	-9.32	-67.3
MJ34	-8.45	-62	LG10	-8.38	-63.2	MJ45	-9.12	-66.9
MJ35	-8.04	-61.3	LG12	-8.84	-64	LG36	-8.92	-65.7
MJ36	-8.73	-62.9	LG12-1	-8.44	-63.1	LG37	-8.27	-62
MJ37	-9.2	-66.3	LG12-2	-8.37	-62.6	LG38	-8.11	-61.8
MJ38	-8.98	-66.5	LG24	-8.46	-63.6	LG40	-8.55	-62.7
MJ39	-8.93	-66.3	LG31	-8.75	-65.8	LG42-2	-8.88	-66
MJ40	-9.17	-67.7	LG32	-8.21	-62.9	LG48	-8.45	-64.6



**Table S5  $\delta^{18}\text{O}_{\text{nitrate}}$  (‰) and  $\delta^{15}\text{N}_{\text{nitrate}}$  (‰) values of Groundwater and River water in the study area (June)**

Point Name	$\delta^{15}\text{N}$ (‰)	$\delta^{18}\text{O}$ (‰)	Point Name	$\delta^{15}\text{N}$ (‰)	$\delta^{18}\text{O}$ (‰)
ZK02	11.05	8.59	MJ21	11.11	14.08
ZK01	3.75	10.97	MJ01	9.15	12.43
ZK04	-2.73	7.36	MJ04	-2.63	12.52
ZK03	9.36	9.16	MJ11	9.3	11.21
ZK05	0.3	11.75	MJ20	7.05	10.86
BH07	-2.46	11.27	MJ06	4.44	10.25
BH05	-3.14	8.71	LG02-1	6.41	11.86
MJ18	11.84	8.12	LG04-1	3.79	8.04
MJ09	9.19	9.86	LG3-1	9.25	12.31
MJ19	7.45	9.81	LG06	1.58	10.69
MJ12	8.41	11.07	LG05-1	13.22	11.03
MJ10	7.54	12.68	LG18	5.46	12.11
MJ17	12.64	13.29	HH-M	3.87	15.96
MJ02	9.18	12.58	XH04	2.63	10.13

**Table S6  $\delta^{18}\text{O}_{\text{nitrate}}$  (‰) and  $\delta^{15}\text{N}_{\text{nitrate}}$  (‰) values of Groundwater and River water in the study area (September)**

Point Name	$\delta^{18}\text{O}$ (‰)	$\delta^{15}\text{N}$ (‰)	Point Name	$\delta^{18}\text{O}$ (‰)	$\delta^{15}\text{N}$ (‰)	Point Name	$\delta^{18}\text{O}$ (‰)	$\delta^{15}\text{N}$ (‰)
MJ01	16.54	12.62	JS25	18.61	14.45	HH01	7.26	-10.36
MJ08	9.61	8.28	JS26	10.07	2.22	HH-M	7.10	4.85
MJ10	9.21	7.59	JS27	8.12	6.45	WS02	12.54	1.42
MJ12	8.42	4.51	LG02-1	4.06	7.48	XH01	4.66	4.85
MJ18	21.39	12.51	LG03	-7.26	7.36	XH02	3.80	13.31
MJ20	7.99	-0.07	LG04-1	-1.22	8.74	MJ41	9.70	-12.87

MJ25	8.81	4.51	LG05	12.38	8.85	MJ42	10.27	1.88
MJ30	9.04	6.22	LG10	6.37	9.54	MJ44	11.75	-18.36
MJ31	5.55	8.05	LG12-1	13.57	8.85	MJ36	10.83	-0.75
MJ32	7.46	7.82	LG37	16.54	8.05	LG40	11.45	7.02
MJ33	-6.00	-0.41	LG38	20.36	15.02			
MJ35	24.85	1.08	LG39	17.20	10.68			

**Table S7 The  $\delta^{15}\text{N}_{\text{nitrate}}$  and  $\delta^{18}\text{O}_{\text{nitrate}}$  values for soil samples**

<b>Point Name</b>	<b><math>\delta^{15}\text{N}(\text{‰})</math></b>	<b><math>\delta^{18}\text{O}(\text{‰})</math></b>	<b>Point Name</b>	<b><math>\delta^{15}\text{N}(\text{‰})</math></b>	<b><math>\delta^{18}\text{O}(\text{‰})</math></b>
TY03-2	1.68	7.43	XZ02	0.62	10.98
TY02	0.76	-4.81	TY10	5.08	-0.17
TY05	3.68	-0.96	XZ01	-0.93	-2.34
TY01	6.71	-5.99	TY07	12.6	11.47
TY04	7.57	13.94	TY11	4.59	-6.39
TY06	0.39	22.13	XZ07	5.68	16.9
XZ04-2	4.99	16.01			