

Supplemental Table S3: Estimators of land use and cover with stratified random sampling for hexagons and centroids (categorical 0/1).

Hexagons		
Concept	Formula	Comments
Average proportion in the stratum	$\bar{y}_{gh} = \frac{1}{n_{gh}} \sum_{i \in gh} y_i$	n_{gh} is the sample size in stratum gh
Estimated proportion from stratified sample	$\bar{y}_{str} = \sum_{gh} \frac{N_{gh}}{N} \bar{y}_{gh}$	N_{gh} is the population size in stratum gh
Estimated area in the stratum	$\hat{A}_{gh} = D_{gh} \bar{y}_{gh}$	D_{gh} is the area of stratum gh
Overall estimated area	$\hat{A} = \sum_{gh} \hat{A}_{gh} = D \bar{y}_{str}$	
Overall estimated area (equivalent formula)	$\hat{A} = \sum w_i y_i$	Weight $w_i = \frac{D_{gh}}{n_{gh}}$, $i \in \text{stratum } gh$
Estimated variance of the proportion in stratum h	$V(\bar{y}_{gh}) = \frac{1}{n_{gh}(n_{gh} - 1)} \sum_{i=1}^{n_{gh}} (y_i - \bar{y})^2$	
Variance in stratum gh	$V(\hat{A}_{gh}) = D_{gh}^2 Var(\bar{y}_{gh})$	
Variance of the overall estimated area	$V(\hat{A}) = \sum_{gh} Var(\hat{A}_{gh})$	
Centroids		
Concept	Formula	Comments
Proportion of class c in the stratum	$\bar{z}_{gh} = p_{gh} = \frac{n_{cgh}}{n_{gh}}$	n_{cgh} is the number units of class c in stratum gh
Estimated proportion from stratified sample	$\bar{z}_{str} = \sum_{gh} \frac{N_{gh}}{N} p_{gh}$	
Estimated area in the stratum	$\hat{A}_{gh} = D_{gh} p_{gh}$	
Overall estimated area	$\hat{A} = \sum_{gh} \hat{A}_{gh} = D \bar{z}_{str}$	
Estimated variance of the proportion in stratum h	$V(p_{gh}) = \frac{p_{gh}(1 - p_{gh})}{n_{gh} - 1}$	
Variance in stratum gh	$V(\hat{A}_{gh}) = D_{gh}^2 Var(p_{gh})$	
Variance of the overall estimated area	$V(\hat{A}) = \sum_{gh} Var(\hat{A}_{gh})$	