Table S1. Estimates of carbon stocks for tropical landscapes. All values include carbon stored in aboveground and belowground living plant biomass (t C / ha)[1, 2]

Biomass Carbon of Tropical Land Cover Types (t C / ha)												
	Americas			Sub-Saharan Africa			Southeast Asia[2]			Pan-Tropical		
Crop Type	Humid	Seasonal	Dry	Humid	Seasonal	Dry	Humid	Seasonal	Dry	Humid	Seasonal	Dry
Forests	197	132	130	204	156	76	229	109	82	210	132	96
Disturbed Forests[3]	100	68	67	104	80	40	116	56	43	107	68	50
Shrubland / Savanna	64	43	42	67	51	24	75	35	26	69	43	31
Grassland	8	8	4	8	8	4	8	8	4	8	8	4
Degraded Land[4]	1	1	1	1	1	1	1	1	1	1	1	1
Annual Cropland[5]	6	7	7	4	3	5	5	5	5	5	5	5
Sugarcane[6]	11	14	15	5	9	14	13	13	14	10	12	14
Oil Palm[7]	71	79	72	17	23	45	88	77	77	58	60	65
Coconut[8]	95	93	93	68	41	29	67	66	74	77	66	65

1. Humid, seasonal and dry ecoregions were defined according to the FAO Global Ecoflorisitic zones. The dry ecoregions includes both dry tropical forests and shrublands. Mountain ecoregions were included as humid tropics in Southeast Asia and dry tropics in Africa and Latin America. All biomass carbon values estimated using IPCC Tier-1 methods (Eggelston *et al* 2006, Gibbs *et al* 2007). Estimates include litter and dead wood carbon stocks for forests (Eggelston *et al* 2006).
2. Used insular Southeast Asia value for humid forests and continental Southeast Asia values for seasonal and dry forests based on patterns of forest distribution.
3. Forest carbon values were reduced by 50% to estimate disturbed forest biomass (i.e. affected by shifting cultivation, logging, fragmentation, fire etc.)
4. Assumed that degraded lands have very little living biomass.
5. To estimate biomass for annual crops, we assigned 5 t C / ha to the mean tropical yield for annual crops and then scaled according to regional yields. Ratios of average pan-tropical yield / regional yields (0.85, 0.73, 0.76 for Americas, 1.41, 1.45, 1.11 for Africa, and 1.01, 0.99, 1.10 for Asia).

6. Assumed sugarcane stored 14 t C / ha in seasonal Americas. Scaled across the tropics using ratios of Africa and Southeast Asia / seasonal Americas yield data (0.82 and 1.07 for humid and dry Americas and 0.33, 0.67 and 0.97 for humid, seasonal and dry Africa, and 0.95, 0.93, and 0.98 for humid, seasonal and dry Southeast Asia, respectively

7. Oil palm value based on average IPCC GPG (Eggelston *et al* 2006) value for humid Southeast Asia, we used 0.47 for C fraction and then added in root biomass according to IPCC. Scaled across tropics using ratios of Africa and Americas / humid Southeast Asia yield data (0.81, 0.91, 0.82 for humid, seasonal and dry Americas and 0.19, 0.26 and 0.51 for humid, seasonal and dry Africa, and 0.87 and 0.88 for seasonal and dry Southeast Asia, respectively).

8. Coconut value based on best guess for humid Southeast Asia, we used 0.47 for C fraction and then added in root biomass according to IPCC (Eggelston *et al* 2006). Scaled using ratios of Africa and Americas / humid Southeast Asia yield data (1.41, 1.37, 1.38 for humid, seasonal and dry Americas and 1.0, 0.61 and 0.44 for humid, seasonal and dry Africa, and 0.98 and 1.10 for seasonal and dry Southeast Asia, respectively).

Table S2. Estimates of organic soil carbon stocks for tropical landscapes. Values down to 1m depth (t C / ha)[1,2]

Organic soil carbon stocks for tropical land sources (t C / ha)												
	Americas			Sub-Saharan Africa			Southeast Asia			Pan-tropical		
Crop Type	Humid	Seasonal	Dry	Humid	Seasonal	Dry	Humid	Seasonal	Dry	Humid	Seasonal	Dry
Forest / Disturbed Forest	77	76	67	77	67	60	62	73	73	72	72	67
Shrubland /Savanna / Grassland	45	45	45	41	41	41	80	80	80	55	59	59

1. Average soil carbon stock estimates for each FAO ecoregions and continent derived from Batjes (2006). Values over 500 t C / ha were excluded from Southeast Asia to estimate non-peat carbon stocks.
2. Conversion of natural ecosystems to cropland emits 25% of soil carbon while conversion to plantations emits 10% (Murty *et al* 2002, Guo and Gifford 2002, Houghton and Goodale 2004). Peat soils, not included in the table, are assumed to emit ~1600 t C / ha over 120 year period (Hooijer *et al* 2006, Page *et al* 2002).

Table S3. Conversion factors used to convert estimates of crop yields into potential volume of biodiesel or ethanol.[1]

Biofuels Conversion Factors	
Biodiesel Crops	**liters/ton**
Oil Palm	223
Soybean	183
Coconut	130
Groundnut	309
Castor	393
Ethanol Crops	**liters/ton**
Corn	410
Sugarcane	81
Wheat	389
Cassava	180
Rice	430

[1] Biodiesel crop yields were first converted to oils using the average oil content of the different oilseed crops, and then converted to liters by dividing by the crop oil densities. Volumes of raw vegetable oils were reduced by a processing ratio of 0.96 to account for losses in converting to food-grade vegetable oil and then by a biodiesel refining ratio of 0.98 to account for the conversion efficiency of processed vegetable oil to refined biodiesel (NREL 2004). The processing of ethanol, which can come from grains, sugars and starches, is more crop specific than biodiesel. As such, pre-calculated conversion factors (in liters/tons) were compiled from a variety of sources (e.g., Shapouri and Salassi 2004, Nigam and Agrawal 2004).

Table S4. Mean potential biofuel yields across the tropics and world circa 2000 (L / ha)[1]

Biofuel Crop Yields (Liters / ha)													
	America			Africa			Asia			Pan-Tropical			Global
Crop Type	Humid	Seasonal	Dry	Humid	Seasonal	Dry	Humid	Seasonal	Dry	Humid	Seasonal	Dry	90th %
Maize	836	1,167	865	469	500	563	936	930	750	770	912	707	3,729
Sugarcane	4,531	5,529	5,892	1,846	3,683	5,372	5,240	5,138	5,408	4,644	5,390	5,510	7,752
Wheat	616	762	807	674	638	662	676	894	1,042	657	869	1,015	1,913
Rice	1,345	1,293	2,026	654	727	740	1,535	1,370	1,261	1,461	1,329	1,257	2,819
Cassava	2,285	2,223	1,835	1,698	1,437	1,379	2,445	1,972	3,066	1,930	1,651	2,016	2,965
Oil Palm	3,249	3,643	3,310	757	1,062	2,044	4,013	3,511	3,530	2,882	1,690	3,225	4,507
Castor	398	416	202	116	126	237	195	180	401	232	245	367	699
Soybean	490	448	425	149	141	241	221	252	178	369	432	221	554
Coconut	864	839	846	613	370	267	611	598	669	620	602	622	746
Groundnut	366	516	461	263	281	248	501	420	313	394	319	287	962

[1]Area weighted mean crop yields derived from Monfreda *et al* (2008) across different tropical regions and converted to potential ethanol and biodiesel yields using conversion factors in Table S3. We calculated the area-weighted 90th percentile yields for each crop by first sorting all of the global cropland data according to yield and then aggregating the area cultivated until the top 10th percent was reached – this was done to ensure small agricultural plots with lower than normal yields would not skew the results.

Table S5a: Ecosystem Carbon Payback Time (in years) for biofuels produced from different tropical land sources in tropical Latin America. Note that this table provides more detailed information for each ecoregion and continent combination, rather than averaged across all continents as depicted in Figure 3.

Latin America - Humid Tropics

Crop Type	Forests	Dist. Forests	Woody Sav.	Grassland	Degraded	Annual Crops
Maize	549	300	188	41	0	0
Sugarcane	100	54	33	6	0	0
Wheat	746	408	255	56	0	0
Rice	342	187	117	26	0	0
Cassava	201	110	69	15	0	0
Palm	77	33	15	0	0	0
Castor	794	434	271	60	0	0
Soybean	645	353	220	48	0	0
Coconut	269	103	36	0	0	0
Groundnut	864	473	295	65	0	0

Immediate
1-10 Years
11-25 Years
26-50 Years
51-100 Years
101-200 Years
201-300 Years
> 301 Years

Latin America - Seasonal Tropics

Crop Type	Forests	Dist. Forests	Woody Sav.	Grassland	Degraded	Annual Crops
Maize	272	154	93	29	0	0
Sugarcane	56	31	18	5	0	0
Wheat	416	235	143	44	0	0
Rice	245	139	84	26	0	0
Cassava	143	81	49	15	0	0
Palm	41	14	3	0	0	0
Castor	526	297	181	55	0	0
Soybean	488	276	168	51	0	0
Coconut	164	51	2	0	0	0
Groundnut	423	239	146	44	0	0

Immediate
1-10 Years
11-25 Years
26-50 Years
51-100 Years
101-200 Years
201-300 Years
> 301 Years

Latin America - Dry

Crop Type	Forests	Dist. Forests	Woody Sav.	Grassland	Degraded	Annual Crops
Maize	357	200	125	30	0	0
Sugarcane	51	28	17	3	0	0
Wheat	383	214	134	32	0	0
Rice	152	85	53	13	0	0
Cassava	168	94	59	14	0	0
Palm	45	17	5	0	0	0
Castor	1051	588	368	89	0	0
Soybean	500	280	175	42	0	0
Coconut	158	47	0	0	0	0
Groundnut	461	258	161	39	0	0

Immediate
1-10 Years
11-25 Years
26-50 Years
51-100 Years
101-200 Years
201-300 Years
> 301 Years

Table S5b: Ecosystem Carbon Payback Time (in years) for biofuels produced from different land sources in tropical Africa. Note that this table provides more detailed information for each ecoregion and continent combination, rather than averaged across all continents as depicted in Figure 3.

Africa - Humid Tropics

Crop Type	Forests	Dist. Forests	Woody Sav.	Grassland	Degraded	Annual Crops
Maize	1016	557	345	74	0	0
Sugarcane	258	141	87	18	0	0
Wheat	708	388	241	51	0	0
Rice	730	400	248	53	0	0
Cassava	281	154	95	20	0	0
Palm	399	202	123	7	0	0
Castor	2833	1552	962	205	0	0
Soybean	2200	1205	747	159	0	0
Coconut	430	188	90	0	0	0
Groundnut	1250	684	424	90	0	0

Immediate
1-10 Years
11-25 Years
26-50 Years
51-100 Years
101-200 Years
201-300 Years
> 301 Years

Africa - Seasonal Tropics

Crop Type	Forests	Disturbed For	Woody Sav.	Grassland	Degraded	Annual Crops
Maize	736	408	255	69	0	0
Sugarcane	98	54	33	8	0	0
Wheat	577	320	200	54	0	0
Rice	506	281	176	48	0	0
Cassava	256	142	89	24	0	0
Palm	211	105	60	0	0	0
Castor	2019	1120	700	190	0	0
Soybean	1799	998	623	169	0	0
Coconut	570	265	138	0	0	0
Groundnut	902	500	313	85	0	0

Immediate
1-10 Years
11-25 Years
26-50 Years
51-100 Years
101-200 Years
201-300 Years
> 301 Years

Africa - Dry Tropics

Crop Type	Forests	Dist. Forests	Woody Sav.	Grassland	Degraded	Annual Crops
Maize	338	200	122	46	0	0
Sugarcane	35	21	13	5	0	0
Wheat	288	170	104	39	0	0
Rice	257	152	93	35	0	0
Cassava	138	82	50	19	0	0
Palm	40	14	1	-13	0	0
Castor	553	328	200	75	0	0
Soybean	543	322	197	74	0	0
Coconut	307	106	9	-102	0	0
Groundnut	529	313	191	72	0	0

Immediate
1-10 Years
11-25 Years
26-50 Years
51-100 Years
101-200 Years
201-300 Years
> 301 Years

Table S5c: Ecosystem Carbon Payback Time (in years) for biofuels produced from different land sources in tropical Southeast Asia. Note that this table provides more detailed information for each ecoregion and continent combination, rather than averaged across all continents as depicted in Figure 3.

Southeast Asia - Humid Tropics

Crop Type	Peat Forests	Forests	Dist. Forests	Woody Sav.	Grassland	Degraded	Annual Crops
Maize	4210	557	298	213	58	0	0
Sugarcane	750	98	51	36	9	0	0
Wheat	5831	771	412	296	80	0	0
Rice	2568	340	181	130	35	0	0
Cassava	1612	213	114	82	22	0	0
Palm	661	71	29	15	0	0	0
Castor	13947	1845	986	707	192	0	0
Soybean	12305	1628	870	624	169	0	0
Coconut	4365	489	216	120	0	0	0
Groundnut	5418	717	383	275	75	0	0

Immediate
1-10 Years
11-25 Years
26-50 Years
51-100 Years
101-200 Years
201-300 Years
> 301 Years

Southeast Asia - Seasonal Tropics

Crop Type	Forests	Dist. Forests	Woody Sav.	Grassland	Degraded	Annual Crops
Maize	288.7	166.9	121.8	58.2	0	0
Sugarcane	50.6	28.6	20.4	8.9	0	0
Wheat	300.3	173.6	126.7	60.5	0	0
Rice	196.0	113.3	82.7	39.5	0	0
Cassava	136.2	78.7	57.4	27.4	0	0
Palm	32.9	10.7	2.0	0.0	0	0
Castor	1030.0	595.6	434.6	207.6	0	0
Soybean	734.5	424.7	309.9	148.0	0	0
Coconut	206.5	76.0	25.1	0.0	0	0
Groundnut	440.4	254.7	185.8	88.8	0	0

Immediate
1-10 Years
11-25 Years
26-50 Years
51-100 Years
101-200 Years
201-300 Years
> 301 Years

Southeast Asia - Dry Tropics

Crop Type	Forests	Dist. Forests	Woody Sav.	Grassland	Degraded	Annual Crops
Maize	280.8	168.6	125.8	62.8	0	0
Sugarcane	37.2	21.6	15.6	6.9	0	0
Wheat	202.2	121.4	90.6	45.2	0	0
Rice	167.1	100.3	74.8	37.3	0	0
Cassava	68.7	41.3	30.8	15.4	0	0
Palm	21.2	4.8	-1.9	0.0	0	0
Castor	361.9	217.3	162.1	80.9	0	0
Soybean	816.2	490.2	365.6	182.4	0	0
Coconut	115.6	29.0	-6.4	0.0	0	0
Groundnut	464.0	278.7	207.9	103.7	0	0

Immediate
1-10 Years
11-25 Years
26-50 Years
51-100 Years
101-200 Years
201-300 Years
> 301 Years