Supplementary Material for

Increasing the thematic resolution for trees and built area in a global land cover dataset using class probabilities

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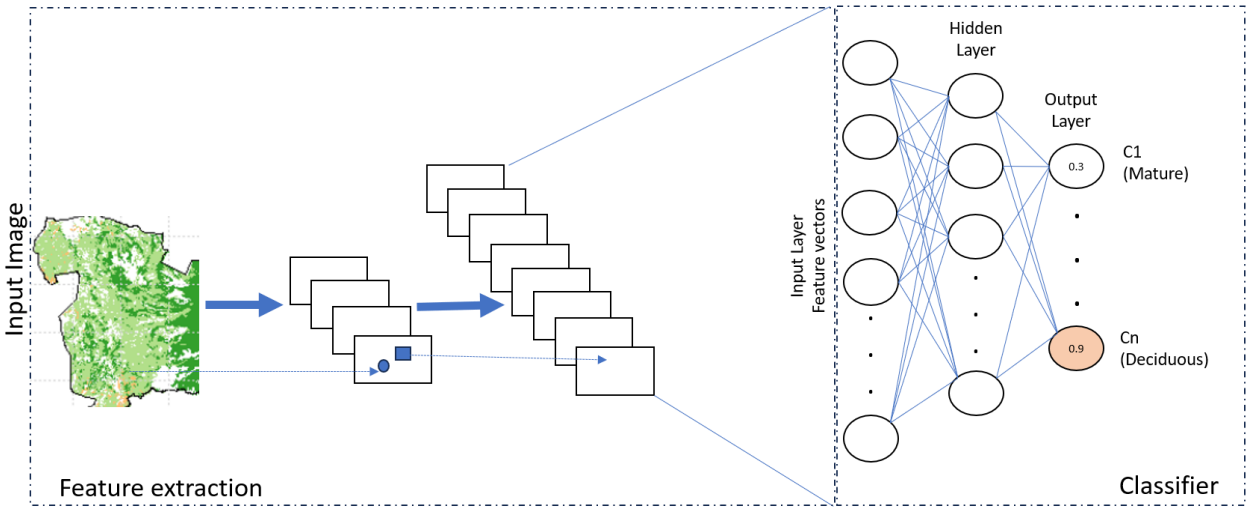


Figure S1. Convolutional neural networks (CNN) for land cover classification. A CNN-based pixel classification architecture includes two main components: feature extraction, which utilizes convolutional layers to extract features from the images, and the classifier, which categorizes these features into specific classes.

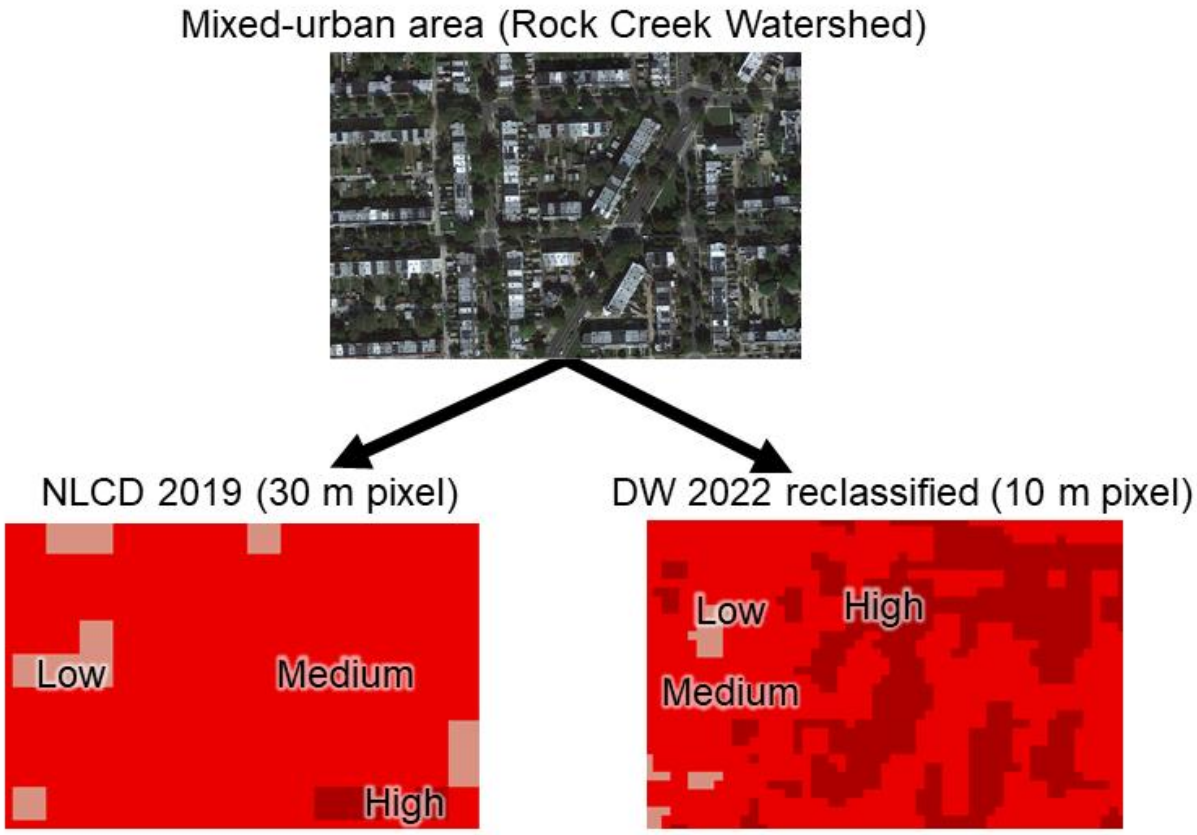


Figure S2. A mixed-intensity developed area in the Rock Creek Watershed, showing the classification with NLCD 2019 30 m pixels (right) vs. the classification with Dynamic World 2022 pixel class probability re-classification (10 m pixels), for low, medium, and high intensity developments, over Google satellite imagery (-77.0182335, 38.9522688).

Table S1. Accuracy matrix comparing reference (NLCD) forest classes with classified Dynamic World data using pixel class probabilities, including producer's, user's, and overall accuracies (OA; %), for South Fork Quantico Creek Watershed, after resampling all data to 30 m.

		Reference data (NLCD)				
		Deciduous	**Mixed**	**Evergreen**	**Total**	**User's Accuracy**
Dyn. World pixel prob's	**Deciduous**	17696	5253	232	23181	76.34
	Mixed	7356	7366	1025	15747	46.78
	Evergreen	307	1274	1210	2791	43.35
	Total	25359	13893	2467	41719	NA
	Prod's Acc.	69.78	53.02	49.05	NA	OA: 62.97

Table S2. Accuracy matrix comparing reference (NLCD) developed classes with classified Dynamic World data using pixel class probabilities, including producer's, user's, and overall accuracies (OA; %), for Rock Creek Watershed, after resampling all data to 30 m.

			Reference data (NLCD)				
		Open space	**Low**	**Medium**	**High**	**Total**	**User's Accuracy**
Dyn. World pixel prob's	**Open space**	20567	12335	3716	1084	37702	54.55
	Low	14933	27433	10635	4601	57602	47.63
	Medium	2613	13648	11592	5836	33689	34.41
	High	216	2357	5100	2034	9707	20.95
	Total	38329	55773	31043	13555	138700	NA
	Prod's Acc.	53.66	49.19	37.34	15.01	NA	OA: 44.43

Table S3. Confusion matrix comparing Dynamic World human-classified training data for the East image in Virginia, USA (dw_-77.1067353418_38.6996057874-20191001) with the Dynamic World 2019 dominant land cover composite.

		Reference (Dynamic World human-classified training data)										
		Water	**Trees**	**Grass**	**Flooded Veg**	**Crops**	**Shrub/ Scrub**	**Built**	**Bare**	**Snow/ Ice**	**Total**	**User's Acc.**
Dynamic World 2019 composite	**Water**	86844	1050	75	0	34	0	448	0	0	88451	98%
	Trees	634	76150	1114	0	279	34	14818	0	0	93029	82%
	Grass	4	84	2635	0	1426	245	146	0	0	4540	58%
	Flooded Veg	192	1	0	0	0	0	0	0	0	193	0%
	Crops	0	1	0	0	10	13	0	0	0	24	42%
	Shrub/Scrub	0	6	0	0	0	1	5	0	0	12	8%
	Built	197	3720	157	0	232	121	54403	136	0	58966	92%
	Bare	0	0	0	0	0	0	0	0	0	0	NA
	Snow/Ice	0	0	0	0	0	0	0	0	0	0	NA
	Total	87871	81012	3981	0	1981	414	69820	136	0	245215	NA
	Producer's Acc.	99%	94%	66%	NA	1%	0%	78%	0%	NA	NA	OA: 90%

Table S4. Confusion matrix comparing Dynamic World human-classified training data for the West image in Virginia, USA (dw_-77.3966281551_39.0206632388-20190524) with the Dynamic World 2019 dominant land cover composite.

		Reference (Dynamic World human-classified training data)										
		Water	**Trees**	**Grass**	**Flooded Veg**	**Crops**	**Shrub/ Scrub**	**Built**	**Bare**	**Snow/ Ice**	**Total**	**User's Acc.**
Dynamic World 2019 composite	**Water**	0	108	179	0	76	0	479	0	0	842	0%
	Trees	0	39524	481	0	387	0	1946	0	0	42338	93%
	Grass	0	633	3881	0	270	0	206	0	0	4990	78%
	Flooded Veg	0	0	0	0	0	0	0	0	0	0	NA
	Crops	0	11	11	0	57	0	12	0	0	91	63%
	Shrub/Scrub	0	6	0	0	100	0	6	0	0	112	0%
	Built	0	15750	922	0	513	0	144677	0	0	161862	89%
	Bare	0	0	0	0	0	0	42	0	0	42	0%
	Snow/Ice	0	0	0	0	0	0	0	0	0	0	NA
	Total	0	56032	5474	0	1403	0	147368	0	0	210277	NA
	Producer's Acc.	NA	71%	71%	NA	4%	NA	98%	NA	NA	NA	OA: 89%

Table S5. Confusion matrix comparing Dynamic World human-classified training data for the South image in Costa Rica dw_-85.4393520175_10.7676075124-20190305) with the Dynamic World 2019 dominant land cover composite.

		Reference (Dynamic World human-classified training data)										
		Water	**Trees**	**Grass**	**Flooded Veg**	**Crops**	**Shrub/ Scrub**	**Built**	**Bare**	**Snow/ Ice**	**Total**	**User's Acc.**
Dynamic World 2019 composite	**Water**	0	0	0	0	0	0	0	0	0	0	NA
	Trees	0	101312	0	0	0	57404	453	0	0	159169	64%
	Grass	0	311	0	0	0	10382	44	0	0	10737	0%
	Flooded Veg	0	0	0	0	0	0	0	0	0	0	NA
	Crops	0	9	0	0	0	269	16	0	0	294	0%
	Shrub/Scrub	0	4827	0	0	0	65934	3	0	0	70764	93%
	Built	0	360	0	0	0	2476	369	0	0	3205	12%
	Bare	0	0	0	0	0	0	0	0	0	0	NA
	Snow/Ice	0	0	0	0	0	0	0	0	0	0	NA
	Total	0	106819	0	0	0	136465	885	0	0	244169	NA
	Producer's Acc.	NA	95%	NA	NA	NA	48%	42%	NA	NA	NA	OA: 69%