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Published in:

Environmental Earth Sciences

DOI:

[10.1007/s12665-022-10543-1](https://doi.org/10.1007/s12665-022-10543-1)

Publication date:

2022

Citation for published version (APA):

Das, S., Mukherjee, J., Bhattacharyya, S., Patel, P. P., & Banerjee, A. (2022). Detection of groundwater potential zones using analytical hierarchical process (AHP) for a tropical river basin in the Western Ghats of India. *Environmental Earth Sciences*, 81(16), Article 416. <https://doi.org/10.1007/s12665-022-10543-1>

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Supplementary Information

Detection of Groundwater Potential Zones using Analytical Hierarchical Process (AHP) for a tropical river basin in the Western Ghats of India

Soumik Das¹, Jayesh Mukherjee¹, Suman Bhattacharyya¹, Priyank Pravin Patel² and Anushna Banerjee¹

¹Centre for the Study of Regional Development, School of Social Sciences, Jawaharlal Nehru University, New Delhi – 110067, India.

²Department of Geography, Presidency University, 86/1, College Street, Kolkata, West Bengal – 700073, India.

Table S1 List of parameters used by researchers for analyzing GWPZ during the last five years (2017–2021)

References		Parameters used for GWPZ analysis																											
Author(s)	Year	GL	GM	LD	DD	SO	LULC	SL	RF	LI	DR	ST	SD	STx	WD	GWI	TWI	ALT	Cu	LiD	GWF	TPI	Ro	MNDWI	CST	AT	TPI	DI	
Roy et al.	2021	*	*		*	*	*	*	*																				
Doke et al.		*	*	*	*	*	*	*	*		*																		
Aykut		*	*	*	*	*	*	*	*	*																			
Vellaikannu et al.		*	*	*	*	*		*																					
Arunbose et al.	2020																												
Lentswe and Molwalefhe				*	*	*		*		*		*																	
Dar et al.			*	*	*	*	*	*	*	*	*																		
Doke et al.		*		*	*			*	*				*	*	*														
Tiwari and Kushwaha		*	*	*	*	*	*	*	*																				
Kumar et al.		*	*	*	*	*	*	*	*																				
Anbarasu et al.		*	*	*	*	*	*	*	*	*																			
Mukherjee and Singh		*	*	*	*	*	*	*	*	*								*		*			*	*					
Biswas et al.	*	*		*	*	*	*	*	*								*		*					*					
Bera et al.	*	*	*	*	*	*	*	*	*								*		*										

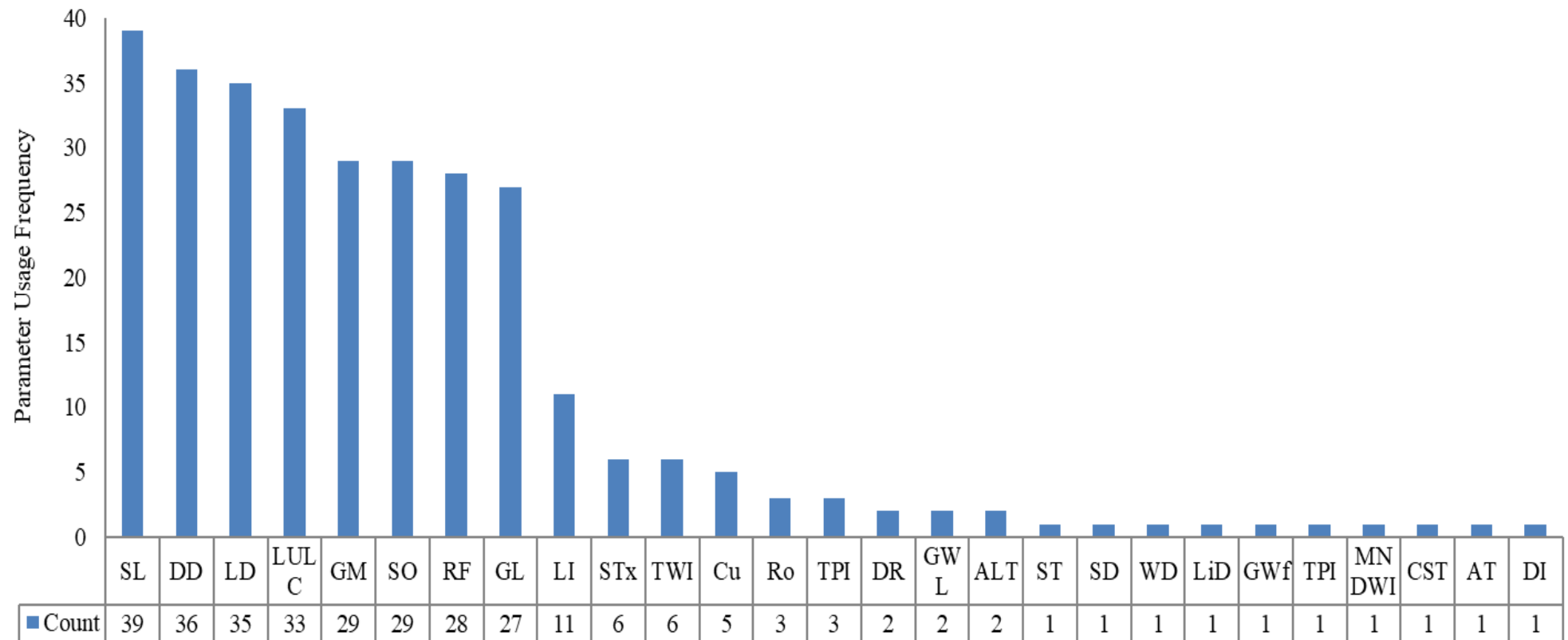


Fig. S1 Parameter usage frequency plot derived from the past literatures on GWPZ delineation (based on Table S1)

Note: ALT = Altitude, AT = Aquifer Thickness, CST = Cumulative Sand Thickness, Cu = Curvature, DD = Drainage Density, DI = Dissection Index, DR = Distance from river, GL = Geology, GM = Geomorphology, GWf = Ground Water Fluctuation, GWL = Ground Water Level, LD = Lineament Density, LI = Lithology, LiD = Lineament Intersection Density, LULC = Land Use Land Cover, MNDWI = Modified Normalized Difference Water Index, RF = Rainfall, Ro = Roughness, SD = Soil Depth, SL = Slope, Sla = Slope Aspect, SO = Soil, ST = Soil Thickness, STx = Soil Texture, TPI = Topographic Position Index, TWI = Topographic Wetness Index, WD = Well Density.

Table S2 Saaty's scale for AHP analysis used in determining the GWPZ of the Tadri River Basin

Intensity of Importance	Degree of Reference	Description
1	Equally important	The contribution of the two factors is equally important
3	Slightly important	Experiences and judgment slightly tend to certain factor
5	Quite important	Experiences and judgment strongly tend to certain factor
7	Extremely important	Experiences and judgment extremely strongly tend to certain factor
9	Absolutely important	There is sufficient evidence for absolutely tending to certain factor
2,4,6,8	Intermediate values	In between two judgments

Table S3 Assigned weights to the various criteria and their sub-criteria

Parameters	Classes	A	B	C	D	E	F	Normalised Weights (Xw)	CR	Class Weights (Yw)
Lithology	Vanadiferous Titanite-Magnetite	1						0.33	0.04	0.415
	Dolerite	1/3	1							0.248
	Hornblende-Actinolite-Chlorite Schist	1/4	1/3	1						0.154
	Laterite	1/5	1/4	1/3	1					0.094
	Banded Iron Formation	1/6	1/5	1/4	1/3	1				0.057
	Chlorite Schist	1/7	1/6	1/5	1/4	1/3	1			0.033
Lineament Density (km./km. ²)	>0.58	1						0.23	0.02	0.503
	0.58 – 0.41	1/3	1							0.260
	0.40 – 0.26	1/5	1/3	1						0.134
	0.25 – 0.11	1/7	1/5	1/3	1					0.068
	< 0.11	1/9	1/7	1/5	1/3	1				0.035
Geomorphology	Flood Plain	1						0.16	0.02	0.503
	Low Dissected Hills and Valleys	1/3	1							0.260
	Pediment Pediplain Complex	1/5	1/3	1						0.134
	Moderately Dissected Hills and Valleys	1/7	1/5	1/3	1					0.068
	Quarry and Mine Dump	1/9	1/7	1/5	1/3	1				0.035
Slope (°)	<5	1						0.11	0.02	0.503
	6 -10	1/3	1							0.260
	11-20	1/5	1/3	1						0.134
	21 -30	1/7	1/5	1/3	1					0.068
	>30	1/9	1/7	1/5	1/3	1				0.035
Soil Type	Coastal Alluvial	1						0.07	0.005	0.539
	Lateritic Soil	1/2	1							0.297
	Red Sandy Soil	1/3	1/2	1						0.164
Rainfall (mm.)	>2900	1						0.05	0.02	0.503
	2900 – 2701	1/3	1							0.260
	2700 – 2501	1/5	1/3	1						0.134
	2500 – 2301	1/7	1/5	1/3	1					0.068
	< 2300	1/9	1/7	1/5	1/3	1				0.035
Drainage Density (km./km. ²)	<0.85	1						0.03	0.02	0.503
	0.85 - 1.50	1/3	1							0.260
	1.51 - 2.30	1/5	1/3	1						0.134
	2.31 - 3.30	1/7	1/5	1/3	1					0.068
	>3.30	1/9	1/7	1/5	1/3	1				0.035
LULC Classes	Waterbody/ Salt marsh/ Estuary	1						0.02	0.007	0.377
	Dense Forest/Mixed Forest	1/2	1							0.297
	Agricultural Land/Scrub	1/3	1/3	1						0.165
	Fallow	1/5	1/5	1/3	1					0.088
	Barren	1/7	1/7	1/5	1/3	1				0.047
	Settlement	1/9	1/9	1/7	1/5	1/3	1			0.026

Table S4 Pair-wise comparison matrix

Parameters	Lithology	Lineament Density	Geomorphology	Slope	Soil	Rainfall	Drainage Density	LULC
Lithology	1	2	3	4	5	6	7	8
Lineament Density	1/2	1	2	3	4	5	6	7
Geomorphology	1/3	1/2	1	2	3	4	5	6
Slope	1/4	1/3	1/2	1	2	3	4	5
Soil	1/5	1/4	1/3	1/2	1	2	3	4
Rainfall	1/6	1/5	1/4	1/3	1/2	1	2	3
Drainage Density	1/7	1/6	1/5	1/4	1/3	1/2	1	2
LULC	1/8	1/7	1/6	1/5	1/4	1/3	1/2	1

Table S5 Error matrix showing accuracy of supervised land use classification for the Tadri River Basin

Reference Data									
Classified Data	Salt marsh/ Estuary	Forests	Agricultural land	Fallow Land	Barren and Rocky Outcrops	Settlements	Total	Producer's Accuracy %	User's Accuracy %
Salt marsh/Estuary	7	2	0	0	0	0	9	87.5	77.08
Forests	0	8	0	0	0	0	8	57.14	100
Agricultural land	0	3	6	0	0	0	9	46.15	66.67
Fallow Land	0	1	3	10	1	0	15	90.9	66.67
Barren and Rocky Outcrops	0	0	0	1	12	0	13	85.71	92.31
Settlements	1	0	4	0	1	5	11	100	45.45
Total	8	14	13	11	14	5	65		
Overall Accuracy	73.85%								