

Appendix A1: 1999 Malawi adjusted confusion matrix

1. Error matrix (i.e. original confusion matrix) The traditional confusion matrix												
1. Error matrix (i.e. original confusion matrix) The traditional confusion matrix		REFERENCE (pixels)										
PREDICTED (PIXELS)	Class	Grassland (nij)	Woodland	Agriculture	Plantation	Settlements	Wetland	total (ni)	wi (Ami/Atot)	map area (ha)	user acc	
	Grassland (nij)	3584	538	157	0	0	25	4304	0.189	2 229 695.91	83.3	
	Woodland	147	9538	0	26	0	50	9761	0.372	4 389 290.46	97.7	
	Agriculture	0	0	3743	0	20	0	3763	0.159	1 871 991.54	99.5	
	Plantation	0	25	0	1336	0	0	1361	0.015	172 893.51	98.2	
	Settlements	0	0	12	0	2472	0	2484	0.043	512 673.48	99.5	
	Wetland	7	0	157	0	0	1431	1595	0.222	2 624 596.65	89.7	
	Total	3738	10101	4069	1362	2492	1506	23268		11 801 141.55		
Pij	Producer accuracy	95.88014981	94.42629443	91.98820349	98.09104258	99.19743178	95.01992032			overall accuracy	94.99742135	
2. error matrix in terms of an unbiased estimator of the proportion of area in the cell I,j of the error matrix												
	Class	Grassland (nij)	Woodland	Agriculture	Plantation	Settlements	Wetland	row total	user accuracy			
	Grassland (nij)	0.157332106	0.023617375	0.006892059	0	0	0.001097462	0.188939002	83.27137546	0.841314554	1.16E-06	1.15565E-08
	Woodland	0.005601975	0.363480506	0	0.000990825	0	0.001905434	0.371937786	97.71539801	0.97715398	3.16E-07	3.1649E-09
	Agriculture	0	0	0.157784912	0	0.000843093	0	0.158628005	99.46850917	0.994685092	3.54E-08	3.53608E-10
	Plantation	0	0.000268363	0	0.014341319	0	0	0.014650575	98.16311536	0.978754579	2.83E-09	2.82991E-11
	Settlements	0	0	0.000209868	0.	0.043232834	0	0.043442702	99.51690821	0.995169082	3.65E-09	3.65413E-11
	Wetland	0.000976058	0	0.021891595	0	0	0.199534215	0.222401929	89.71786834	0.897178683	2.86E-06	2.86254E-08
	Total (P.j)	0.163910139	0.387366244	0.186778434	0.015332145	0.044075928	0.222401868				4.38E-06	
An unbiased estimator of the	Aj (an unbiased	1934327	4571364	2204199	180937	520146	2390169		11801142	Overall accuracy	93.57058927	

total area of each class i.e. error adjusted estimator of areas because it includes the area of map omission error of category j and leaves out the area of map commission error

estimator of the area)
 Producer accuracy

95.98680529	93.83381008	84.47705045	93.53759398	98.08717967	98.51736048
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3. The estimated standard error of the estimated proportion. Standard error (SE) of error adjusted area estimate

Class	Grassland (nij)	Woodland	Agriculture	Plantation	Settlements	Wetland	
Grassland (nij)	1.15565E-06	9.07382E-07	2.91582E-07	0	0	4.79082E-08	
Woodland	2.1029E-07	3.1649E-07	0	3.76623E-08	0	7.2249E-08	
Agriculture	0	0	3.53608E-08	0	3.53608E-08	0	
Plantation	0	2.82991E-09	0	2.82991E-09	0	0	
Settlements	0	0	3.65413E-09	0	3.65413E-09	0	
Wetland	1.35586E-07	0	2.75376E-06	0	0	2.86253E-06	
S(P,j)	0.00122537	0.001107566	0.001756233	0.000201227	0.000197522	0.001727047	
S(Aj)	14460.76013	13070.53796	20725.55567	2374.706214	2330.985215	20381.12549	
An approximate 95%CI of unbiased area estimates	-	1 905 405.23	4 545 222.80	2 162 747.62	176 187.40	515 484.29	2 349406.86
	+	1 963248.27	4 597 504.96	2 245 649.85	185 686.22	524 808.23	2 430931.36

Appendix A2: 2018 Malawi adjusted confusion matrix

1. Error matrix (i.e. original confusion matrix). The traditional confusion matrix											
PREDICTED (PIXELS)		REFERENCE (pixels)									
Class	Grassland (nij)	Woodland	Agriculture	Plantation	Settlements	Wetland	total (ni)	wi (Ami/Atot)	map area (ha)	user acc	
Grassland (nij)	1481	165	0	0	2	0	1648	0.124	1457714	89.9	
Woodland	25	15646	0	0	0	0	15671	0.287	3392606	99.8	
Agriculture	0	24	2932	0	78	20	3054	0.254	3001662	96.0	
Plantation	0	0	0	2560	0	0	2560	0.016	188314	100.0	
Settlements	0	8	41	0	1833	0	1882	0.047	554107	97.4	
Wetland	0	0	0	64	0	3632	3696	0.272	3206737	98.3	
Pij	Total	1506	15843	2973	2624	1913	3652	28511		11801140,2	
Producer accuracy	98.33997344	98.75654863	98.62092163	97.56097561	95.81808677	99.45235487				overall accuracy	98.50233243
2. error matrix in terms of an unbiased estimator of the proportion of area in the cell i,j of the error matrix											
Class	Grassland (nij)	Woodland	Agriculture	Plantation	Settlements	Wetland	row total	user acc			
Grassland (nij)	0.111005901	0.012367302	0	0	0.000149907	0	0.12352311	89.86650485	0.898665049	8.4365E-07	8.43645E-09
Woodland	0.00045862	0.287022591	0	0	0	0	0.28748121	99.84046966	0.998404697	8.4004E-09	8.4004E-11
Agriculture	0	0.001998849	0.244192756	0	0.00649626	0.001665708	0.25435357	96.00523903	0.96005239	8.1271E-07	8.12708E-09
Plantation	0	0	0	0.015957273	0	0	0.01595727	100	1	0	0
Settlements	0	0.000199591	0.001022902	0	0.045731188	0	0.04695368	97.39638682	0.973963868	2.9721E-08	2.97214E-10
Wetland	0	0	0	0.004705301	0	0.267025852	0.27173115	98.26839827	0.982683983	3.4004E-07	3.40037E-09
col Total(P.j)	0.111464521	0.301588332	0.245215658	0.020662575	0.052377355	0.26869156	1			2.0345E-06	
An unbiased estimator of the	1315408	3559086	2893824	243842	618113	3170867	11801140			actual overall accuracy	97.09355611

total area of each class i.e. error adjusted estimator of areas because it includes the area of map omission error of category j and leaves out the area of map commission error

estimator of the area) Producer accuracy

99.58855091 95.17032329 99.58285631 77.22790394 87.31099164 99.38006696

3. The estimated standard error of the estimated proportion Standard error (SE) of error_adjusted area estimate

Class	Grassland (nij)	Woodland	Agriculture	Plantation	Settlements	Wetland	
Grassland (nij)	8.43645E-07	8.34668E-07	0	0	1.12292E-08	0	
Woodland	8.4004E-09	8.4004E-09	0	0	0	0	
Agriculture	0	1.65221E-07	8.12708E-07	0	5.27398E-07	1.37866E-07	
Plantation	0	0	0	0	0	0	
Settlements	0	4.96102E-09	2.49775E-08	0	2.97214E-08	0	
Wetland	0	0	0	3.40037E-07	0	3.40037E-07	
S(P.j)	0.000923063	0.001006603	0.000915252	0.000583127	0.000753889	0.000691305	
S(Aj)	10893.19908	11879.06382	10801.01343	6881.563558	8896.748502	8158.189387	
An approximate 95%CI of unbiased area estimates	-	1293622	3535328	2872222	230079	600319	3154550
	+	1337195	3582844	2915426	257605	635906	3187183