



Ecological assessment of Urban Field Thermal Variance Index (UFTVI) for different zones in south of Iraq Using remote sensing Data.

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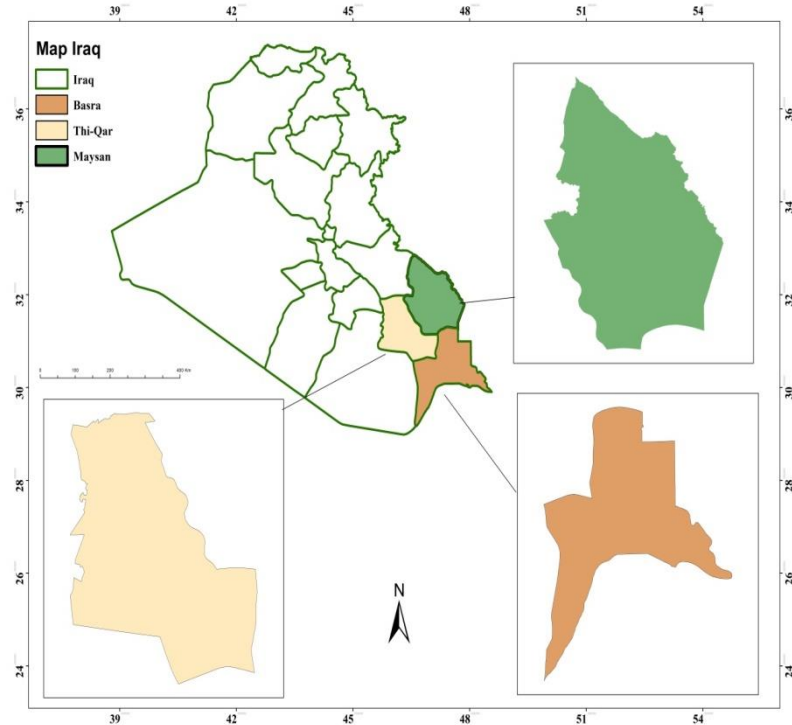
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Alaa M. AL-Lami

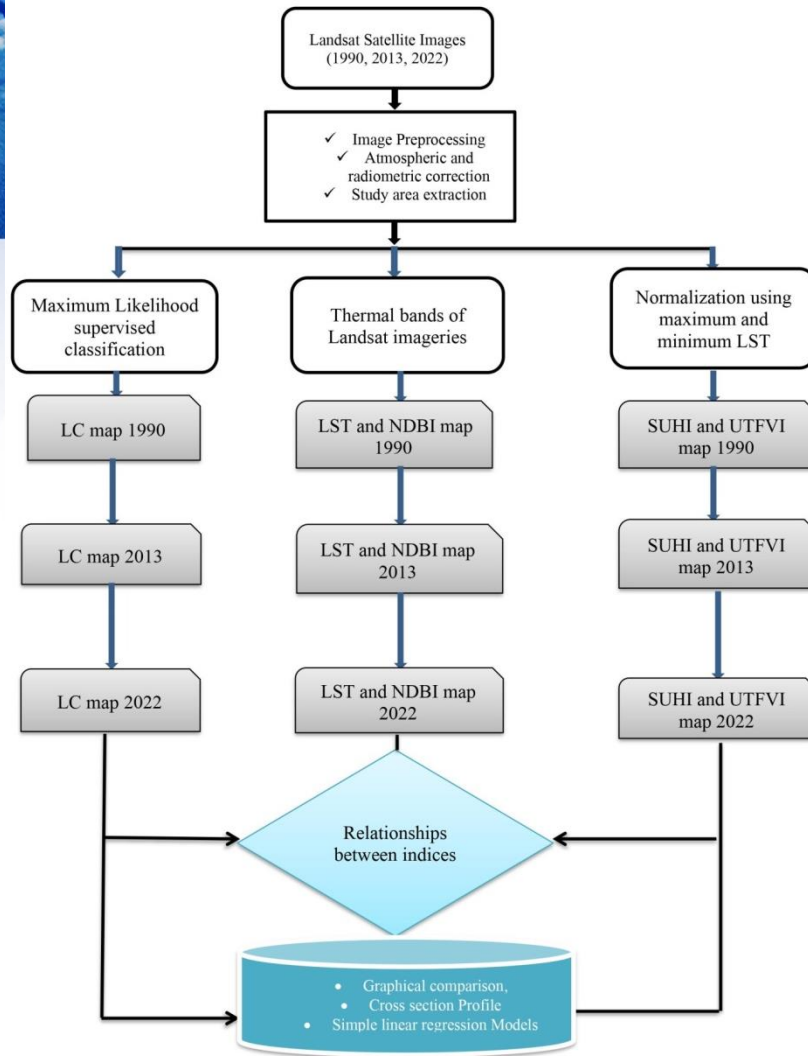
Aim of Study

- 1. present an ecological assessment of UTFVI for three urban sites in the south of Iraq namely Basra, Maysan, and Thi-Qar using remote sensing and GIS data**
- 2. Landsat TM/OLI time-series satellite imageries from 1990, 2013 and 2022 will be employed to evaluate five ecological indices (UTFVI, SUHI, NDBI, NDVI,NDWI,LST, LULC).**
- 3. Evaluate the relationship between the selected indices and climate parameters.**

The Data and Location

- Landsat5 and landsat8 images from " USGS website (<https://earthexplorer.usgs.gov>) for the study areas
- The study focuses on Basra, Maysan, and Thi-Qar Provinces in southern Iraq, covering 48,983 km² or 11.2% of the country. The region, characterized by desert-like conditions and sedimentary soil, experiences extremely hot summers with temperatures reaching up to 45°C and very low annual rainfall (less than 100 mm). The area features significant desert expanses and, similar to Iraq's alluvial plain, it has hot, humid summers and cooler, wet winters in marshland areas.





Urban Heat Islands in Southern Iraq and the Urban Thermal Field Variance Index (UTFVI)

- **1. Urban Heat Islands (UHIs):**
 - - UHIs refer to urban areas being significantly warmer than surrounding rural areas.
 - - Causes: Human activities, increased urban , and reduced vegetation.
 - - Hot, arid climate and rapid urbanization intensify the SUHI effect.
- **2. Urban Thermal Field Variance Index (UTFVI):**
 - - UTFVI is an index used to assess (Thermal Comfort) in urban areas.
 - - Measures (heat stress)* by comparing air temperature to a reference temperature.
 - - In southern Iraq, most urban areas fall under:
 - - "Uncomfortable" or "Extremely Uncomfortable" categories, especially during summer.
 - - High UTFVI levels indicate significant health risks due to heat stress.

Results and Discussion

spatial and temporal distribution of SUHI.

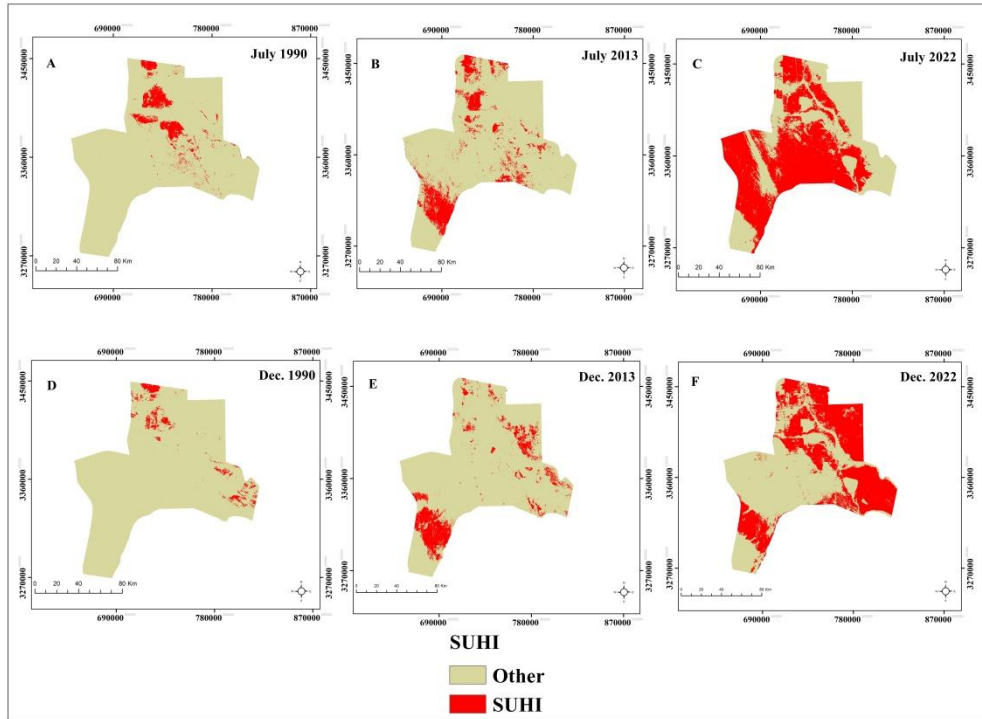


Table :Descriptive statistics of (SUHI) for Basra.

years	Area NON-SUHI	Per. NON-SUHI	Area SUHI	Per. SUHI
July/1990	14569.92	93.9	940.0761	6.06
December/1990	14869.38	96.8	475.9524	3.1
July/2013	14014.75	87.4	2003.096	12.5
December/2013	14151.91	88.8	1775.481	11.1
July/2022	7448.585	46.4	8588.162	53.5
December/2022	9237.754	57.5	6806.889	42.4

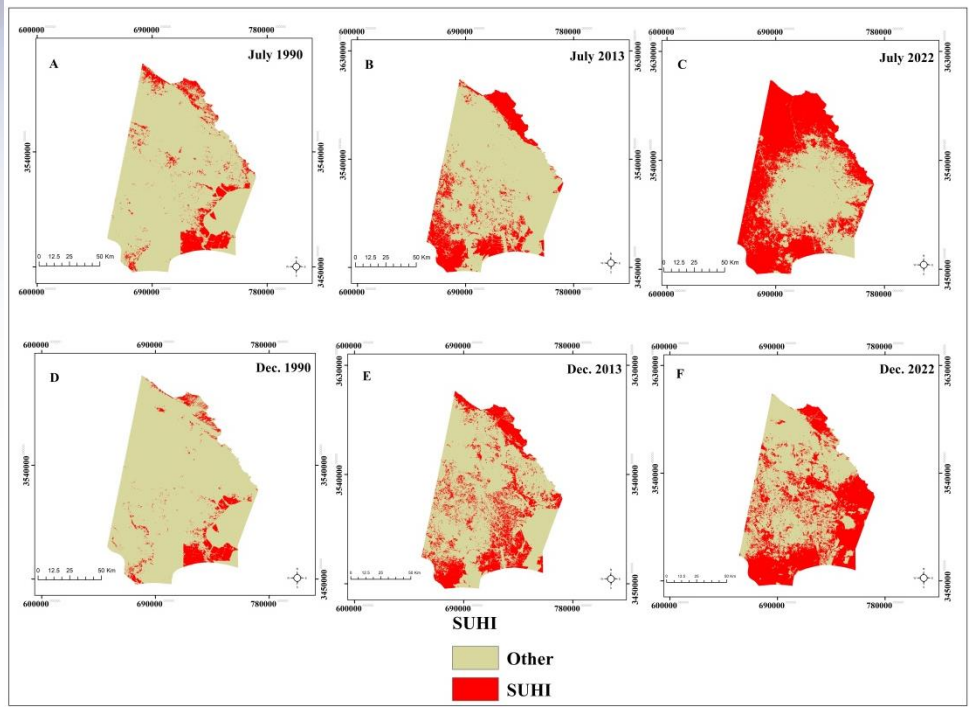


Table :Descriptive statistics of (SUHI) for Maysan

years	Area NON-SUHI	Per.NON-SUHI	Area SUHI	Per. SUHI
July/1990	10869.47	89.04	1337.386	10.95602
December/1990	11704.73	92.18	992.0997	7.813758
July/2013	9229.099	78.28	2559.735	21.71322
December/2013	8946.152	73.67	3196.541	26.32481
July/2022	6173.285	52.74	5529.782	47.25
December/2022	6859.152	58.44	4877.4303	41.55

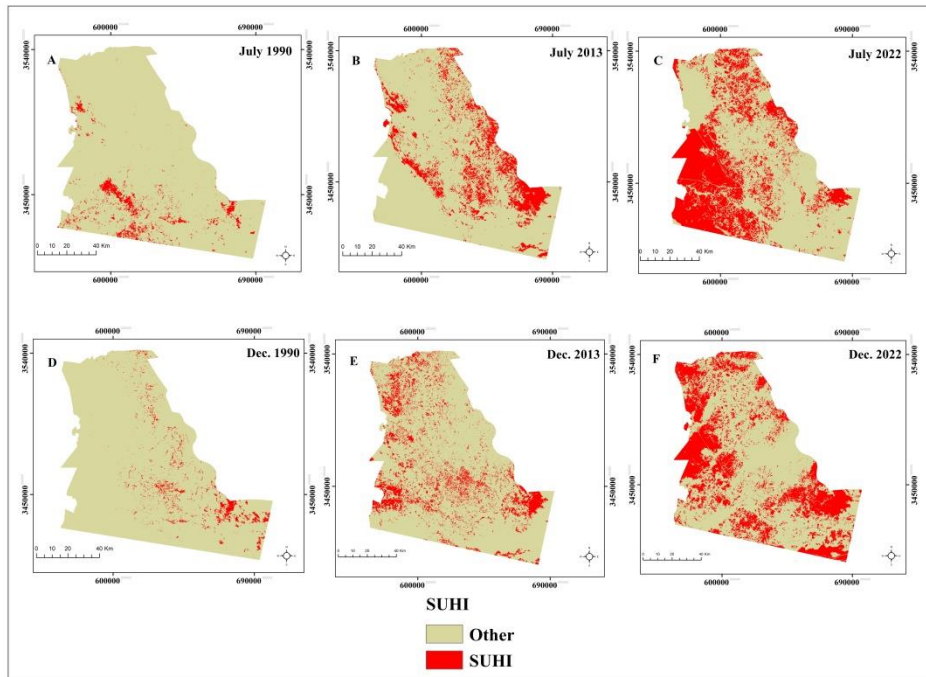


Table :Descriptive statistics of (SUHI) for Thi-qar

years	Area NON-SUHI	Per. NON-SUHI	Area SUHI	Per. SUHI
July/1990	9670.651	95.78	426.0501	4.21
December/1990	10089.15	96.61	353.0196	3.38
July/2013	9594.54	84.43	1769.254	15.56
December/2013	9668.708	85.72	1610.204	14.27
July/2022	3738.557	32.886	7628.859	67.11
December/2022	5453.112	47.90	5930.654	52.09

Spatial and temporal distribution of UTFVI .

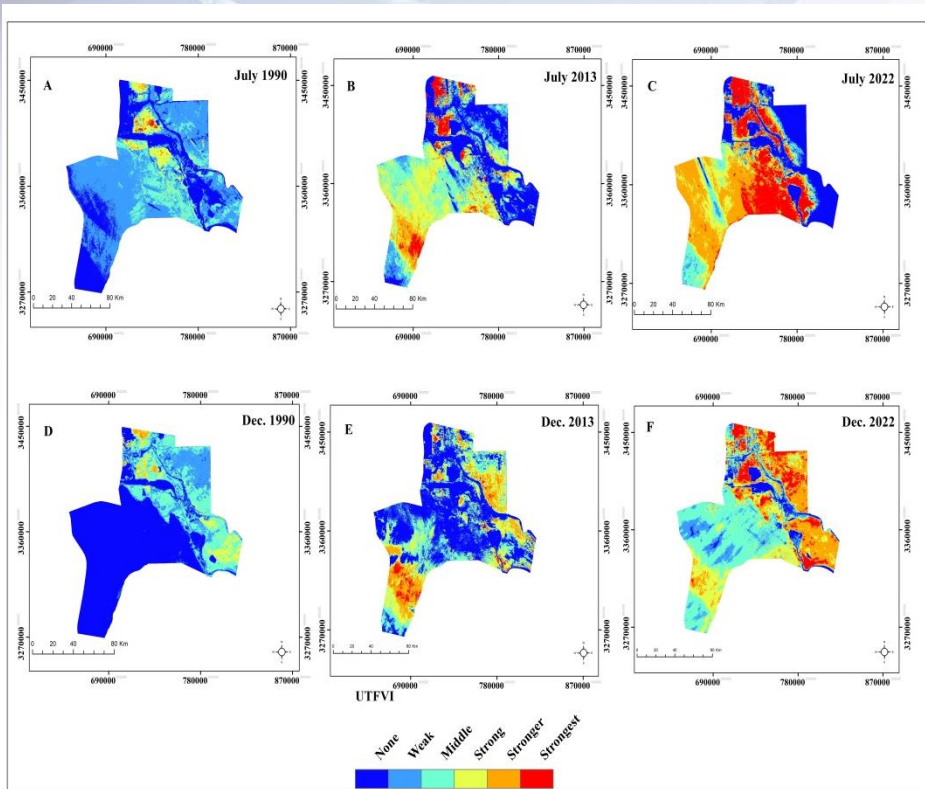


Table :Detailed of (UTFVI) of the study period for Basra

UTFVI	July/1990		July/2013		July/2022	
	Area Km ²	(%)	Area Km ²	(%)	Area Km ²	(%)
None	4461.449	28.76	4759.51	29.71	3928.91	24.49
Weak	7665.486	49.42	2051.91	12.81	797.773	4.97
Middle	2442.989	15.75	3201.82	19.98	1523.47	9.49
Strong	776.358	5.01	4001.43	24.98	2185.81	13.63
Stronger	110.6316	0.71	1200.761	7.49	4379.835	27.31
Strongest	53.0865	0.34	802.337	5.01	3220.82	20.08
UTFVI	Dec./ 1990		Dec./ 2013		Dec./ 2022	
	Area Km ²	(%)	Area Km ²	(%)	Area Km ²	(%)
None	8994.2742	58.61	6988.96	43.87	1090.75	6.79
Weak	2339.8686	15.24	895.435	5.62	1779.05	11.08
Middle	3140.0739	20.46	3281.74	20.6	5369.47	33.46
Strong	716.0715	4.6	2710.22	17.01	2973.45	18.53
Stronger	151.0119	0.98	1701.44	10.68	3226.36	20.1
Strongest	4.032	0.03	350.703	2.20	1605.52	10.0

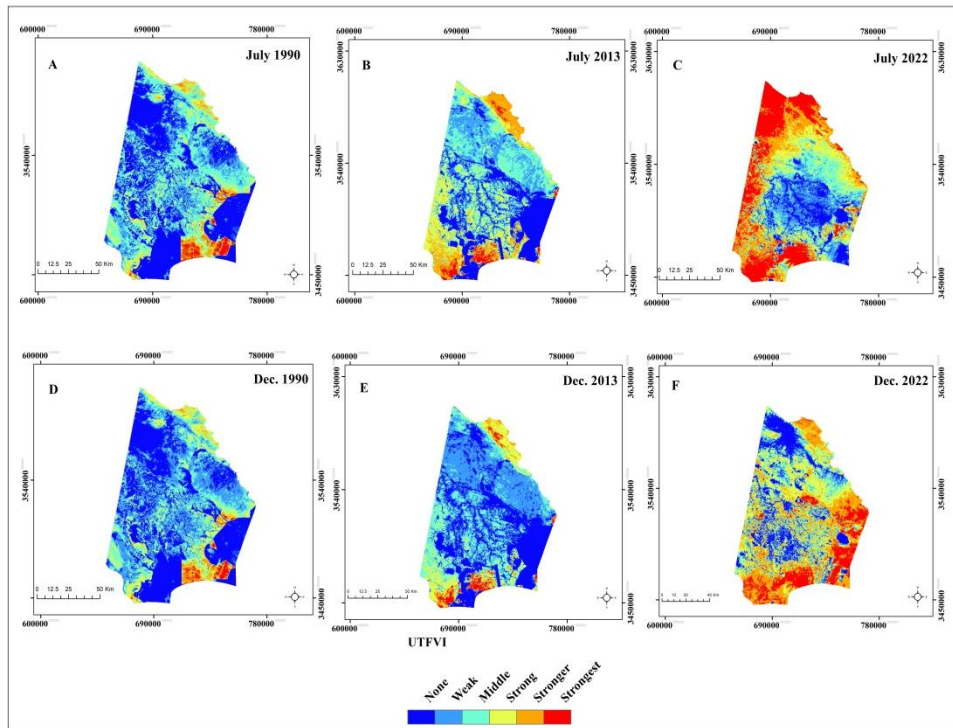


Table:Detailed of (UTFVI) of the study period for maysan

UTFVI	July/1990		July/2013		July/2022	
	Area Km ²	(%)	Area Km ²	(%)	Area Km ²	(%)
None	4910.2	38.6	2941.543	24.95	1432.68	12.24
Weak	2234.5	17.59	2355.51	19.98	1851.62	15.81
Middle	377288	29.71	3166.624	26.86	1664.93	14.2
Strong	1035.1	8.15	1885.97	15.99	1970.02	16.83
Stronger	491.84	3.87	1139.043	9.66	2192.05	18.73
Strongest	251.90	1.98	300.1446	2.546	2592.57	22.15
UTFVI	Dec./ 1900		Dec./ 2013		Dec./ 2022	
	Area Km ²	(%)	Area Km ²	(%)	Area Km ²	(%)
None	4910.6223	38.67	3974.645	33.71	1966.84	16.75
Weak	3454.9758	27.21	3797.337	32.21	1100.68	9.37
Middle	2552.0625	20.1	2359.023	20.01	1571.19	13.38
Strong	1206.4932	9.50	1043.149	8.84	2923.98	24.91
Stronger	398.8449	3.14	350.658	2.97	2810.53	23.94
Strongest	173.8323	1.36	264.0222	2.23	1363.38	11.61

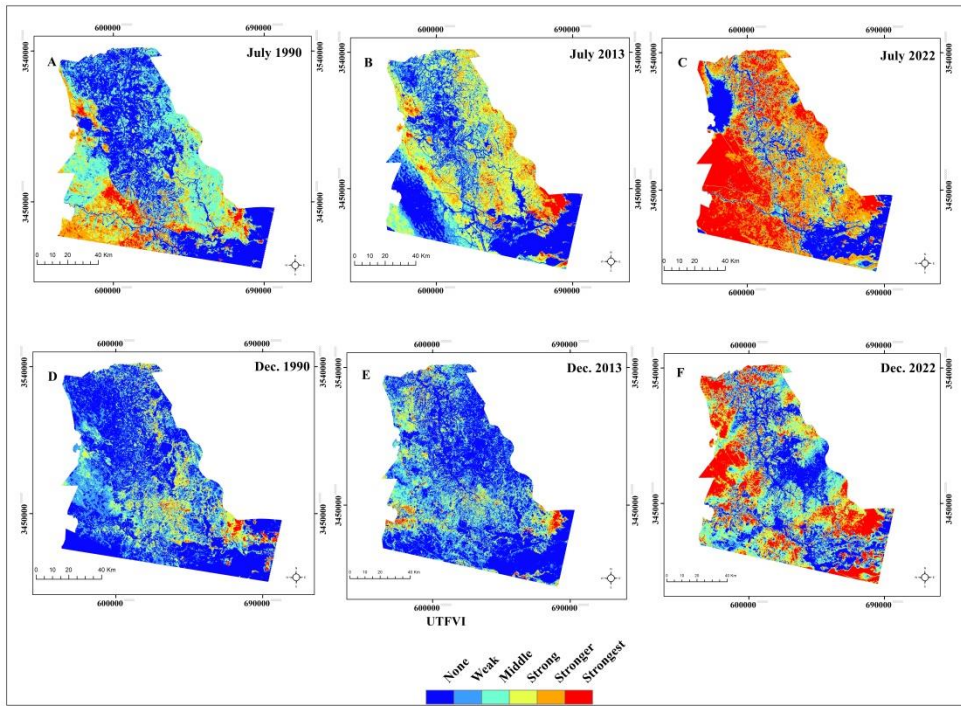


Table :Detailed of (UTFVI) of the study period for Thi-Qar

UTFVI	July/1990		July/2013		July/2022	
	Area Km ²	(%)	Area Km ²	(%)	Area Km ²	(%)
None	3504.861	34.71	3603.464	31.71	2150.07	18.91
Weak	1129.336	11.18	1842.216	16.21	544.4541	4.78
Middle	2660.848	26.35	1654.483	14.55	758.3301	6.67
Strong	1172.151	11.60	2882.696	25.36	1116.116	9.81
Stronger	1203.455	11.91	1023.861	19.0	3338.135	29.36
Strongest	426.0501	4.21	357.0741	3.14	3460.31	30.44
UTFVI	Dec./ 1900		Dec./ 2013		Dec./ 2022	
	Area Km ²	(%)	Area Km ²	(%)	Area Km2	(%)
None	5074.2495	48.59	5403.2409	47.90	2698.9875	23.70
Weak	2744.6175	26.28	2455.8723	21.77	1201.6944	10.55
Middle	1123.1784	10.75	1950.2856	17.29	2338.6005	20.54
Strong	1147.1085	10.98	975.5604	8.64	1893.0924	16.62
Stronger	191.0592	1.82	352.602	3.126	1074.5217	9.43
Strongest	161.9604	1.55	141.3504	1.25	2176.8696	19.12

Conclusion

Iraq faces urgent environmental degradation issues that, if not addressed, will complicate future remedial efforts. The current environmental conditions pose significant health hazards. This research is crucial for:

- **Environmental Management:** It enhances understanding of how land use changes impact the environment, aiding in preventing degradation and promoting sustainable practices.
- **Agricultural Policy:** Findings on vegetation loss, notably in Thi-Qar, inform policies to preserve and restore vegetation crucial for food security and ecological balance.
- **Water Resource Management:** Declining water bodies in Maysan highlight the need for better management to ensure sustainable water supply and protect aquatic ecosystems.
- **Climate Change Mitigation:** Insight into LULC changes' impact on climate patterns aids in developing effective local and regional climate adaptation and mitigation strategies.
- This format presents your research's importance clearly and succinctly, focusing on its implications across environmental management, agricultural policy, water resources, and climate change mitigation.

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An aerial photograph of a multi-lane road stretching into the distance, surrounded by a vast field of white clouds under a clear blue sky. The road is overlaid with several semi-transparent, curved bands in shades of blue and white. The text "Thanks for Listening" is centered in a bold, red, sans-serif font.

Thanks for Listening