Supplementary Online Material 4

Accuracy assessment analysis

This supplementary material presents the accuracy assessment protocol applied to the wetlands map in the study area.

Reference data

We generated the reference dataset for assessing the accuracy of the wetlands map using 438275 samples, which correspond to 40% of the total dataset. Table S1 presents the distribution of the validation dataset by wetland map class.

Table S1. Number of samples per reference data class used in the accuracy assessment analysis.

Wetland classes	Samples
Non-Wetland	86423
Tidal flat	6853
Salt marsh	4091
Mangrove	8003
Glacier	4904
Open water	82845
Lowland herbaceous floodplain	75597
Highland herbaceous floodplain	10041
Shrub floodplain	79021
Forest floodplain	80497

Accuracy Metrics

With the reference data, we estimated the following accuracy assessment metrics:

$$OA = \frac{TP}{(TP + TN + FP + FN)}$$

$$UACs = \frac{TP}{(TP + FP)}$$

$$PAc = \frac{TP}{(TP + FN)}$$

where OA = Overall Accuracy; UAc = User Accuracy; PAc = Producer Accuracy; TP = True Positive; TN = True Negative.

Accuracy assessment results

The overall accuracy of the wetland map was 82.2%. Table S2 presents the matrix error for the wetland map classification. The matrix compares the classified wetland classes with the reference data, and diagonal values represent correctly classified samples for each class.

Table S2. Error matrix for the wetland map class.

	No Wetland	Tidal Flat	Salt Marsh	Mangrove	Glacier	Open Water	Lowland Herbaceous Floodplain	Highland Herbaceous Floodplain	Shrub Floodplain	Forest Floodplain
Forest Floodplain	7469	20	22	236	0	155	4333	4	8650	58865
Shrub Floodplain	3807	19	51	67	0	201	11158	23	60727	9217
Highland Herbaceous Floodplain	341	0	0	0	4	110	5	9489	23	10
Lowland Herbaceous Floodplain	1979	102	174	45	0	1035	56206	38	6941	1269
Open Water	61	173	6	10	3	80477	603	51	196	149
Glacier	12	0	0	0	4870	8	0	14	0	0
Mangrove	27	95	82	7504	0	60	71	0	199	346
Salt Marsh	3	267	3299	21	0	17	112	0	29	9
Tidal Flat	9	6174	457	101	0	608	46	0	19	14
No Wetland	72715	3	0	19	27	174	3063	422	2237	10618

Accuracy was also calculated for each of the 146 grids used in the classification process (Figure S1). The grid with the lowest accuracy was NA-20-X, with 69%, while the grid NB-21-X reached the highest value, with 100%. The average accuracy across all grids was 83% (Table S3).

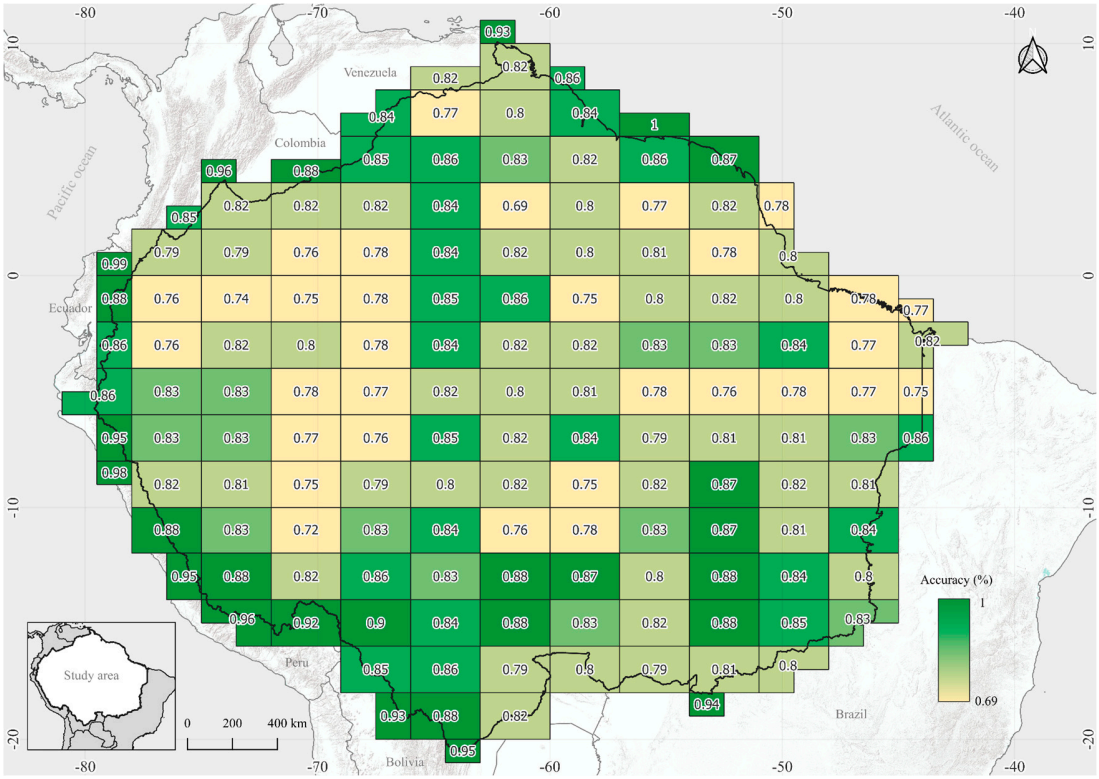


Figure S1. Accuracy calculated per maptile.

Table S3. Global accuracy descriptive statistics by validation grid.

Statistic	Value
Minimum	0.69
1st Quartile	0.79
Median	0.82
Mean	0.83
3rd Quartile	0.85
Maximum	1

Count grids	146

Other accuracy metrics calculated were Users' and Producers' accuracy, where they were estimated for each wetland map class (Table S4). Both accuracies were high for rare classes, such as Glacier and Tidal Flat, and for the Open Water class, likely due to its distinct and consistent spectral signature.

Table S4. User and producer's accuracy.

Class	Producer's accuracy	User's accuracy
No Wetland	84.1	81.4
Tidal Flat	90.1	83.1
Salt Marsh	80.6	87.8
Mangrove	93.8	89.5
Glacier	99.3	99.3
Open Water	97.1	98.5
Lowland Herbaceous Floodplain	74.3	82.9
Highland Herbaceous Floodplain	94.5	95.1
Shrub Floodplain	76.8	71.2
Forest Floodplain	73.1	73.8

The area-adjusted based on 'good practices' [1] accuracy is presented in Table S5,

Table S5. Area-adjusted based on the 'good' practices for accuracy assessment protocol [1].

Mapping and uncertainty				
Classes	**Area adjusted (Mha)**	**ci 95 (Mha)**	**Minimum (Mha)**	**Maximum (Mha)**
Tidal Flat	0.40	0.05	0.35	0.45
Salt Marsh	0.21	0.03	0.18	0.24
Mangrove	1.99	0.09	1.90	2.09
Glacier	0.28	0.05	0.23	0.34

Open Water	14.66	0.13	14.53	14.79
Lowland Herbaceous Floodplain	40.94	0.70	40.24	41.64
Highland Herbaceous Floodplain	3.18	0.29	2.89	3.47
Shrub Floodplain	57.90	0.97	56.93	58.87
Forest Floodplain	128.47	1.33	127.15	129.80
Total	**248.04**	**3.64**	**244.40**	**251.68**

Reference

[1] Olofsson, P.; Foody, G.M.; Herold, M.; Stehman, S. V.; Woodcock, C.E.; Wulder, M.A. Good Practices for Estimating Area and Assessing Accuracy of Land Change. *Remote Sens Environ* 2014, *148*, 42–57.