

## **Marginal Cost Curves for Carbon Sequestration in Forests: Estimates for Boreal, Temperate, and Tropical Regions of the World.**

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This short piece provides estimates of the marginal costs of forest carbon sequestration in all regions of the world. The regions are highly aggregated to the level of countries and in many cases continents. They are the first globally comprehensive estimates of the marginal costs of carbon sequestration through forestry actions over a 100 year period for the world. This paper very briefly provides information on the methods used to estimate the marginal costs, and it provides the data in appendices.

The marginal cost curves have been developed with the global forestry and land use model described in Sohngen et al. (1999); Sohngen and Mendelsohn (2003); Sohngen and Sedjo (2005); and Sohngen and Mendelsohn (2005). The methods for accounting for carbon sequestration with the model are described in Sohngen and Sedjo (2000). The model solves optimal harvest ages, optimal timberland management intensity, and the optimal area of land to maintain in forests in response to demand for industrial wood products. Cost functions for timberland management, timber harvesting and access, plantation establishment, and forestland rental are included in the model and vary by timber type and management intensity. The model solves for a 200 year time period in decadal time steps.

This paper describes how marginal cost curves are developed from data generated with scenario analysis of alternative carbon prices. Marginal cost curves are presented for 13 regions of the globe. To develop the marginal cost curves, baseline carbon storage in each region and globally is first calculated assuming that there is no climate change and there are no incentives to store carbon in forests. Baseline total above ground carbon storage by region is shown in Figure 1 for the period 2005 – 2105. Aboveground carbon is the most active of the carbon pools when carbon sequestration is considered, so only aboveground storage is shown. All calculations below, however, do account for above- and below-ground pools, as well as storage in markets.

To estimate marginal cost curves, a series of experiments are conducted where constant carbon prices are assumed over the period 2005 – 2205. These constant carbon prices are used to provide incentives in the model to sequester carbon. The optimal sequestration pathways, assuming these carbon prices, are then projected with the model. Carbon prices ranging from \$5 per t C to \$800 per t C are used for the analysis. All prices and costs are denominated in 2000 USD. The initial decade for the model is the period 2005 – 2015. Carbon sequestration in the model occurs as a result of several types of responses within the model. These responses include changes in land use (i.e.,

afforestation and reduced deforestation), changes in forest management (i.e. changing the rotation age, or changing management intensity), and changes in timber product harvests (i.e. changing market storage). All of these actions are chosen optimally.

To determine marginal costs, cumulative carbon gains at the end of each decade are first estimated. Cumulative carbon gains are the difference in stocks between the baseline and the scenarios where carbon prices are introduced, i.e.,

$$(1) CG_t = S_t^B - S_t^S$$

where  $CG_t$  is the cumulative carbon gain in period  $t$ , and  $S_t^B$  is the baseline stock in period  $t$ , and  $S_t^S$  is the carbon stock under scenario "S" in period  $t$ . The scenarios allow for carbon prices to stimulate additional sequestration in each period. Annual net sequestration ( $ANS_t$ ) is then measured as:

$$(2) ANS_t = (CG_t - CG_{t-1})/10$$

$ANS_t$  is divided by 10 because the model is solved in decadal time periods. With Annual net sequestration estimated over a 100 year period, it is then possible to determine the present value of carbon sequestered, and the annual equivalent amount of carbon sequestered. Present value carbon (PVC) is:

$$(3) PVC = \sum_{2005}^{2015} ANS_t (1+r)^{-t}$$

Annual equivalent carbon is therefore:

$$(4) AEA = \frac{PVC}{\left[ \frac{1}{r} - \frac{1}{r(1+r)^t} \right]}$$

The annual equivalent carbon is the annual amount of carbon, whose present value (at discount rate  $r$ ) equals the present value calculated. When the interest rate is 5%, as in this analysis, and the compounding period is 100 years, the denominator in the equation (4) above is 0.0504. Annual equivalent carbon for each region is then plotted against the carbon price. For this analysis, we assume that carbon prices are the same for each region of the world, that each region is subject to the same global policy.

The data used for the estimation of the marginal costs is shown in the appendix. The data in tables A1 – A9 show cumulative carbon sequestered by the time given. Table A10 shows the present value carbon sequestered (Equation 3) and Table A11 shows the annual equivalent carbon sequestered (equation 4) for the period 2005 – 2105.

Figure 2 shows the marginal cost curve for carbon sequestration for the world, and for two components of world sequestration, temperate/boreal regions and tropical regions.

The regional sequestration curves are developed by summing total sequestration for the countries or continents in the specific regions. Figure 3 then shows the specific components of temperate/boreal sequestration, i.e. the countries included in that general region and their individual marginal cost curves. Figure 4 shows the specific components of tropical sequestration. Note that additional detail on sequestration at lower levels of aggregation within each of the regions could be shown upon request.

## REFERENCES

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Figure 1: Total aboveground carbon storage in forests.

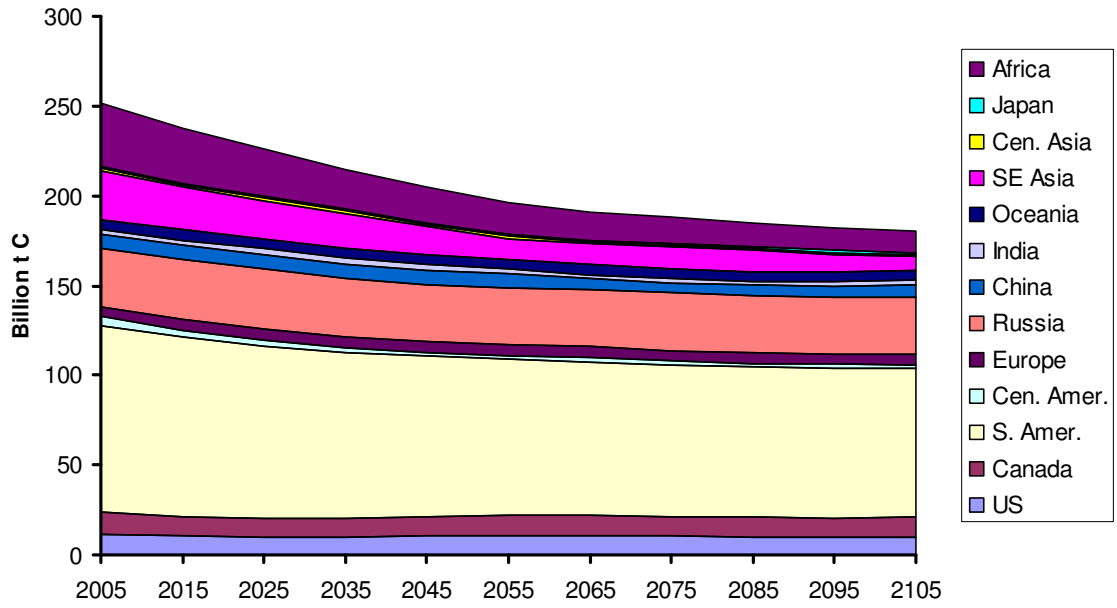


Figure 2: Marginal Cost of Carbon Sequestration for the globe, for the temperate/boreal regions, and for the tropics.

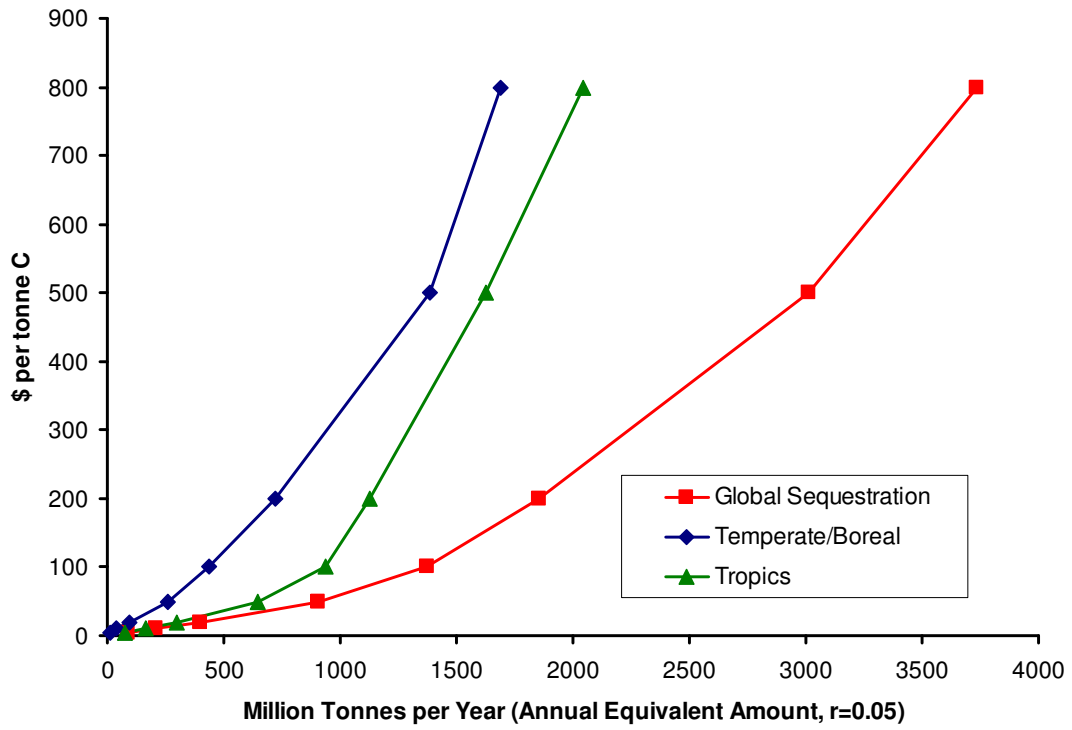


Figure 3: Marginal cost of carbon sequestration for specific temperate/boreal regions of the world (Plot of data from Table A11).

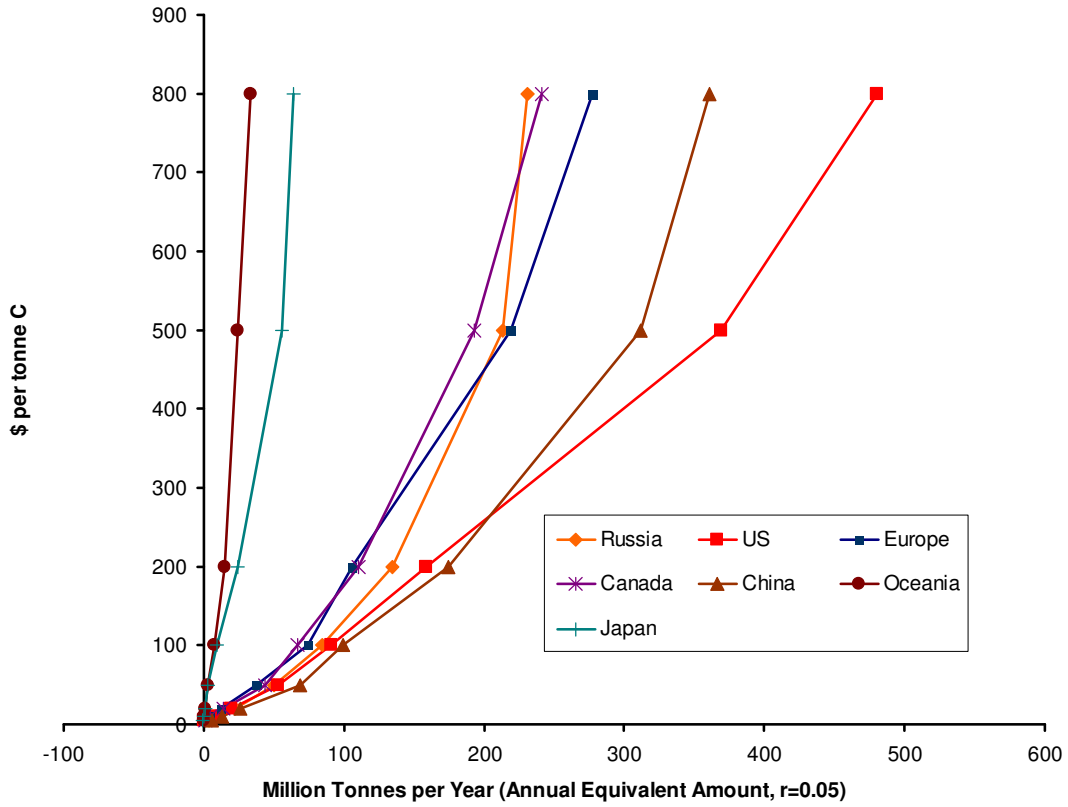
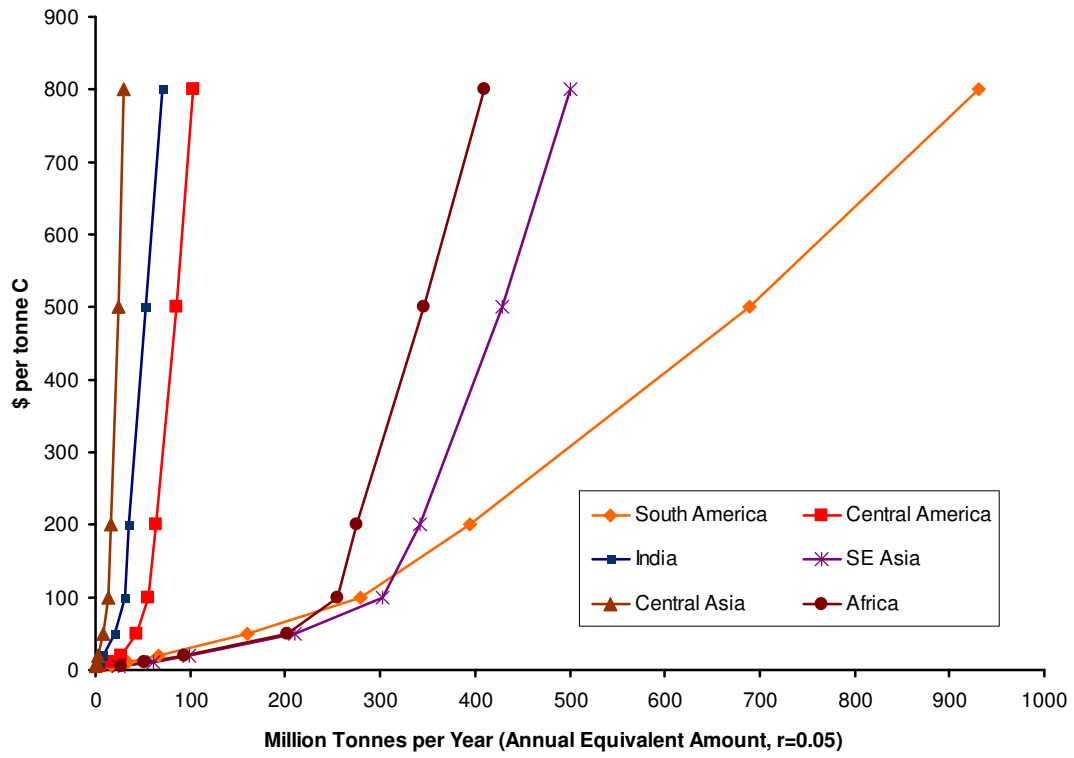


Figure 4: Marginal cost of carbon sequestration for specific tropical regions of the world (Plot of data from Table A11).



APPENDIX A: CUMULATIVE ADDITIONAL CARBON SEQUESTRATION BY THE YEAR GIVEN UNDER ALTERNATIVE CARBON PRICES.

Table A1: \$5/tC (2000 USD) Scenario =&gt; Cumulative carbon sequestered by the year given.

YEAR	US	Canada	South Amer.	Centl Amer.	Europe	Russia	China	India	Oceania	SE Asia	Central Asia	Japan	Africa	TOTAL
BILLION TCE														
2005	-0.07	-0.04	-0.01	0.00	-0.07	-0.01	0.00	0.00	0.00	0.00	0.00	-0.02	0.00	-0.22
2015	-0.07	-0.26	0.35	0.21	0.09	0.18	0.15	0.02	0.00	1.02	0.01	-0.02	0.59	2.28
2025	0.05	0.11	0.68	0.34	-0.01	-0.23	0.12	0.06	0.00	0.68	0.02	-0.01	0.98	2.78
2035	0.16	0.51	0.95	0.38	0.07	-0.36	0.20	0.09	0.01	0.87	0.03	0.01	1.34	4.26
2045	0.21	0.38	1.17	0.34	0.04	-0.22	0.27	0.14	0.02	1.06	0.04	0.02	1.73	5.20
2055	0.22	0.35	1.30	0.19	0.12	0.81	0.29	0.15	0.03	1.27	0.05	0.00	2.06	6.85
2065	0.15	0.24	1.35	-0.02	0.18	1.40	0.95	0.11	0.03	2.03	0.06	0.01	2.32	8.82
2075	0.25	0.17	1.36	-0.19	0.57	1.79	0.52	0.11	0.04	1.79	0.07	0.02	2.42	8.93
2085	0.32	0.24	1.36	-0.14	0.37	2.99	0.64	0.12	0.04	1.77	0.08	0.23	2.63	10.65
2095	0.30	0.61	1.32	-0.08	0.11	3.70	1.21	0.09	0.04	1.70	0.09	-0.05	2.93	11.96
2105	0.25	0.30	1.29	-0.02	0.06	3.52	1.42	0.07	0.03	1.70	0.09	-0.03	2.89	11.58

Table A2: \$10/tC (2000 USD) Scenario =&gt; Cumulative carbon sequestered by the year given.

YEAR	US	Canada	South Amer.	Centl Amer.	Europe	Russia	China	India	Oceania	SE Asia	Central Asia	Japan	Africa	TOTAL
BILLION TCE														
2005	0.02	0.00	0.00	0.00	-0.01	0.00	0.03	0.00	0.00	0.00	0.01	-0.01	0.00	0.05
2015	0.23	-0.20	0.70	0.45	0.16	0.22	0.25	0.14	0.00	1.41	0.03	-0.01	1.08	4.47
2025	0.16	0.22	1.30	0.72	0.06	0.32	0.50	0.10	0.01	2.09	0.05	0.00	1.82	7.36
2035	0.35	0.66	1.81	0.84	0.17	-0.29	0.73	0.17	0.02	3.78	0.07	0.02	2.50	10.84
2045	0.45	0.67	2.26	0.80	0.12	-0.20	0.52	0.26	0.04	5.40	0.09	0.04	3.25	13.71
2055	0.54	0.74	2.63	0.62	0.28	0.84	0.54	0.31	0.06	3.50	0.11	0.03	4.05	14.26
2065	0.52	0.52	2.82	0.33	0.55	1.43	1.17	0.33	0.07	2.60	0.13	0.05	4.65	15.17
2075	0.53	0.36	2.81	0.06	1.04	1.94	1.27	0.20	0.09	2.70	0.14	0.17	4.95	16.25
2085	0.71	0.38	2.76	-0.03	0.64	3.32	1.81	0.21	0.10	4.07	0.15	0.22	5.18	19.52
2095	0.59	0.78	2.78	-0.06	0.50	4.01	1.47	0.19	0.10	5.79	0.16	-0.06	5.36	21.61
2105	0.67	0.84	2.71	-0.03	0.39	3.79	2.02	0.13	0.10	4.30	0.16	-0.02	5.28	20.35

Table A3: \$20/tC (2000 USD) Scenario => Cumulative carbon sequestered by the year given.

YEAR	US	Canada	South Amer.	Centl Amer.	Europe	Russia	China	India	Oceania	SE Asia	Central Asia	Japan	Africa	TOTAL
BILLION TCE														
2005	0.18	0.07	0.00	0.01	0.07	0.04	0.09	0.01	0.00	0.00	0.01	0.00	0.01	0.49
2015	0.59	0.03	1.38	0.72	0.26	0.29	0.64	0.19	0.01	2.14	0.05	0.00	1.99	8.30
2025	0.56	0.57	2.53	1.21	0.43	0.67	0.91	0.30	0.03	3.38	0.10	0.03	3.53	14.26
2035	0.71	0.96	3.48	1.51	0.55	1.17	1.24	0.42	0.06	5.52	0.14	0.06	4.66	20.50
2045	0.95	1.22	4.29	1.61	0.63	1.16	1.32	0.57	0.09	7.85	0.19	0.09	5.76	25.74
2055	1.09	1.25	5.00	1.54	0.66	1.45	1.37	0.66	0.12	8.05	0.22	0.05	6.88	28.35
2065	1.15	1.11	5.51	1.34	1.07	2.24	2.22	0.83	0.15	5.22	0.26	0.10	7.83	29.03
2075	1.25	0.84	5.65	1.11	1.60	2.77	2.20	0.61	0.18	5.66	0.28	0.25	8.46	30.87
2085	1.58	0.93	5.60	1.01	1.26	4.52	2.37	0.65	0.21	7.09	0.34	0.31	9.05	34.90
2095	1.43	1.50	5.46	0.93	1.05	4.99	2.11	0.52	0.22	10.44	0.37	-0.01	9.49	38.48
2105	1.48	1.55	5.37	0.90	0.77	4.83	2.24	0.35	0.24	12.49	0.38	0.03	9.35	39.98

Table A4: \$25/tC (2000 USD) Scenario => Cumulative carbon sequestered by the year given.

YEAR	US	Canada	South Amer.	Centl Amer.	Europe	Russia	China	India	Oceania	SE Asia	Central Asia	Japan	Africa	TOTAL
BILLION TCE														
2005	0.25	0.10	0.00	0.01	0.11	0.05	0.11	0.01	0.00	0.01	0.02	0.00	0.01	0.68
2015	0.67	0.15	1.72	0.79	0.31	0.40	0.82	0.22	0.02	2.50	0.07	0.01	2.43	10.10
2025	1.02	0.70	3.13	1.32	0.50	0.91	1.06	0.36	0.04	3.99	0.13	0.05	4.27	17.46
2035	0.89	1.18	4.28	1.64	0.84	1.53	1.43	0.52	0.08	6.33	0.18	0.08	5.79	24.77
2045	1.12	1.45	5.26	1.78	1.20	1.39	1.60	0.72	0.12	8.83	0.24	0.11	7.02	30.85
2055	1.31	1.53	6.14	1.74	1.48	1.77	1.68	0.84	0.15	9.17	0.28	0.07	8.22	34.37
2065	1.39	1.52	6.80	1.57	2.04	2.43	2.65	1.04	0.18	6.46	0.32	0.12	9.18	35.71
2075	1.87	1.93	7.09	1.37	2.33	3.04	2.81	0.77	0.22	6.93	0.36	0.28	9.91	38.92
2085	1.90	1.06	7.07	1.27	2.30	4.78	2.93	0.82	0.25	8.44	0.39	0.36	10.53	42.12
2095	1.70	1.69	6.91	1.18	1.95	6.34	2.41	0.68	0.26	11.87	0.42	0.00	11.04	46.44
2105	1.99	1.69	6.70	1.15	1.97	5.62	2.45	0.52	0.28	13.98	0.45	0.08	11.08	47.97

Table A5: \$50/tC (2000 USD) Scenario => Cumulative carbon sequestered by the year given.

YEAR	US	Canada	South Amer.	Centl Amer.	Europe	Russia	China	India	Oceania	SE Asia	Central Asia	Japan	Africa	TOTAL
BILLION TCE														
2005	0.52	0.23	0.01	0.01	0.29	0.12	0.19	0.01	0.00	0.01	0.04	0.02	0.02	1.48
2015	1.01	1.04	3.42	1.20	0.59	0.78	1.51	0.34	0.04	4.21	0.14	0.04	4.55	18.87
2025	1.91	1.56	6.11	1.88	1.00	1.75	2.47	0.74	0.10	7.72	0.26	0.12	7.78	33.40
2035	2.37	2.13	8.28	2.32	1.60	2.50	3.69	1.06	0.16	11.05	0.37	0.18	10.26	45.98
2045	2.52	2.55	10.13	2.58	2.11	3.05	3.91	1.43	0.25	15.75	0.48	0.23	12.41	57.41
2055	2.81	2.66	11.70	2.63	2.26	3.33	4.65	1.81	0.32	18.55	0.57	0.14	14.32	65.74
2065	3.43	2.52	12.94	2.52	2.86	4.10	5.52	2.11	0.38	15.72	0.65	0.24	15.86	68.85
2075	3.70	3.09	13.70	2.33	4.46	5.43	4.76	2.29	0.44	12.88	0.72	0.44	16.93	71.17
2085	4.14	2.93	14.09	2.22	5.19	6.93	4.43	2.37	0.49	13.63	0.78	0.52	17.79	75.51
2095	4.01	3.07	14.20	2.09	5.70	8.28	5.24	1.58	0.52	17.16	0.82	0.14	18.42	81.23
2105	4.38	3.34	14.16	2.06	5.22	8.44	5.51	1.54	0.55	21.97	0.89	0.26	18.58	86.90

Table A6: \$100/tC (2000 USD) Scenario => Cumulative carbon sequestered by the year given.

YEAR	US	Canada	South Amer.	Centl Amer.	Europe	Russia	China	India	Oceania	SE Asia	Central Asia	Japan	Africa	TOTAL
BILLION TCE														
2005	0.88	0.40	0.02	0.02	0.53	0.21	0.30	0.02	0.00	0.03	0.07	0.06	0.02	2.55
2015	1.58	1.41	5.32	1.35	1.22	1.10	2.04	0.46	0.09	5.13	0.25	0.23	5.34	25.53
2025	3.13	2.33	10.50	2.37	1.90	2.70	3.62	0.98	0.22	9.81	0.45	0.39	9.81	48.21
2035	4.28	3.14	14.86	3.06	3.28	4.52	5.30	1.56	0.36	15.11	0.64	0.30	13.28	69.69
2045	4.75	3.87	18.45	3.47	4.56	6.04	5.69	2.20	0.54	21.79	0.81	0.62	16.11	88.89
2055	5.62	4.10	21.32	3.59	5.38	6.84	6.59	2.69	0.69	28.21	0.93	0.44	18.47	104.85
2065	6.07	4.19	23.56	3.50	6.71	6.49	8.06	3.18	0.81	30.11	1.05	0.41	20.30	114.43
2075	6.41	4.87	25.08	3.31	7.79	8.06	8.10	3.47	0.94	30.67	1.13	0.98	21.55	122.35
2085	7.39	4.60	26.05	3.19	8.81	10.33	7.69	3.62	1.04	29.27	1.19	1.50	22.53	127.21
2095	6.54	5.41	26.61	3.05	9.46	12.12	8.32	3.64	1.10	32.25	1.23	0.83	23.20	133.78
2105	7.77	5.40	26.93	3.06	10.08	12.03	7.83	4.70	1.17	35.14	1.30	0.72	23.38	139.51

Table A7: \$200/tC (2000 USD) Scenario =&gt; Cumulative carbon sequestered by the year given.

YEAR	US	Canada	South Amer.	Centl Amer.	Europe	Russia	China	India	Oceania	SE Asia	Central Asia	Japan	Africa	TOTAL
BILLION TCE														
2005	1.34	0.60	0.03	0.03	0.85	0.33	0.42	0.03	0.00	0.04	0.10	0.12	0.04	3.92
2015	2.55	2.16	6.97	1.46	1.67	1.40	2.30	0.51	0.15	5.53	0.30	0.60	5.47	31.07
2025	5.31	3.79	15.15	2.67	2.56	4.08	5.04	1.10	0.42	10.98	0.55	0.84	10.38	62.89
2035	7.70	5.37	21.50	3.49	4.26	6.74	8.60	1.76	0.74	16.97	0.77	1.01	14.42	93.34
2045	9.07	6.62	26.47	3.98	6.14	9.94	11.81	2.47	1.13	24.24	1.00	1.14	17.73	121.74
2055	10.60	7.31	30.36	4.15	7.41	12.28	14.79	3.06	1.47	31.04	1.16	1.67	20.54	145.85
2065	11.45	8.13	33.40	4.10	9.50	13.57	18.36	3.61	1.75	34.32	1.32	1.50	22.78	163.79
2075	11.76	8.08	35.56	3.98	12.01	15.64	21.01	3.96	2.04	36.53	1.48	1.81	24.31	178.16
2085	13.50	9.19	37.08	3.84	13.58	17.26	22.52	4.15	2.30	38.52	1.51	2.00	25.52	190.97
2095	13.25	9.87	38.11	3.77	15.94	18.96	23.66	4.21	2.50	41.11	1.63	2.34	26.46	201.80
2105	14.78	10.37	38.86	3.70	17.62	19.47	24.65	4.07	2.72	43.59	1.67	2.67	26.76	210.93

Table A8: \$500/tC (2000 USD) Scenario =&gt; Cumulative carbon sequestered by the year given.

YEAR	US	Canada	South Amer.	Centl Amer.	Europe	Russia	China	India	Oceania	SE Asia	Central Asia	Japan	Africa	TOTAL
BILLION TCE														
2005	2.08	0.94	0.04	0.03	1.42	0.52	0.59	0.04	0.00	0.06	0.15	0.22	0.06	6.15
2015	4.83	2.91	10.99	1.73	3.26	1.85	2.93	0.68	0.19	6.03	0.39	0.93	5.73	42.45
2025	12.38	6.28	26.63	3.52	5.51	5.56	8.10	1.74	0.58	13.50	0.74	2.22	11.81	98.57
2035	18.95	9.66	38.31	4.84	8.52	10.12	15.64	2.81	1.09	21.85	1.15	2.51	17.95	153.40
2045	23.63	12.43	47.15	5.64	12.78	15.49	22.79	3.85	1.88	31.17	1.46	3.45	23.51	205.23
2055	28.22	14.55	53.89	6.08	15.79	20.07	29.76	4.71	2.54	39.92	1.81	3.98	28.33	249.66
2065	30.24	16.47	59.16	6.21	21.00	24.22	36.91	5.50	3.16	44.62	2.08	4.72	32.56	286.84
2075	33.78	18.81	63.07	6.19	27.26	28.49	41.67	6.03	3.95	47.70	2.27	3.75	36.00	318.98
2085	37.98	17.80	66.07	6.22	32.66	33.47	45.67	6.36	4.60	50.53	2.47	4.67	38.87	347.37
2095	36.21	18.56	68.34	6.23	38.59	38.17	48.64	6.55	5.16	54.21	2.64	5.87	41.31	370.48
2105	39.83	20.37	70.19	6.32	44.20	41.17	51.24	7.67	5.93	57.08	2.75	6.28	42.82	395.86

Table A9: \$800/tC (2000 USD) Scenario => Cumulative carbon sequestered by the year given.

YEAR	US	Canada	South Amer.	Centl Amer.	Europe	Russia	China	India	Oceania	SE Asia	Central Asia	Japan	Africa	TOTAL
BILLION TCE														
2005	2.51	1.13	0.05	0.04	1.73	0.62	0.69	0.05	0.00	0.07	0.18	0.28	0.07	7.40
2015	6.03	3.52	14.21	1.93	3.94	1.99	3.15	0.83	0.22	6.45	0.42	1.04	5.91	49.65
2025	16.14	7.79	35.98	4.16	6.90	5.83	9.35	2.31	0.73	15.66	0.88	2.46	13.10	121.30
2035	25.06	11.72	52.04	5.86	11.12	10.61	18.27	3.80	1.41	26.12	1.45	3.18	21.21	191.86
2045	31.19	15.97	64.25	6.93	15.96	16.56	26.73	5.16	2.59	37.25	1.98	3.95	28.87	257.39
2055	36.88	18.50	73.60	7.57	21.25	21.70	34.87	6.27	3.57	46.76	2.37	4.45	35.62	313.42
2065	40.80	21.09	80.99	7.86	27.44	26.56	43.03	7.28	4.50	52.55	2.78	5.11	41.51	361.49
2075	43.66	24.05	86.71	7.97	34.54	31.80	48.67	7.95	5.75	56.80	3.14	5.84	46.37	403.24
2085	47.90	23.51	91.24	8.10	41.62	37.81	53.43	8.43	6.77	60.60	3.42	6.62	50.51	439.96
2095	51.56	26.50	94.65	8.20	48.16	43.56	57.06	8.73	7.72	64.76	3.59	4.57	53.98	473.03
2105	54.37	26.99	97.63	8.35	54.57	47.62	60.24	9.97	9.00	68.26	3.83	5.65	56.44	502.91

Table A10: Present Value Carbon Sequestered over the period 2005 – 2105 (r = 0.05).

C Price	US	Canada	South Amer.	Centl Amer.	Europe	Russia	China	India	Oceania	SE Asia	Central Asia	Japan	Africa	TOTAL
MILLION TCE														
5	4.8	25.9	342.6	118.9	17.8	83.3	111.7	31.7	3.1	476.3	12.3	-7.2	542.1	1763.2
10	148.3	103.6	679.4	278.2	84.9	171.5	254.9	78.7	9.8	1221.3	30.0	1.0	1022.9	4084.6
20	397.9	286.8	1317.9	529.8	250.8	445.3	514.6	169.5	24.4	1976.6	61.6	17.7	1859.5	7852.3
25	523.5	383.8	1631.5	586.1	382.6	560.0	621.0	206.6	30.8	2291.8	77.9	25.6	2249.6	9570.8
50	1053.6	875.8	3180.7	868.1	739.1	1002.7	1362.8	415.9	65.9	4175.9	159.1	66.1	4020.4	17986.2
100	1811.7	1320.6	5552.2	1108.0	1481.8	1675.1	1979.4	611.0	145.0	6013.0	266.3	195.4	5058.2	27217.7
200	3158.2	2200.3	7846.3	1255.4	2099.3	2673.6	3453.1	691.3	298.6	6791.8	334.1	476.5	5466.7	36745.3
500	7324.8	3821.3	13668.8	1709.5	4346.1	4226.0	6177.6	1059.8	486.9	8506.6	483.2	1102.9	6864.2	59777.6
800	9532.7	4788.1	18479.6	2058.1	5496.0	4582.6	7161.7	1398.2	664.2	9936.0	605.4	1272.6	8121.8	74096.9

Table A10: Annual Equivalent Carbon Sequestered over the period 2005 – 2105 (r = 0.05).

C Price	US	Canada	South Amer.	Centl Amer.	Europe	Russia	China	India	Oceania	SE Asia	Central Asia	Japan	Africa	TOTAL
MILLION TCE PER YEAR														
5	0.2	1.3	17.3	6.0	0.9	4.2	5.6	1.6	0.2	24.0	0.6	-0.4	27.3	88.8
10	7.5	5.2	34.2	14.0	4.3	8.6	12.8	4.0	0.5	61.5	1.5	0.0	51.5	205.8
20	20.0	14.5	66.4	26.7	12.6	22.4	25.9	8.5	1.2	99.6	3.1	0.9	93.7	395.6
25	26.4	19.3	82.2	29.5	19.3	28.2	31.3	10.4	1.6	115.5	3.9	1.3	113.3	482.2
50	53.1	44.1	160.3	43.7	37.2	50.5	68.7	21.0	3.3	210.4	8.0	3.3	202.6	906.2
100	91.3	66.5	279.7	55.8	74.7	84.4	99.7	30.8	7.3	303.0	13.4	9.8	254.8	1371.3
200	159.1	110.9	395.3	63.3	105.8	134.7	174.0	34.8	15.0	342.2	16.8	24.0	275.4	1851.3
500	369.0	192.5	688.7	86.1	219.0	212.9	311.2	53.4	24.5	428.6	24.3	55.6	345.8	3011.8
800	480.3	241.2	931.1	103.7	276.9	230.9	360.8	70.4	33.5	500.6	30.5	64.1	409.2	3733.2