Estimation of net carbon sequestered under project scenario

The estimation of the net carbon sequestered (additionality) due to project activity is found by subtracting the baseline values from the values obtained under the scenario of project activity. Based on the assumptions given above 1,477,151 tons of carbon will be sequestered in addition to what would normally have been sequestered under the baseline scenario (Table 23).

Table 23
Areas with and without project activities and estimated net carbon benefits

Site Description/ Previous Activity	Area of Polygon (ha)	Baseline (W/O project)	Carbon Benefits with Project	Net Anticipated Carbon Benefits
1. Corozal				
Sugar Cane	2,613	52,256	261,280	209,024
Annual Crops	181	3,615	18,075	14,460
2. Orange Walk				
Sugar Cane	3,778	75,566	377,830	302,264
Annual Crops	1,164	23,285	116,425	93,140
Pasture	1,290	12,906	129,045	116,140
3. Belize				
Annual Crops	255	5,098	25,490	20,392
Pasture	376	7,521	37,605	30,084
Citrus	1,008			
4. Cayo				
Annual Crops	2,274	45,474	227,370	181,896
Pasture	2,059	20,589	205,890	185,301
Shifting Cultivation	283	5,665	14,163	8,498
Citrus	63	1,531	6,275	4,744
Pasture				
5. Stann Creek				
Citrus	499	12,483	49,930	37,447
Shifting Cultivation	387	7,742	19,355	11,613
Annual crops	77	1,541	7,705	6,164
Banana	40	808	4,040	3,232
	116	1,157	11,565	10,408
6. Toledo				
Shifting Cultivation	3,592	71,838	179,595	107,757
Annual Crop	1,161	23,218	116,090	92,872
Pasture	464	4,635	46,350	41,715
Grand Total	19,106	376,928 tons carbon	1,854,078 tons carbon	1,477,151
Adjustment for Re-emission (50% of 1,477,151)				-738,576 T/C
Adjustment for Risk (20% of 738,576)				- 590,861 T/C

Many of the potential project areas will be suitable for reforestation under plantation regimes and therefore it must be assumed that at some point or another, all of the harvestable products (e.g. timber) will be removed. Normally, plantation systems have a set rotation period after which the products are harvested and the area reforested for another crop. From the CDM perspective this releases the carbon from storage (in the trees), which means that carbon is not always stored in the mature forest but rather varies between the amounts contained within replanted seedlings and the harvestable trees.

Because of this, the project assumes a rough average of one half the net carbon value bringing the net carbon storage value down to 738,576 tons of carbon (50% of 1,477,151). In cases where the carbon is permanently locked inside the biomass of natural forest an average does not need to be taken and the calculated net value is given instead.

Calculation of total carbon sequestered for Belize

In the last step the carbon storage potential of the country is found by multiplying the net storage average for each project activity or the combination of such activity where more than one activity occurs inside a polygon by the number of hectares in each polygon. The same is done for the baseline values inside the polygon. Adding these values give the carbon storage potential of the complete polygon. Adding the quantities for all the polygons done this way gives the national potential for carbon storage in the forest sector under the Clean Development Mechanism. The process is summarized in Table 23.

Accounting for the risk factors

The main threats to reforestation projects are diseases, agriculture, logging, floods and fires. The effects are often cumulative with for example logging and agriculture creating dry debris for fire spread into hardwood forest.

- ***Diseases.*** In 1999 there was an outbreak of Caribbean Pine Beetles *(Dendroctonus approximates and D adjunctus)* infestation in the Mountain Pine Ridge Forest Reserve, the repository of the nations largest softwood timber stocks. By late 2000 the infestation was full blown, threatening up to 70% of the pine forest in the reserve and menacing to spread to other areas across the country. Starting in 2000 and continuing well into 2001, a series of countermeasures were instituted by the Forest Department to contain the outbreak in tandem with a massive salvaging operation launched to recuperate the damaged timber. Unfortunately the infestation had spread to other pine stands across the country and although the full extent of the damage remains unknown, in the Mountain Pine Ridge alone it is estimated that 70% of the pine forest has been decimated. This phenomenon is causing considerable hardship in the forest industry and has led to retrenchments, depletion of the foreign exchange reserves due to importation to cover local timber production deficits and loss of revenue to Central Government through taxation from this sector.
- ***Illegal Logging.*** There is widespread illegal logging in Belize, which is contributing to the unsustainable depletion of timber stocks on both private and national lands. Of great concern to the future of forestry management in the country is that as stocks are dwindling elsewhere illegal operators are beginning to penetrate into protected areas. This creates a vexing situation for protected areas managers, who are often understaffed and under equipped to deal with such situations. In addition many of the perpetrators are of foreign origin, which puts the complexity of trans-boundary relations between Belize and its neighbors in jeopardy creating the opportunities for international incidences. Already there have been several violent confrontations between national law enforcement officials, protected areas personnel

and illegal loggers, which has resulted in the loss of life.

- ***Agriculture.*** Deforestation due to the expansion of agriculture into forested areas account for most of the forest lost in Belize. Although no reliable or updated figure can be arrived at, it is believed that the rate averaged 25,000 ha. per annum in the first half of the 1990s of which about 2,250 ha. were being lost from protected areas.

- ***Fires.*** There are frequent occurrences of forest fires during the dry season of which a combination of arsonist, hunters and lightening strikes are to blame. Fires are common to frequent in pine savannah areas but will occur in broadleaf forest on average every 5-10 years. Most fires in lowland broadleaf forest are believed to be of human origin, usually resulting from milpa activity and do untold damage to adjacent forestland. Most forest fires in Belize are allowed to burn themselves out or are fought with untrained personnel and rudimentary equipment, the sole exception being the Forest Department which has a fire suppression capability operating out of the Mountain Pine Ridge Forest Reserve and the Río Bravo Conservation and Management Area, which has forest fire fighting capability centered at the Hill Bank Field Station.

- ***Hurricanes.*** These are devastating climatic features that can be expected to affect the country and produce significant damage to the forest sector on average every 10 (in the north) to 15 years (in the south). In the past hurricanes have devastated the national forest estate including those areas that were being given silvicultural treatments. Most recently, Hurricane Iris in 2001 caused massive damage to the forest in southern Belize destroying an estimated 310,000 ha (Meerman, 2001). Many of the timber trees being planted as shade for cacao suffered major damage (Toledo Cacao Growers Association, pers. comm.) Most hurricanes however will cause wind throw without knocking down the trees, hence allowing the forest to recuperate within a number of years.

- ***Cross Border Incursions.*** There are frequent incidences of foreign nationals entering the country and squatting in what is to them, vacant and unclaimed forest land. If not checked on time these immigrants can put down roots, deforesting the area in the process and laying claim to the land by occupation. This could be a serious problem for forest plantations in remote areas and near the national frontiers.

Final potential: adjustments for the risk factors

Because of the real threats mentioned above it should be clear that not all the potential carbon uptake would be realized in the reforested areas. These uncertainties place potential projects in a difficult situation in terms of projecting long-term carbon stocks. Because the risks are diverse and subjected to a high degree of uncertainty, this project uses a generic figure of 20% as the discount to apply to the national total carbon potential (20% of 738,576). When this value is applied the national total is further reduced to 590,861 tons of carbon.

Belize-Potential Carbon Stocks per District

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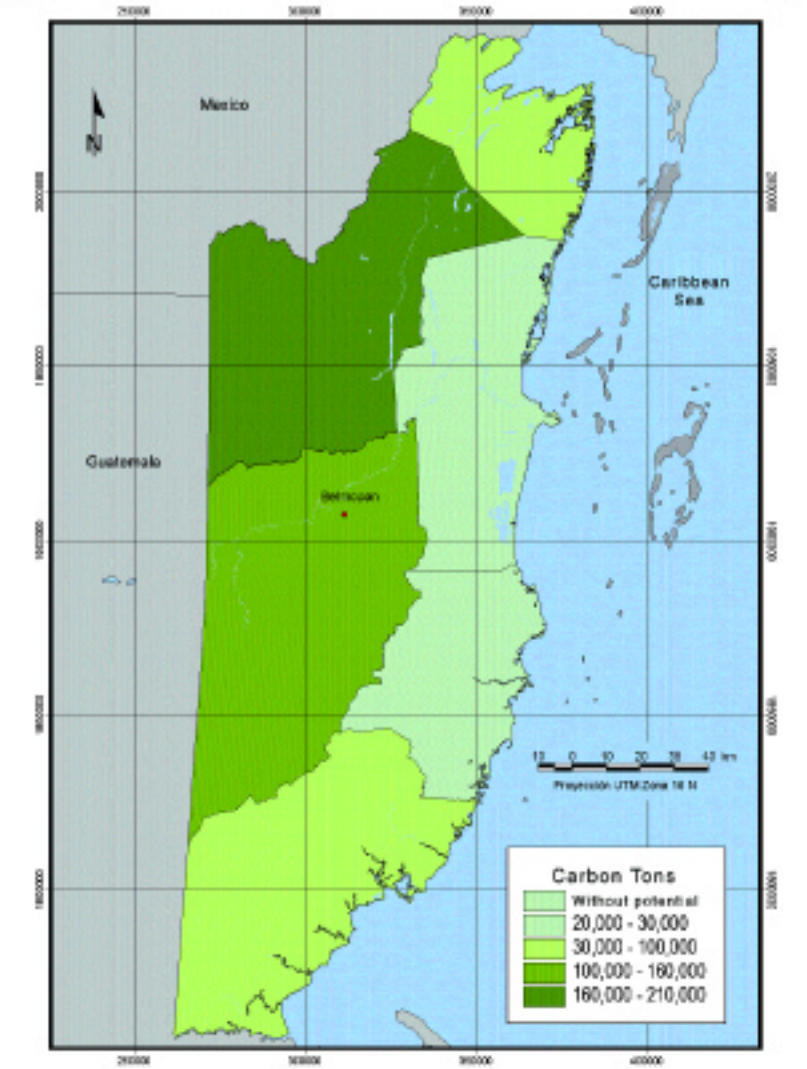

Belize- CDM Projects Proposed for Potential Areas

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