



ESTIMATION OF CARBON CONTENT AND CARBON DIOXIDES RELEASE IN PEATLANDS IN U MINH REGION, LOWER MEKONG DELTA, VIETNAM

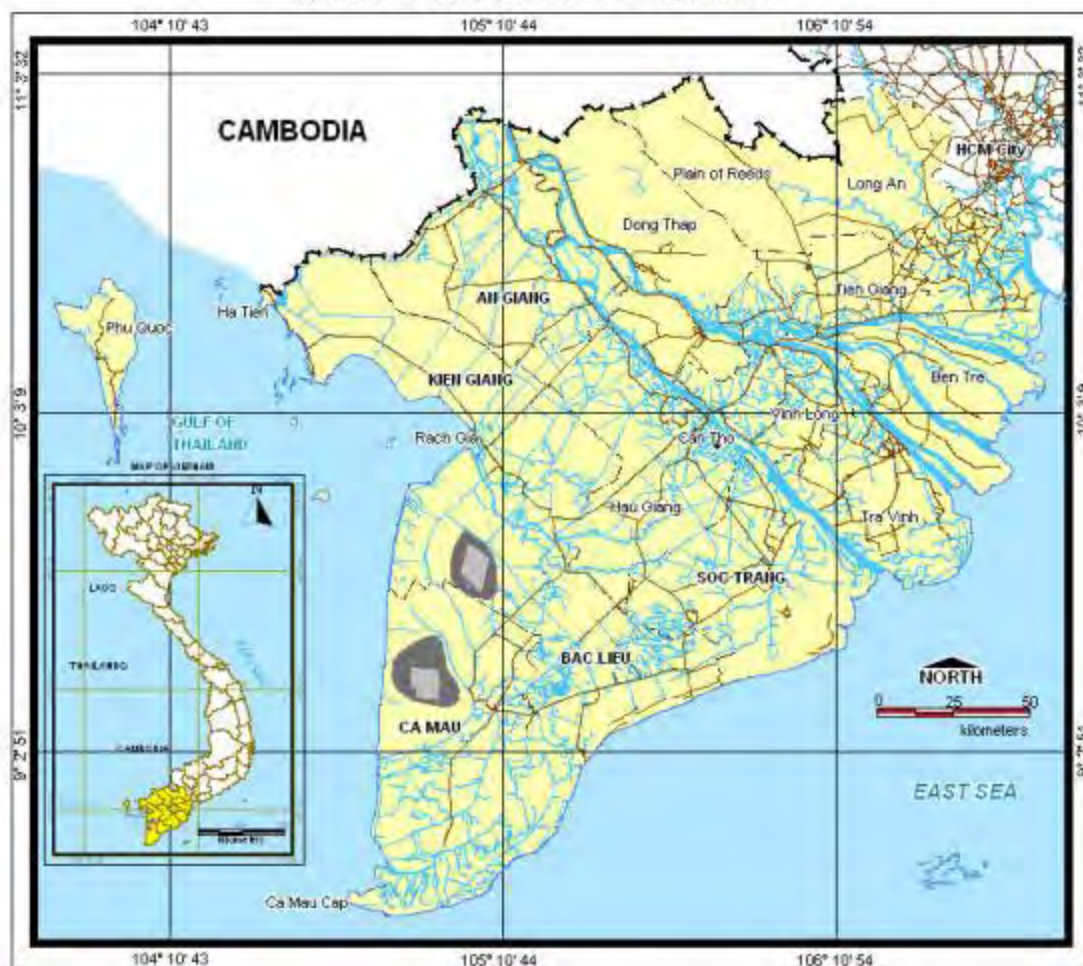
Le Phat Quoi
Institute of Environment and Natural Resources
Vietnam National University, HCM City

OUTLINE

- 1. Overview**
- 2. Methodology**
- 3. Results**
 - Distribution of peatlands**
 - Land cover in peatlands**
 - Estimate Carbon content and Carbon dioxides release**
- 4. Remarks**

1. Overview

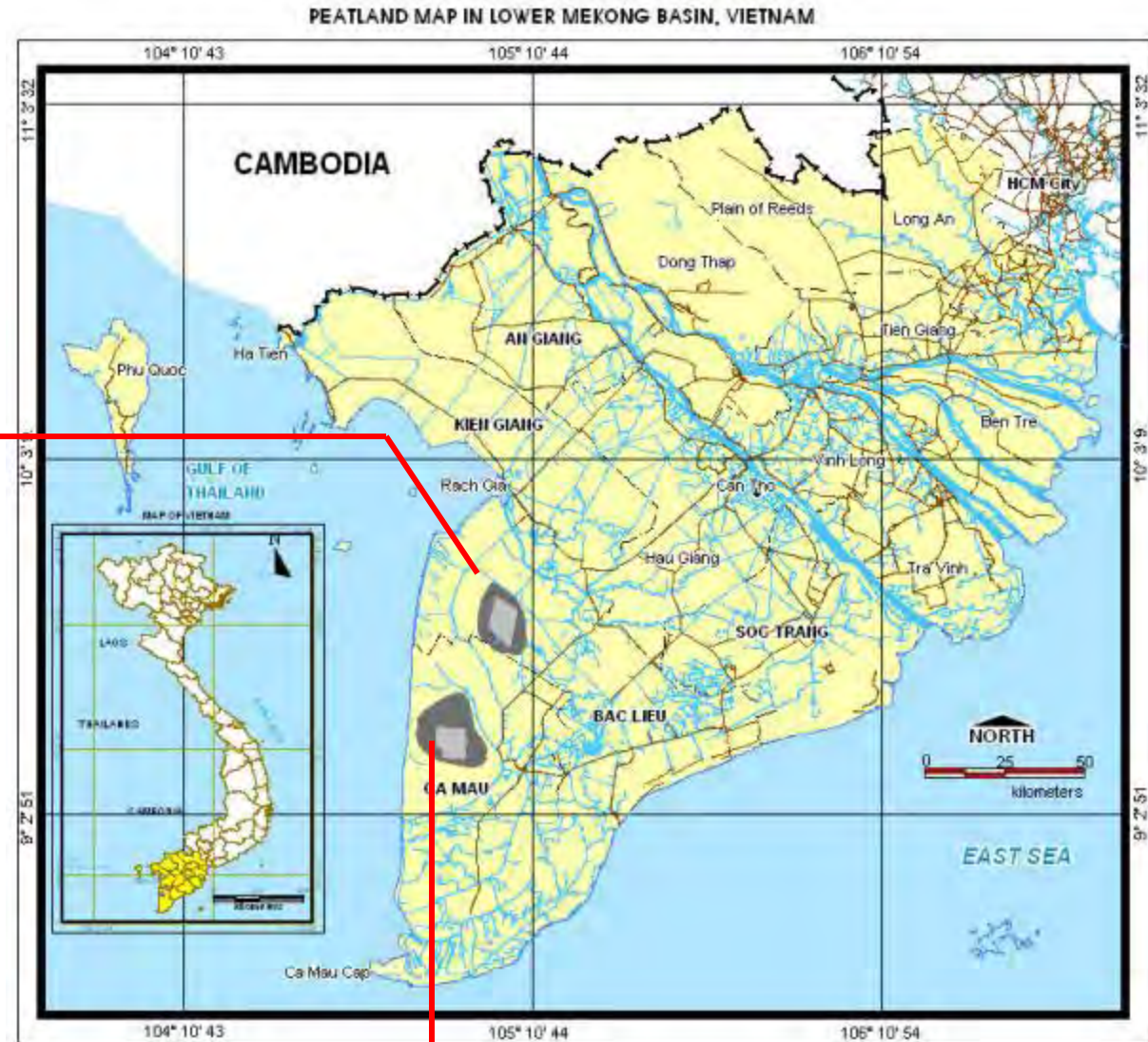
PEATLAND MAP IN LOWER MEKONG BASIN, VIETNAM



Peatland covers in UMH region:

- Total area: **43,000 ha**
 - U Minh Ha: **35,000 ha**
 - U Minh Thuong: **8,000 ha**
- Part of peatland area was established as nature reserves: **U Minh Ha and U Minh Thuong National Parks.**

1. Overview



Picture 2. Peatland in U Minh Ha (Vo Doi district, Ca Mau Province). A part of area of peatland is established as National Park.

1. Overview

Root cause of peatland loss:

- Conversion for agricultural production.
- Fire.
- Extraction for fertilizer processing.



1. Overview

U Minh Ha	35,654.2	9,853.41
U Minh Thuong	25,660.0	1,890,78
Total	61,314.20	11,744.19

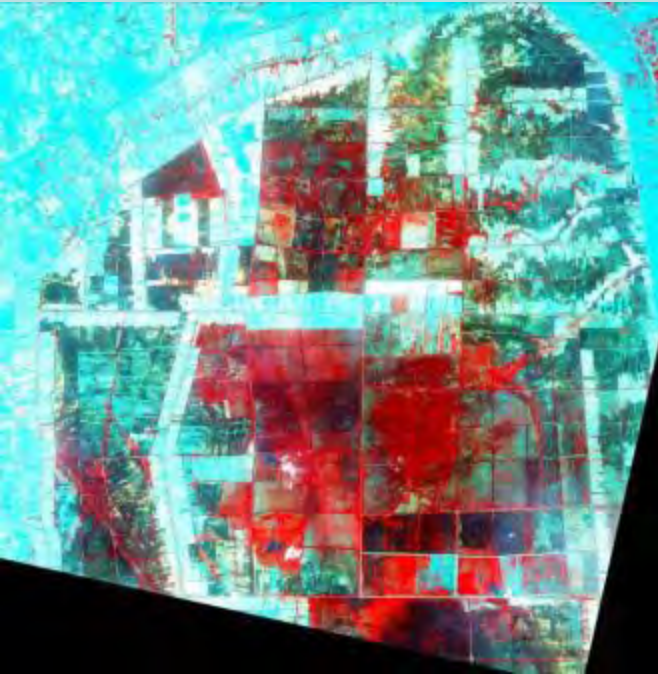
Loss of peatlands:

- **Loss of carbon**
- **Released Carbon Dioxides (CO₂) into the atmosphere**

The study is to inventory of peatlands in U Minh region, estimate carbon content and carbon dioxides release into atmosphere from decomposition and fire.

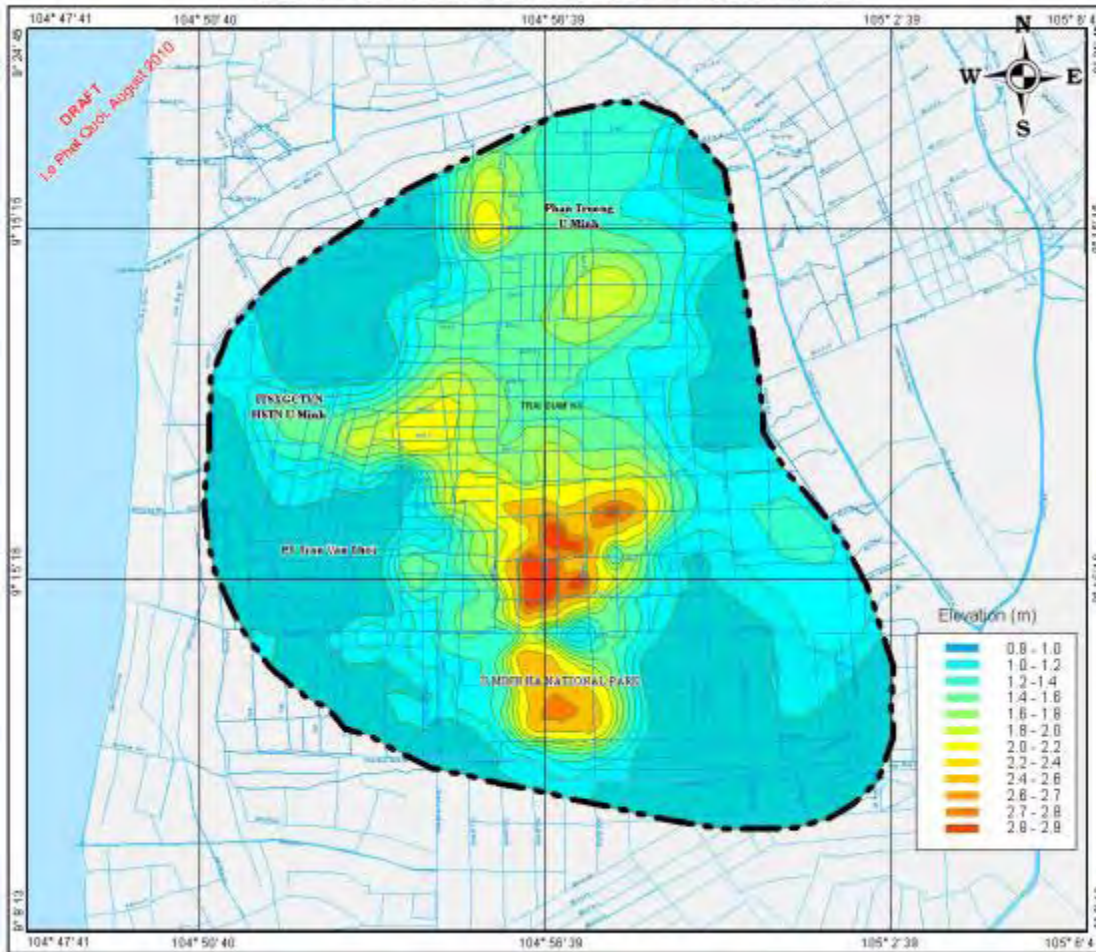
2. Methodology

1. Satellite interpretation: SPOT 5 (2008), Landsat TM7 (2009)
2. Ground truthing (2009, 2010)
3. Map overlaying and mapping
4. Measure and estimate Carbon dioxides released



Topographic map

TOPOGRAPHICAL MAP IN U MINH HA REGION, CA MAU DISTRICT, VIETNAM



- **Elevation: 0.8 – 2.9 m**
- **Large area of peatlands: 1.6 – 2.9 m**
- **Dome top: 2.6 - 2.9 m**

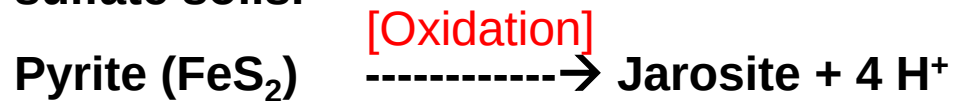
3. Results

- **Peat layer is in large variations:**

From 30 cm to more than 190 cm in depth

- **Mineral soil belows peat layer**

If exposing to the air, mineral soil with high Pyrite (FeS_2) that will be oxidized to form acid sulfate soils.

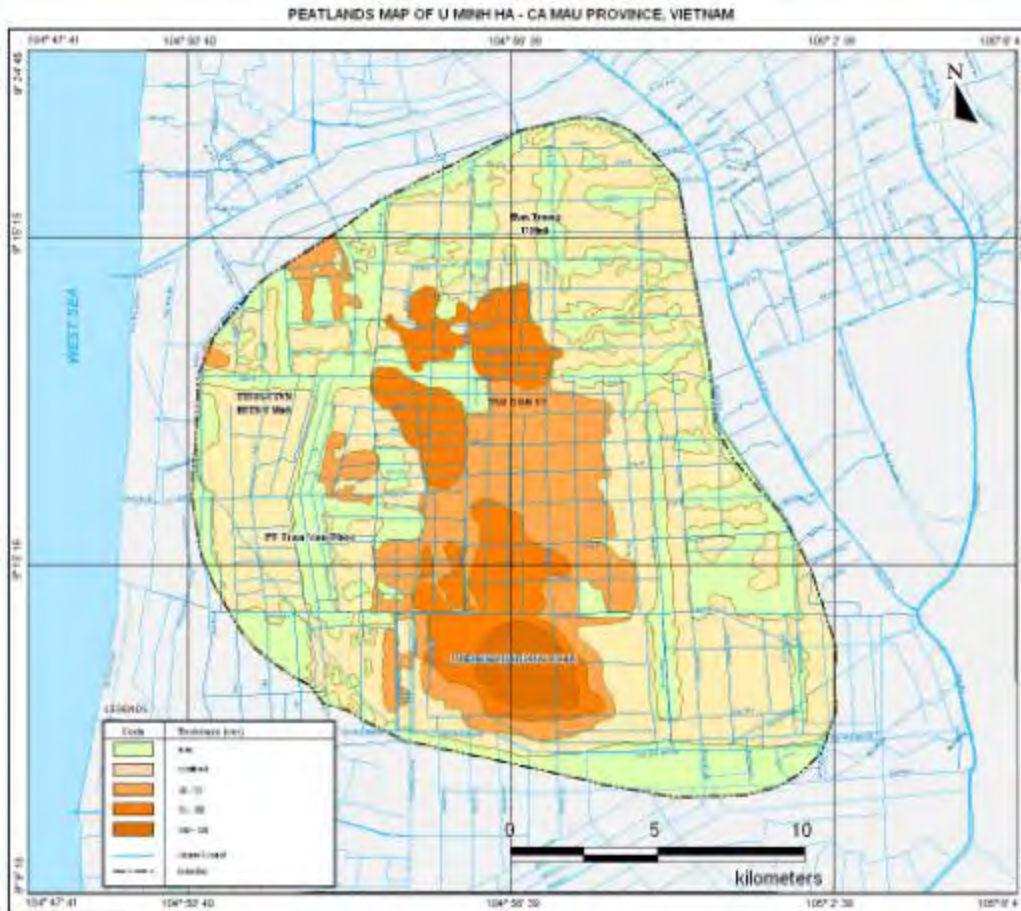


Jarosite minerals

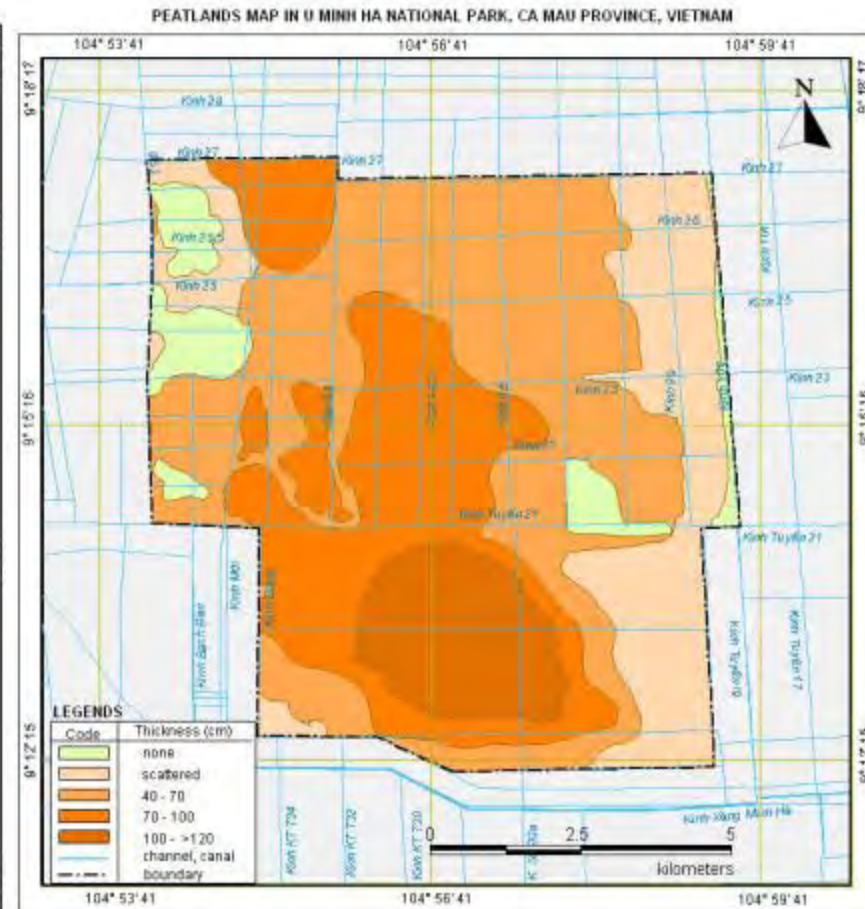


3. Results

Peatland map of U Minh Ha area



Peatlands in U Minh Ha area



Peatlands in U Minh National Park

3. Results

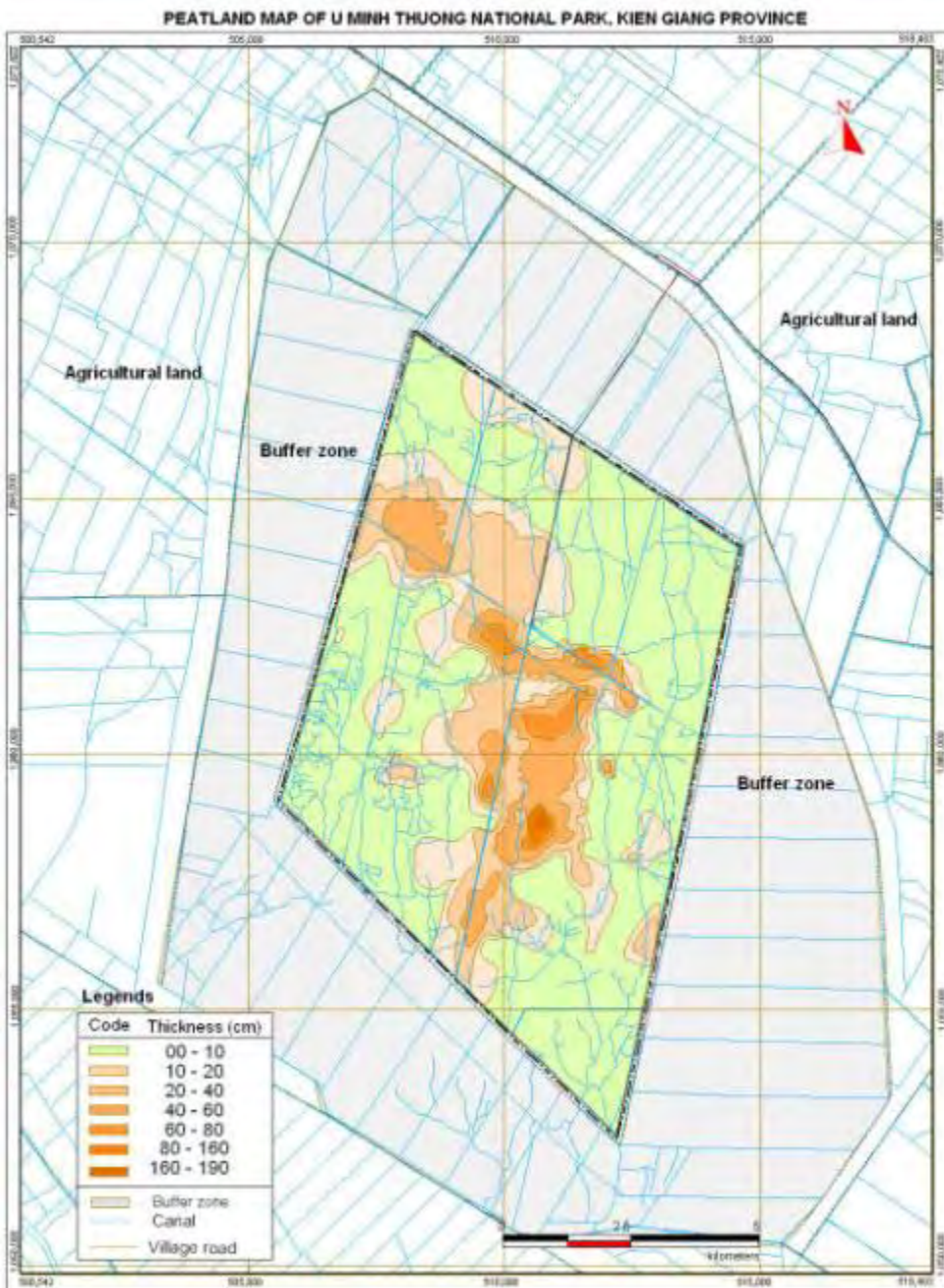
Peatlands in U Minh Ha region

Thickness (cm)	Peatlands in UMH region (ha)	Peatland in buffer zone (ha)	Peatland in UMHNP (ha)
100 - > 120	792.04	0	792.04
70 - 100	3,855.47	1,665.44	2,190.03
40 - 70	5,205.90	1,827.08	3,378.82
scattered	15,114.15	13,441.16	1,672.99
None	10,686.17	10,144.44	541.73
Total	35.653.73	27,078.12	8,575.61

Peatlands in U Minh Ha National Park

Thickness (cm)	Peatlands in UMH region (ha)	Peatland in buffer zone (ha)	Peatland in UMHNP (ha)
100 - > 120	792.04	0	792.04
70 - 100	3,855.47	1,665.44	2,190.03
40 - 70	5,205.90	1,827.08	3,378.82
Total	9,853.41	3,492.52	6,360.89

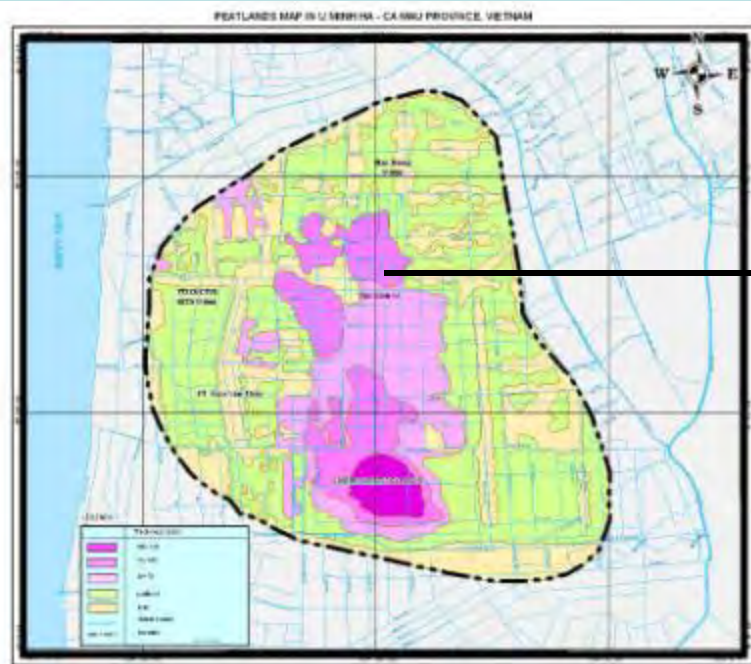
3. Results



Thickness (cm)	Area (ha)
0 - 10	4,878.32
10 - 20	1,340.55
20 - 40	1,104.80
40 - 60	651.77
60 - 80	112.15
80 - 160	15.92
160 - 190	6.14
Total	8,109.65

Thickness (cm)	Area (ha)
20 - 40	1,104.80
40 - 60	651.77
60 - 80	112.15
80 - 160	15.92
160 - 190	6.14
Total	1,890.78

3. Results



Peat on surface



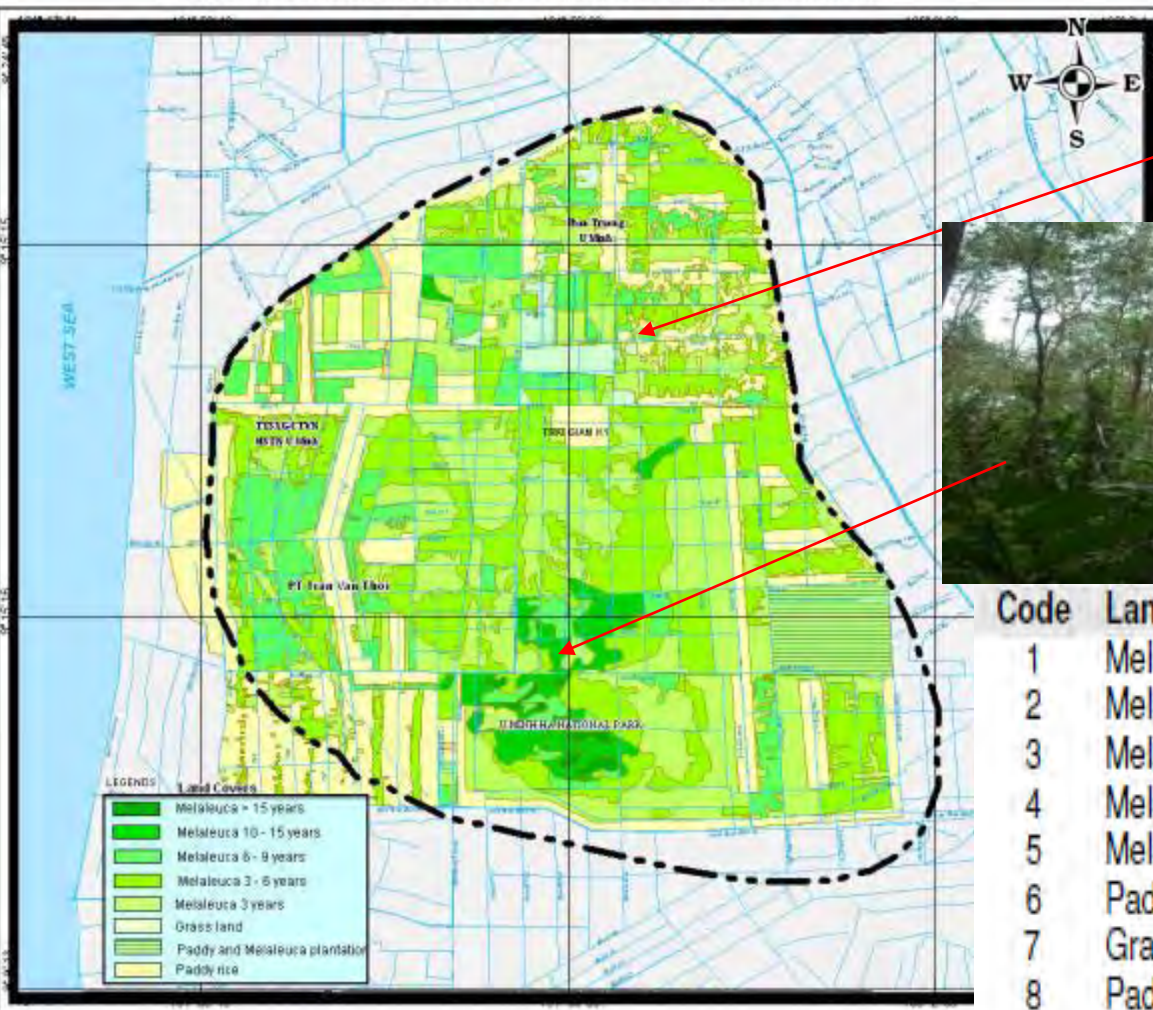
Crop cultivating on peatland



3. Results

Landcover of U Minh Ha area

LAND COVER MAP IN PEATLANDS AREA OF U MINH HA - CA MAU PROVINCE, VIETNAM



Code	Landcover Types	Area (ha)
1	Melaleuca 3 years old	9,831.26
2	Melaleuca 3 – 6 years old	8,909.01
3	Melaleuca 6 – 9 years old	4,151.31
4	Melaleuca 9 – 12 years old	1,152.02
5	Melaleuca > 12 years old	182.54
6	Paddy rice and forest plantation	1,024.95
7	Grass land	619.90
8	Paddy rice	9,227.35
9	House land	152.42
Total		35,250.76

3. Results

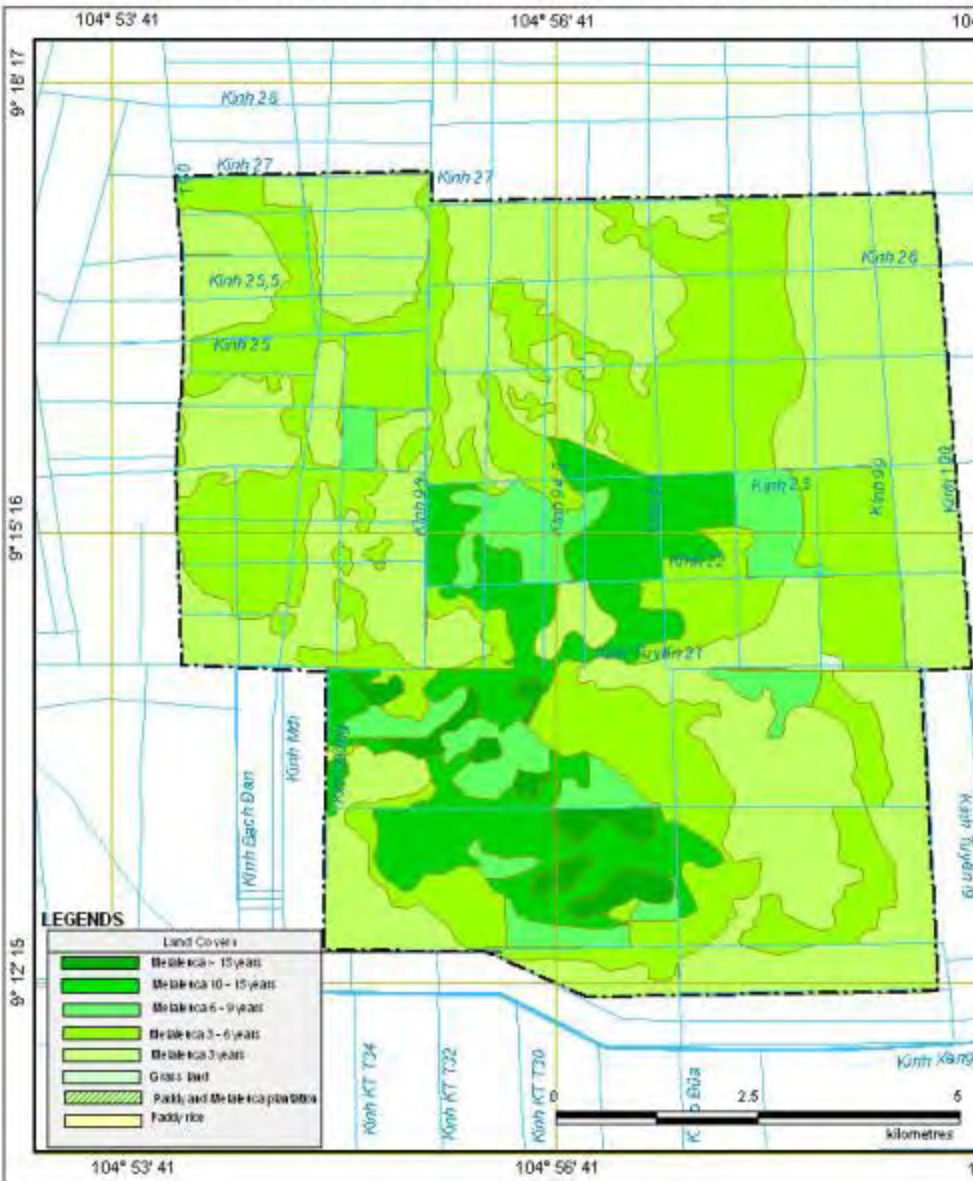


**Crop production
in peatland in buffer
zone**



3. Results

LANCOVER MAP IN U MINH HA NATIONAL PARK, CA MAU PROVINCE



Code	Landcover	Area (ha)
1	Melaleuca 3 years old	3,906.20
2	Melaleuca 3 - 6 years old	2,906.55
3	Melaleuca 6 - 9 years old	574.10
4	Melaleuca 9 - 12 years old	986.84
5	Melaleuca > 12 years old	178.14
6	Grass land	4.86
Total		8,556.69



3. Results

MAP OF VEGETATION IN U MINH THUONG NATIONAL PARK IN 2009

SCALE: 1:600,000



	Land cover	Area (ha)
I	Melaleuca forest in peatlands	1.385,93
1	Average Melaleuca	911,09
2	Dense Melaleuca	474,84
II	Mixed forest	3.060,46
3	Dense Melaleuca – Phragmitex sp.	1.357,14
4	Thin Melaleuca – Stenochloena palustris	168,81
5	Thin Melaleuca – Phragmitex sp. – Eleocharis sp.	1163,1
6	Thin Melaleuca - Pistia stratiotes	371,41
III	Aquatic vegetation	3.411,14
7	Typha domingensis	95,13
8	Pistia stratiotes	789,79
9	Pistia stratiotes – Typha domingensis - Melaleuca	2.131,85
10	Open water/ Haloragaceae - Nymphoides indicum	394,37
IV	Mixed wood trees - Phragmitex	137,45
V	Bare ground	0,47
	Total	7.995,45

3. Results

Carbon content in s in different peat layers of U Minh Thuong National Park

Depth	Bulk Density	Volume	Weight	C	Carbon content	tCO ₂ e
(m)	(Mg/m ³)	(m3)	(tons/ha)	(%)	(tons/ha)	(tons/ha)
0.10	0.19	1,000	190	51.60	98.04	359.81
0.20	0.20	2,000	400	52.00	208.00	763.36
0.30	0.20	3,000	600	52.83	317.00	1,163.39
0.40	0.20	4,000	810	53.20	430.92	1,581.48
0.50	0.20	5,000	1,020	53.44	545.09	2,000.47
0.60	0.21	6,000	1,240	53.48	663.19	2,433.92
0.70	0.21	7,000	1,470	53.64	788.55	2,893.98
0.80	0.21	8,000	1,670	53.68	896.37	3,289.69
0.90	0.21	9,000	1,880	53.73	1,010.19	3,707.39
1.00	0.21	10,000	2,110	53.79	1,134.97	4,165.34
1.20	0.21	12,000	2,542	53.79	1,367.27	5,017.87
1.60	0.21	16,000	3,387	53.82	1,822.59	6,688.91
1.80	0.21	18,000	3,822	53.69	2,051.75	7,529.94
1.90	0.21	19,000	4,058	53.63	2,176.05	7,986.12
	0.21			53.31		

3. Results

Carbon content in peatlands of U Minh Thuong National Park

Thickness	Area	C	Carbon Content	Carbon content	t CO2e	t CO2e
(cm)	(ha)	(%)	(tons/ha)	(tons/area)	(tons/ha)	(tons/area)
160 to 190	6.14	53.91	2,264.22	13,902.31	8,309.69	5,1021.48
80 to 160	15.92	53.78	1,443.22	22,976.13	5,296.63	84,322.38
60 to 80	112.15	54.25	804.60	90,235.67	2,952.87	331,164.90
40 to 60	651.77	53.46	548.86	357,729.04	2,014.31	1,312,865.56
20 to 40	1,104.80	53.02	320.11	353,655.59	1,174.80	1,297,916.03
10 to 20	1,340.55	-	-	-	-	-
0 to 10	4,878.32	-	-	-	-	-
Total	8,109.65	-	-	838,498.74	-	3,077,290.36

3. Results

Carbon content in s in different peat layers of U Minh Ha Region

Depth	Bulk Density	Volume	Weight	C (%)	Carbon content	tCO ₂ e
		(m3)	(tons/ha)		(tons/ha)	(tons/ha
0.10	0.20	1,000	200	53.40	106.80	391.96
0.20	0.21	2,000	410	53.80	220.58	809.53
0.30	0.20	3,000	600	54.03	324.20	1189.81
0.40	0.20	4,000	810	54.00	437.40	1605.26
0.50	0.21	5,000	1,030	53.96	555.79	2039.74
0.60	0.21	6,000	1,250	53.40	667.50	2449.73
0.70	0.21	7,000	1,460	53.54	781.73	2868.93
0.80	0.21	8,000	1,680	53.40	897.12	3292.43
0.90	0.21	9,000	1,910	53.50	1,021.85	3750.19
1.00	0.21	10,000	2,130	53.52	1,139.98	4183.71
1.20	0.21	12,000	2,553	53.51	1,365.94	5013.00
	0.21			53.64		

3. Results

Carbon content in peatlands of U Minh Ha Region

Thickness	Area)	C	Carbon content	Carbon content	t CO2e	t CO2e
(cm)	(ha	(%)	(tons/ha)	(tons/area	(tons/ha)	(tons/area)
100 - > 120	792.04	53.51	1353.80	1,072,266.13	4,968.46	39,35216.69
70 - 100	3,855.47	53.47	1084.46	4,181,112.63	3,979.98	15,344,683.36
40 - 70	5,205.90	53.63	685.19	3,567,018.16	2,514.64	13,090,956.64
scattered	1,5047.89	-	-	-	-	-
None	10,686.18	-	-	-	-	-
Total	35.654.20	-	-	8,820,396.92	-	32,370,856.69

3. Results

Monitored result in peatlands of U Minh region showed:

When the water table was around -30 cm from the peat surface during 4 months in dry season.

- **Overall amount of CO₂ released: 51.84 tons/ha/year**

A preliminary estimation shows a high amount of carbon dioxides will be released into the atmosphere in peatlands of U Minh region each year:

- **U Minh Ha: 510,800.77 tons/year**
- **U Minh Thuong: 98,018.04 tons/year**

4. Remarks

The result showed:

- **Area of peatlands in U Minh Region has been declined because of fires and human activities during several decades.**
- **A high of Carbon content stored in peatlands.**
- **A canal system for fire control built in the peatland area has been resulted in subsidence of peatland because of loss of water in dry season.**
- **Lowering the water level results in decomposition of peat materials and release high amount of carbon dioxides (CO₂) to the atmosphere.**

**THANKS
FOR ATTENTION**