

Supporting Information

Land transformation across agroecological zones reveals expanding cropland and settlement at the expense of tree-cover and wetland areas in Nigeria

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Land stocks and flows

Land-cover transition matrix as percentage (2000 – 2022)

		1	2	3	4	5	6	7
UNCCD classification scheme		Tree-covered area	Grassland	Cropland	Wetland	Artificial surface	Otherland	Waterbody
Percentage of land area under each transition during the second time interval (2000 – 2013)								
<i>Latter time 2013</i>								
<i>Initial time 2000</i>	Tree-covered area	83,6	8,8	45,9	18,4	25,1	1,1	6,2
	Grassland	0,6	48,2	17,6	0,5	6	34	1,6
	Cropland	9	36,3	31,6	1,4	12,2	35,8	1,8
	Wetland	5,1	4,6	3,3	76,8	4,9	6,6	19,1
	Artificial surface	0,1	0,1	0,1	0	49,3	0	0
	Otherland	0	1,6	0	0	0,1	20,7	0,1
	Waterbody	1,7	0,3	1,5	2,9	2,6	1,8	71,2
Percentage of land area under each transition during the third time interval (2013 – 2022)								
<i>Latter time 2022</i>								
<i>Initial time 2013</i>	Tree-covered area	81,2	6,5	28,7	12	18,9	3,7	7,9
	Grassland	1,3	53,7	20,7	6,1	11	63	1
	Cropland	16,6	35,9	49,4	2,4	17,6	6,6	4
	Wetland	0,6	0,2	0,3	78,2	0,7	0,2	16,1
	Artificial surface	0,2	0,2	0,3	0,2	50,1	2,9	2,6
	Otherland	0,02	3,4	0,5	0,7	0,8	23,3	0,9
	Waterbody	0,1	0,1	0,08	0,3	1	0,26	67,4

Accuracy

Error matrix and accuracy of land cover maps (2000 – 2022)

2000	Tree-covered areas	Grassland	Cropland	Wetland	Artificial Surfaces	Other land	Water body	Total	User accuracy (%)
Tree-covered areas	80	13	33	0	0	0	1	127	0,63
Grassland	1	57	22	0	0	0	1	81	0,7
Cropland	10	20	52	0	0	0	0	82	0,63
Wetland	0	2	0	79	0	0	10	91	0,87
Artificial Surfaces	2	0	2	0	14	0	0	18	0,78
Otherland	0	0	0	0	0	14	1	15	0,93
Waterbody	1	0	0	0	0	0	85	86	0,99
Total	94	92	109	79	14	14	98	500	
P_Accuracy	0,85	0,62	0,48	1	1	1	0,87		0,76
2013									
Tree-covered areas	71	1	2	0	0	0	0	74	0,96
Grassland	1	28	1	0	0	7	0	37	0,76
Cropland	8	1	23	0	0	0	0	32	0,72
Wetland	0	0	0	26	0	0	2	28	0,93
Artificial Surfaces	0	0	2	0	10	0	0	12	0,83
Otherland	0	1	0	0	0	70	1	72	0,97
Waterbody	0	0	0	1	0	0	122	123	0,99
Total	80	31	28	27	10	77	125	378	
Producer accuracy	0,89	0,9	0,82	0,96	1	0,91	0,98		0,93
2022									
Tree-covered areas	13	4	5	0	0	0	0	22	0,59
Grassland	2	17	0	0	0	0	0	19	0,89
Cropland	0	12	50	0	0	2	0	64	0,78
Wetland	0	0	0	34	0	0	0	34	1
Artificial Surfaces	0	0	8	0	15	2	10	35	0,43
Otherland	0	3	2	0	0	11	0	16	0,69
Waterbody	0	0	0	0	0	0	115	115	1
Total	15	36	65	34	15	15	125	305	
Producer accuracy	0,87	0,47	0,77	1	1	0,73	0,92		0,84

Summary of human-appropriated natural land cover (HANLC) changes expressed as percent of total land area in agroecological zones, where the upper number is 2000 – 2013 and the lower number is 2013 – 2022.

Agroecological zones (%)

Drivers and Processes underlying HANLC changes	Time Intervals		Guinea Savannah	Sudan Savannah	Rainforest	Sahel Savannah	Freshwater swamp	Mangrove	Lake Chad
	2000 – 2013	2013 – 2022							
*Natural regeneration and afforestation (expansion of natural cover in croplands)	2000 – 2013		6,94	20,97	5,22	26,95	2,25	2,01	3,3
	2013 – 2022		16,56	15,41	1,7	0,65	2,92	2,66	5,2
Settlement and infrastructure development (e.g., settlement expansion into natural cover and croplands)	2000 – 2013		0,78	1,24	2,37	0,37	1,6	1,65	0,37
	2013 – 2022		3,65	4,5	0,89	5,56	0,41	0,6	5,2
Cropland expansion (e.g., loss of natural cover to croplands)	2000 – 2013		26,25	23,11	2,35	1,58	0,69	0,97	6,04
	2013 – 2022		54,3	24,24	86,18	9,64	37,33	21,92	10,1