

Supplementary file

Hydrogeochemical Modelling and Probabilistic Health Risk Assessment of Nitrate and Fluoride in Groundwater of Kota Stone Mines

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Table S1: Sampling Locations with Coordinates

Sample Number	Site	Lat	Long
Sample 1	Sathal Khedi	24°39'10"	75°59'58"
Sample 2	Khandaila	24°39'10"	75°58'38"
Sample 3	Gram Pachayat	24°39'6"	75°58'17"
Sample 4	Gram Pachayat 2	24°39'7"	75°58'19"
Sample 5	Redas colony	24°39'5"	75°57'54"
Sample 6	Redas colony 2	24°39'1"	75°57'36"
Sample 7	Yadav Mohalla	24°38'57"	75°56'47"
Sample 8	Mansapur	24°38'20"	75°56'53"
Sample 9	Nalodiya village	24°37'1"	75°58'6"
Sample 10	Before railway crossing	24°36'48"	75°58'19"
Sample 11	Near pond	24°36'46"	75°58'19"
Sample 12	Guradiya Jhala	24°32'56"	75°59'33"
Sample 13	Amritkhedi	24°35'58"	76°0'29"
Sample 14	Kumbhkot	24°37'4"	76°0'9"
Sample 15	KMC stone, Nayagaon	24°39'30"	76°0'45"
Sample 16	Sathalkhedi School	24°39'11"	76°0'22"
Sample 17	Sathelkhedi Sec School	24°39'2"	76°0'14"
Sample 18	Sathalkedi farm	34°39'35"	76°0'46"
Sample 19	Peepakhedi	24°39'35"	76°0'4"
Sample 20	Peepakhedi 2	24°39'47"	76°0'18"
Sample 21	Gram pachayat Sathalkhedi	24°39'21"	76°0'2"
Sample 22	Laxmipura School	24°38'47"	76°0'19"
Sample 23	Laxmipura colony	24°37'55"	76°0'17"
Sample 24	Durjanpura	24°38'35"	76°0'21"
Sample 25	Kumbhkot	24°36'51"	75°59'60"
Sample 26	Lakhariya 1	24°35'38"	76°0'38"

Sample 27	Lakahriya 2	24°35'30"	76°0'39"
Sample 28	Suket Road	24°35'42"	76°0'58"
Sample 29	Teen tapri Village	24°36'56"	76°1'58"
Sample 30	Sureda	24°37'37"	76°2'17"
Sample 31	Dingy village	24°39'4"	76°2'36"
Sample 32	Dingy village 2	24°40'14"	76°1'55"
Sample 33	Antraliya	24°41'36"	76°0'58"
Sample 34	Udpura	24°43'39"	75°59'2"
Sample 35	Modak boys school	24°43'47"	75°58'56"
Sample 36	Modal Police station	24°43'46"	75°58'28"
Sample 37	SBI, Modak	24°43'19"	75°57'3"
Sample 38	Dudakhedi	24°42'6"	75°56'16"
Sample 39	Navoday school	24°40'16"	75°55'53"
Sample 40	Manpura road	24°45'29"	76°0'11"
Sample 41	Manpura village	24°45'35"	76°1'2"
Sample 42	Gram Panchayat Khairabad	24°44'50"	76°1'13"
Sample 43	Sarvada	24°45'52"	75°59'28"
Sample 44	School Sarvada	24°44'44"	75°59'47"
Sample 45	Gujariyakhdi 1	24°44'23"	76°0'14"
Sample 46	Gujariyakhedi 2	24°44'23"	76°0'28"
Sample 47	Jalimpura farm	24°45'31"	75°59'19"
Sample 48	Nimana 1	24°41'36"	75°58'46"
Sample 49	Nimana 2	24°40'23"	75°58'34"
Sample 50	Hariyakhedi	24°39'8"	75°55'8"
Sample 51	Khairabad	24°42'34"	75°59'51"

Table S2: Classification of groundwater quality based on EWQI

EWQI range	Classification
<25	Excellent
25-50	Good
50-100	Medium
100-150	Poor
>150	Very poor

Table S3: Parameter values for non-carcinogenic health risk assessment models

Parameters	Unit	Children	Adult
IR	L day ⁻¹	1	3.53
EF	days year ⁻¹	365	365
ED	years	6	70
BW	kg	15	70
AT	days	365*6	365*70

Table S4: Categorisation of groundwater samples based on total hardness

S. No	Groundwater class based on TH	Range	No. of samples (%)	Sample number
Pre-monsoon				
1	Soft	<75	7.84	10,27,35,38
2	Moderately hard	75-150	47.06	2,3,4,7,14,17,18,19,21,23,26,30,32,34,36,37,40,41,42,45,47,48,50,51
3	Hard	150-300	37.25	1,5,6,8,9,11,12,13,15,16,20,22,25,31,33,39,43,44,49
4	Very hard	>300	7.84	24,28,29,46
Post-monsoon				
1	Soft	<75	21.57	21,28,29,30,32,33,34,36,39,41,46
2	Moderately hard	75-150	54.90	1,2,3,4,5,6,11,14,15,16,17,18,19,20,23,24,25,35,37,38,40,42,44,47,48,49,50,51
3	Hard	150-300	13.73	7,8,9,12,13,31,43
4	Very hard	>300	9.80	10,22,26,27,45

Table S5: Deterministic health risks of children and adults in pre- and post-monsoon

HQ ingestion	Fluoride				Nitrate			
	Pre-monsoon		Post-monsoon		Pre-monsoon		Post-monsoon	
	Children	Adult	Children	Adult	Children	Adult	Children	Adult
Min	0.37	0.28	0.33	0.25	0.01	0.01	3.74	0.09
Max	10.06	7.61	9.52	7.20	3.32	2.51	0.12	2.83
Average	3.03	2.29	2.89	2.19	1.37	1.04	1.52	1.15
SD	1.49	1.13	1.44	1.09	0.91	0.69	1.06	0.80

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Fig. S2: Piper diagram of collected groundwater samples of (A) pre-monsoon and (B) post-monsoon season in Kota mine spoil areas

Fig. S3: Gibbs diagram of the groundwater samples in the pre-monsoon season

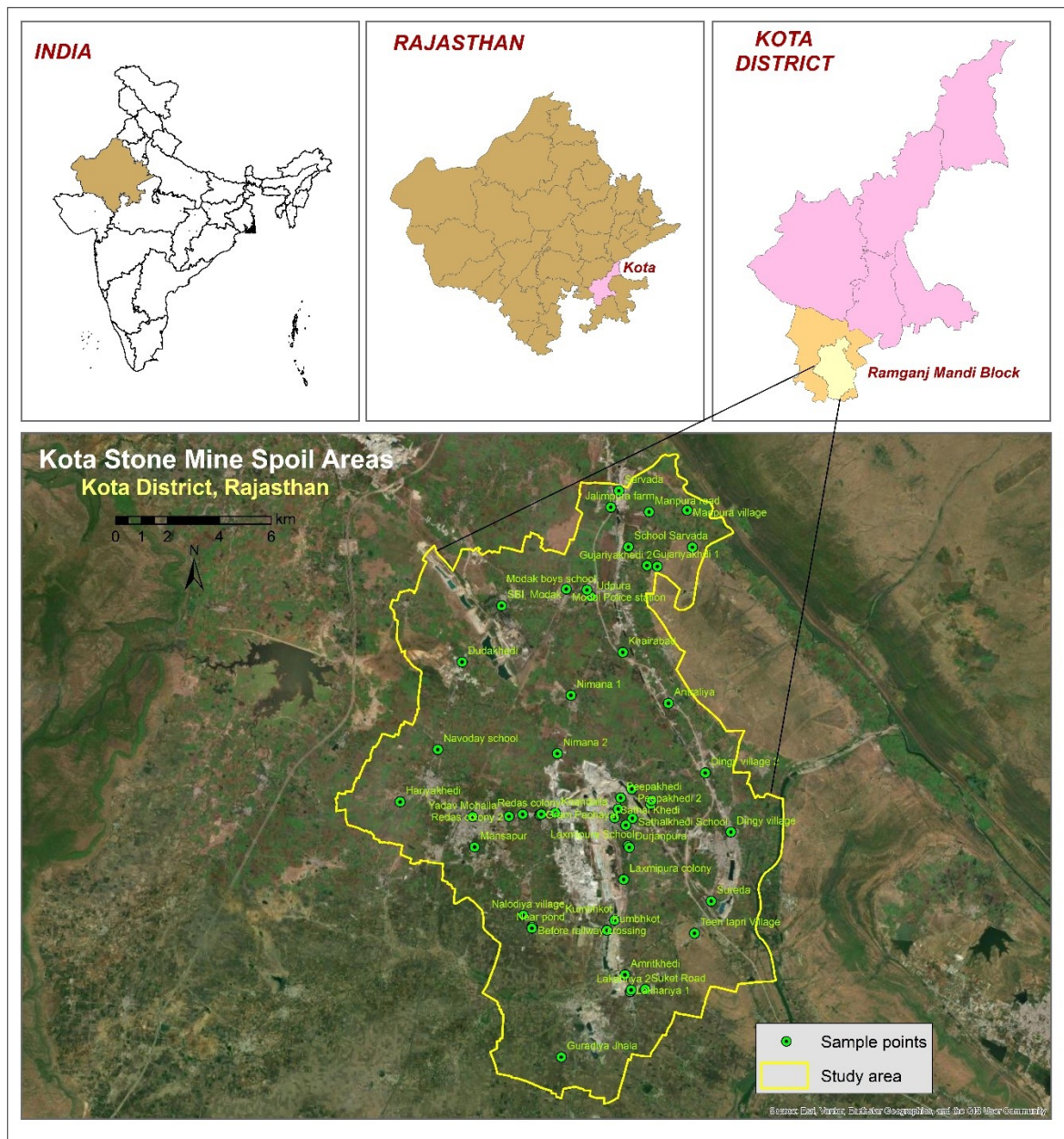


Fig. S1: Spatial map of the groundwater sampling from the Kota Stone Mine out areas, Ramganj Mandi, Kota (N = 51)

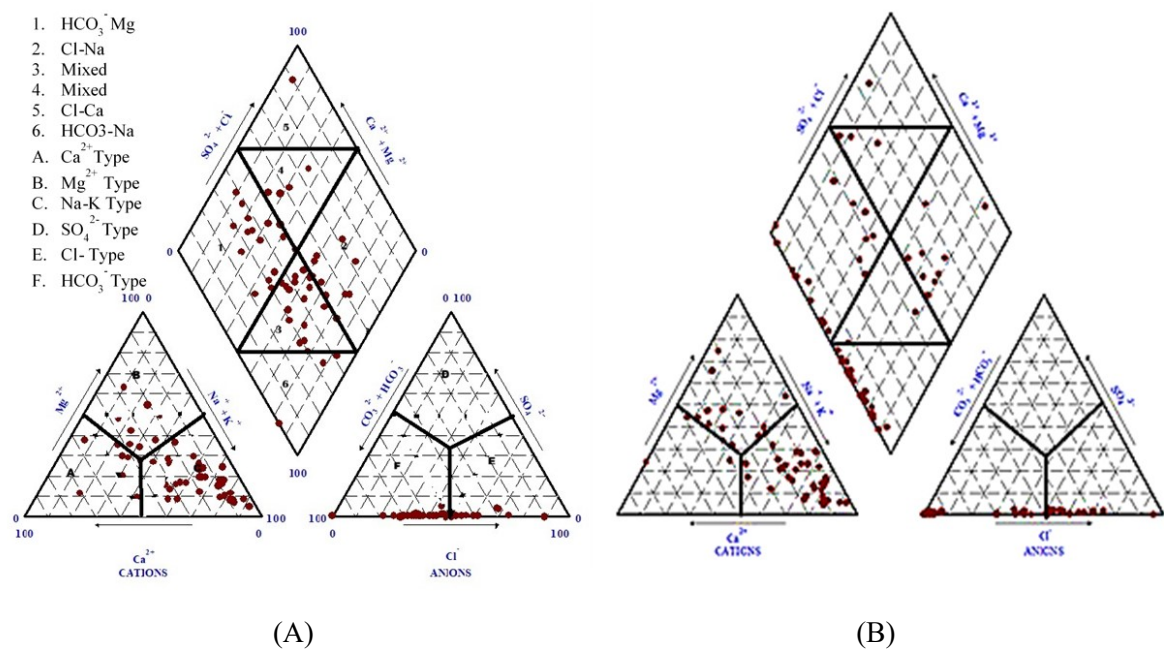


Fig. S2 Piper diagram of collected groundwater samples of (A) pre-monsoon and (B) post-monsoon season in Kota mine spoil areas

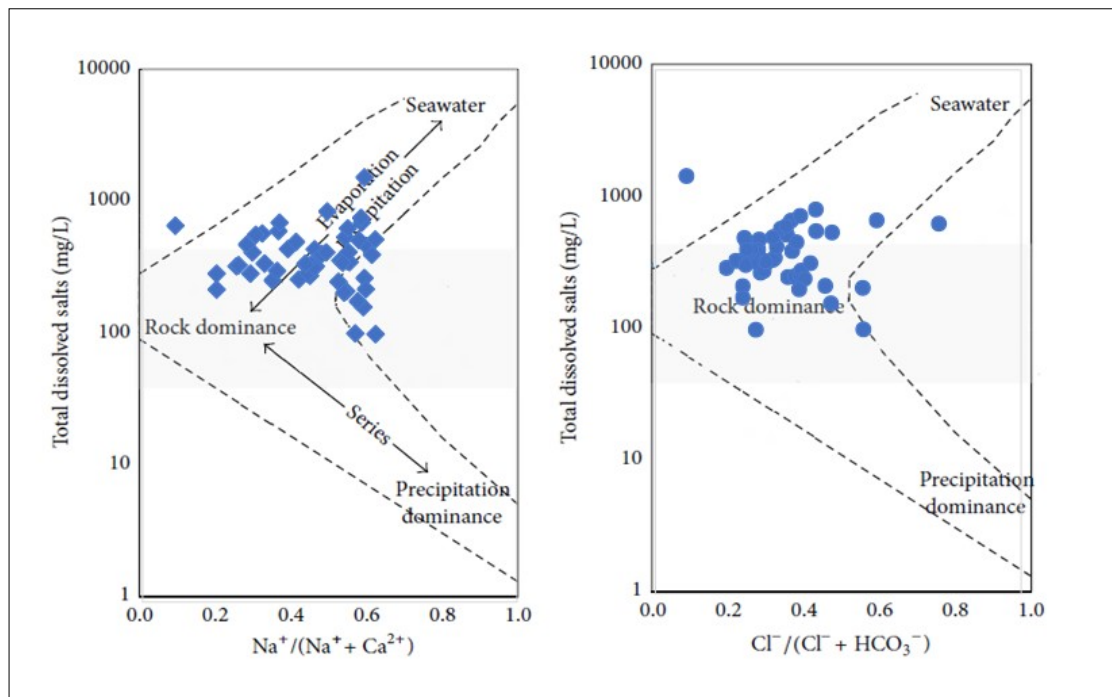


Fig. S3: Gibbs diagram of the groundwater samples in the pre-monsoon season