Table S 1. The parameters of LT-GEE.

Parameter	Value
maxSegments	6
spikeThreshold	0.9
vertexCountOvershoot	3
preventOneYearRecovery	True
recoveryThreshold	0.25
pvalThreshold	0.05
bestModelProportion	0.75
minObservationsNeeded	6
delta	loss/gain
sort	greatest
year	Start:2000 End:2020
mag	200
dur	4
preval	200
mmu	11

Table S 2. The PCA results and the water threshold for IRB from 2000 to 2020.

Year	Parameters	EVI	LST	SPWI	NDBSI	CSI
2000	Water threshold			-0.0898		
	Eigenvalues	0.1227	0.0073	0.0047	0.0031	0.0004
	Percentage variance	88.79%	5.31%	3.37%	2.27%	0.26%
	PC1	0.4346	-0.4346	0.4610	-0.4622	-0.4428
	PC2	-0.6974	-0.5770	0.2405	-0.1680	0.3077
	PC3	-0.1105	0.6405	0.4869	-0.5034	0.2952
	PC4	0.5590	-0.2563	0.0241	0.0362	0.7874
	PC5	-0.0110	-0.0477	-0.7014	-0.7096	0.0464
2001	Water threshold			-0.0976		
	Eigenvalues	0.1204	0.0094	0.0042	0.0038	0.0004
	Percentage variance	87.14%	6.82%	3.02%	2.74%	0.28%
	PC1	0.4285	-0.4370	0.4650	-0.4658	-0.4385
	PC2	-0.6681	-0.5213	0.2754	-0.2228	0.3954
	PC3	0.2970	0.4654	0.3752	-0.3874	0.6359
	PC4	0.5308	-0.5644	-0.2464	0.3047	0.4961
	PC5	-0.0058	-0.0465	-0.7117	-0.7003	0.0300
2002	Water threshold			-0.0743		
	Eigenvalues	0.1196	0.0104	0.0038	0.0036	0.0004
	Percentage variance	86.86%	7.54%	2.72%	2.6%	0.28%
	PC1	0.4237	-0.4383	0.4665	-0.4682	-0.4376
	PC2	-0.7009	-0.5107	0.2627	-0.2276	0.3565
	PC3	-0.2280	0.7394	0.4439	-0.4518	-0.0047
	PC4	0.5265	-0.0068	0.1680	-0.1205	0.8246
	PC5	0.0011	-0.0165	-0.6986	-0.7144	0.0372
2003	Water threshold			-0.0743		
	Eigenvalues	0.1217	0.0094	0.0038	0.0029	0.0003
	Percentage variance	88.16	6.78	2.74	2.07	0.25
	PC1	0.4350	-0.4258	0.4663	-0.4655	-0.4419
	PC2	-0.5768	-0.6500	0.1984	-0.1513	0.4273
	PC3	0.5328	-0.5709	-0.3860	0.4528	0.1904
	PC4	0.4406	0.2595	0.2608	-0.2909	0.7654
	PC5	-0.0032	-0.0545	-0.7254	-0.6861	0.0067
2004	Water threshold			-0.0742		
	Eigenvalues	0.1210	0.0108	0.0032	0.0031	0.0003
	Percentage variance	87.38	7.82	2.31	2.27	0.22
	PC1	0.4405	-0.4357	0.4646	-0.4663	-0.4277
	PC2	0.4776	0.5313	-0.2856	0.2203	-0.5996
	PC3	0.2344	0.6598	0.3795	-0.4179	0.4371
	PC4	-0.7231	0.2997	0.2219	-0.2696	-0.5151

	PC5	-0.0045	-0.0521	-0.7137	-0.6977	0.0338
2005	Water threshold			-0.0585		
	Eigenvalues	0.1233	0.0081	0.0038	0.0028	0.0003
	Percentage variance	89.18	5.85	2.74	1.99	0.24
	PC1	0.4322	-0.4326	0.4618	-0.4628	-0.4456
	PC2	-0.6611	-0.5772	0.2473	-0.1844	0.3669
	PC3	-0.3892	0.6761	0.4086	-0.4525	-0.1404
	PC4	0.4739	0.1436	0.2443	-0.2218	0.8037
	PC5	0.0101	0.0442	0.7064	0.7056	-0.0338
2006	Water threshold			-0.0665		
	Eigenvalues	0.1234	0.0083	0.0036	0.0029	0.0003
	Percentage variance	89.15	5.98	2.57	2.08	0.23
	PC1	0.4364	-0.4345	0.4618	-0.4620	-0.4406
	PC2	-0.5964	-0.5683	0.2655	-0.2009	0.4587
	PC3	-0.2061	0.6959	0.4425	-0.5144	0.1128
	PC4	-0.6412	0.0105	-0.0608	0.0515	-0.7631
	PC5	0.0127	0.0615	0.7188	0.6920	-0.0203
2007	Water threshold			-0.0586		
	Eigenvalues	0.1244	0.0078	0.0035	0.0026	0.0003
	Percentage variance	89.81	5.59	2.51	1.86	0.23
	PC1	0.4276	-0.4374	0.4610	-0.4604	-0.4487
	PC2	-0.7449	-0.5161	0.2415	-0.2207	0.2678
	PC3	-0.2159	0.7308	0.4354	-0.4789	0.0206
	PC4	-0.4643	0.0859	-0.1546	0.1630	-0.8524
	PC5	-0.0069	-0.0297	-0.7181	-0.6953	-0.0019
2008	Water threshold			-0.0429		
	Eigenvalues	0.1260	0.0069	0.0032	0.0022	0.0003
	Percentage variance	90.86	4.96	2.34	1.62	0.23
	PC1	0.4371	-0.4353	0.4579	-0.4592	-0.4460
	PC2	-0.6353	-0.5903	0.2507	-0.1763	0.3925
	PC3	-0.1145	0.6549	0.4843	-0.5037	0.2642
	PC4	0.6261	-0.1766	0.0024	0.0285	0.7590
	PC5	-0.0186	-0.0436	-0.7021	-0.7097	0.0341
2009	Water threshold			-0.0586		
	Eigenvalues	0.1240	0.0076	0.0041	0.0023	0.0004
	Percentage variance	89.64	5.49	2.94	1.67	0.26
	PC1	0.4358	-0.4284	0.4605	-0.4604	-0.4500
	PC2	-0.6416	-0.6210	0.2306	-0.1480	0.3573
	PC3	-0.3048	0.6524	0.4533	-0.5194	0.0789
	PC4	0.5523	-0.0260	0.1248	-0.1241	0.8144
	PC5	0.0230	0.0670	0.7167	0.6935	-0.0176

	Water threshold			-0.0743		
	Eigenvalues	0.1266	0.0062	0.0030	0.0026	0.0003
	Percentage variance	91.3	4.49	2.13	1.84	0.24
	PC1	0.4399	-0.4363	0.4585	-0.4583	-0.4426
2010	PC2	-0.5726	-0.6220	0.2332	-0.1613	0.4527
	PC3	-0.1337	0.6360	0.4637	-0.5356	0.2751
	PC4	0.6788	-0.1176	-0.0190	0.0460	0.7232
	PC5	-0.0093	-0.0665	-0.7211	-0.6892	0.0228
	Water threshold	-0.0430				
	Eigenvalues	0.1241	0.0077	0.0041	0.0023	0.0004
	Percentage variance	89.57	5.55	2.95	1.64	0.29
	PC1	0.4344	-0.4286	0.4605	-0.4607	-0.4509
2011	PC2	-0.6473	-0.6510	0.2009	-0.1180	0.3208
	PC3	-0.3608	0.6228	0.4591	-0.5175	0.0580
	PC4	-0.5119	0.0205	-0.1869	0.1229	-0.8292
	PC5	0.0001	-0.0650	-0.7084	-0.7007	0.0541
	Water threshold			-0.0585		
	Eigenvalues	0.1262	0.0065	0.0035	0.0021	0.0003
	Percentage variance	91.03	4.72	2.49	1.52	0.25
	PC1	0.4386	-0.4299	0.4591	-0.4583	-0.4494
2012	PC2	-0.6045	-0.7025	0.1512	-0.0928	0.3311
	PC3	-0.3543	0.5605	0.4831	-0.5463	0.1686
	PC4	-0.5626	0.0658	-0.1195	0.0761	-0.8118
	PC5	0.0084	-0.0565	-0.7202	-0.6908	0.0308
	Water threshold			-0.0977		
	Eigenvalues	0.1222	0.0083	0.0043	0.0029	0.0004
	Percentage variance	88.46	6.04	3.11	2.1	0.3
	PC1	0.4281	-0.4335	0.4625	-0.4634	-0.4475
2013	PC2	-0.7236	-0.5314	0.2566	-0.2012	0.2962
	PC3	-0.3202	0.7229	0.3999	-0.4441	-0.1334
	PC4	0.4366	0.0738	0.2537	-0.2162	0.8323
	PC5	0.0071	0.0413	0.7042	0.7077	-0.0382
	Water threshold			-0.0742		
	Eigenvalues	0.1258	0.0069	0.0032	0.0024	0.0004
	Percentage variance	90.75	4.97	2.3	1.72	0.26
	PC1	0.4334	-0.4362	0.4589	-0.4591	-0.4478
2014	PC2	-0.6923	-0.5768	0.2332	-0.1817	0.3171
	PC3	-0.2484	0.6846	0.4549	-0.5065	0.0784
	PC4	0.5208	-0.0774	0.1448	-0.1013	0.8316
	PC5	-0.0002	-0.0484	-0.7121	-0.6996	0.0344
2015	Water threshold			-0.0820		
	Eigenvalues	0.1236	0.0081	0.0033	0.0030	0.0004

	Percentage variance	89.26	5.87	2.41	2.18	0.28
	PC1	0.4300	-0.4372	0.4623	-0.4620	-0.4436
	PC2	-0.6871	-0.5502	0.2397	-0.2142	0.3491
	PC3	0.4232	-0.6712	-0.3542	0.4135	0.2718
	PC4	0.4049	0.2329	0.3007	-0.2907	0.7790
	PC5	0.0083	-0.0365	-0.7162	-0.6965	0.0231
	Water threshold			-0.0977		
	Eigenvalues	0.1210	0.0080	0.0050	0.0030	0.0004
	Percentage variance	88.06	5.82	3.66	2.17	0.29
2016	PC1	0.4341	-0.4240	0.4664	-0.4641	-0.4461
	PC2	-0.6480	-0.6266	0.2104	-0.1542	0.3455
	PC3	-0.4709	0.6263	0.3773	-0.4588	-0.1818
	PC4	0.4118	0.1740	0.2381	-0.3085	0.8052
	PC5	0.0185	0.0706	0.7343	0.6747	0.0167
	Water threshold			-0.0743		
	Eigenvalues	0.1228	0.0081	0.0037	0.0033	0.0004
	Percentage variance	88.83	5.85	2.66	2.36	0.3
2017	PC1	0.4309	-0.4387	0.4635	-0.4634	-0.4385
	PC2	-0.6712	-0.5505	0.2433	-0.2149	0.3755
	PC3	0.5970	-0.2049	0.0029	0.0181	0.7754
	PC4	-0.0858	0.6793	0.4638	-0.5008	0.2555
	PC5	-0.0023	-0.0319	-0.7148	-0.6985	0.0124
	Water threshold			-0.0743		
	Eigenvalues	0.1224	0.0080	0.0042	0.0031	0.0004
	Percentage variance	88.6	5.81	3.06	2.22	0.3
2018	PC1	0.4296	-0.4360	0.4627	-0.4615	-0.4453
	PC2	-0.7235	-0.5058	0.2664	-0.2293	0.3117
	PC3	-0.2382	0.7424	0.4016	-0.4784	-0.0434
	PC4	0.4848	-0.0054	0.1633	-0.1888	0.8382
	PC5	0.0144	0.0540	0.7259	0.6855	0.0049
	Water threshold			-0.0743		
	Eigenvalues	0.1257	0.0068	0.0032	0.0025	0.0004
	Percentage variance	90.68	4.93	2.33	1.79	0.28
2019	PC1	0.4349	-0.4341	0.4595	-0.4599	-0.4470
	PC2	-0.6544	-0.6298	0.2061	-0.1437	0.3348
	PC3	0.4155	-0.6363	-0.4316	0.4784	0.0862
	PC4	0.4583	0.0885	0.2350	-0.2168	0.8246
	PC5	-0.0093	-0.0477	-0.7105	-0.7014	0.0284
	Water threshold			-0.0509		
	Eigenvalues	0.1248	0.0074	0.0035	0.0023	0.0004
2020	Percentage variance	90.21	5.31	2.54	1.65	0.28
	PC1	0.4400	-0.4245	0.4622	-0.4607	-0.4476

PC2	-0.5250	-0.7469	0.1286	-0.0564	0.3830
PC3	0.5418	-0.4915	-0.4397	0.5210	0.0084
PC4	0.4870	0.1249	0.2080	-0.2261	0.8080
PC5	-0.0015	-0.0687	-0.7302	-0.6797	0.0093

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Table S 3 Research Paper Formulas and Parameters Overview.

Formula Number	Equation	Parameter Descriptions
(1)	$PC_i = f(EVI, SPWI, LST, NDBSI, CSI)$	where $f(\cdot)$ represents the PCA operation; PC_i is the obtained principal component; PC_1 is the first principal component; ARSEI is the ultimate result of PC1, with its values representing the assessment out-comes of EQ. High values indicate better EQ, while low values suggest poorer EQ.
(2)	$ARSEI = 1 - PC_1$	
(3)	$X' = (X - X_{min})/(X_{max} - X_{min})$	where X' indicates the normalized ARSEI, X_{max} is the maximum value of ARSEI, and X_{min} is the minimum value of ARSEI.
(4)	$CV_{ARSEI} = \sigma_{ARSEI}/\overline{ARSEI}$	where σ_{ARSEI} is the standard deviation of ARSEI, and $\overline{ARSEI}$ is the mean of ARSEI.
(5)	$S_{ARSEI} = Median\big((X_j - X_i)/(j - i)\big), \forall j > i$	where S_{ARSEI} is the Theil-Sen Median slope; Median is the median function; ARSEI inclines when $S_{ARSEI} > 0$, and ARSEI declines when $S_{ARSEI} < 0$.
(6)	$sgn(x_j - x_i) = \begin{cases} 1 & (x_j - x_i > 0) \\ 0 & (x_j - x_i = 0) \\ -1 & (x_j - x_i < 0) \end{cases}$	
(7)	$S = \sum_{i=1}^{n-1} \sum_{j=i+1}^{n} sgn(x_j - x_i)$	In the formula: sgn is a sign function; n is the amount of data in the sequence; S is the test statistic; when $|z| < \mu_{1-\frac{\alpha}{2}}$ is the significant change in the ARSEI studied at a given significant level α.
(8)	$VAR(S) = n(n - 1)(2n + 5)/18$	
(9)	$Z = \begin{cases} (S - 1)/\sqrt{VAR(S)} & (S > 0) \\ 0 & (S = 0) \\ (S + 1)/\sqrt{VAR(S)} & (S < 0) \end{cases}$	
(10)	$P_{i,k(x)}^d = \sum_{n=1}^{M} I(h_n(x) = d)/M$	where $P_{i,k(x)}^d$ is the development of probability of land type k in unit i; when d is 1, it means that it converted other land use types to type k, and when d is 0, it means other transitions; x is a vector composed of multiple driving factors; I is the indicator function of the decision tree; $h_n(x)$ is the prediction type of the nth decision tree of the vector x; M is the total number of decision trees.