'Carbon in the Forests of Guyana' – a 10-part feature series published in July-August 2009 in the Stabroek News newspaper, Georgetown, Guyana (www.stabroeknews.com/features)

1. Stabroek News, Feature column, Monday 27 July 2009. "Carbon in the forests of Guyana." http://www.stabroeknews.com/2009/features/daily/07/27/carbon-in-the-forests-of-guyana/.

2. Stabroek News, Feature column, Tuesday 28 July 2009 - "Carbon in the forests of Guyana (2)" - http://www.stabroeknews.com/2009/features/07/28/what-is-carbon/

3. Stabroek News, Feature column, Friday 31 July 2009 - "When did carbon become tradable and what is actually traded?" - http://www.stabroeknews.com/2009/features/07/31/53115/

4. Stabroek News, Feature column, Tuesday, 4 August 2009. "REDD antecedents, and possible architecture." http://www.stabroeknews.com/2009/features/08/04/redd-antecedents-and-possible-architecture/ .

5. Stabroek News, Feature column, Friday 07 August 2009 - "Carbon in the forests of Guyana (5)" –Area components of the forest carbon budget. http://www.stabroeknews.com/2009/features/08/07/area-components-of-the-forest-carbon-budget/

6. Stabroek News, Feature column, Saturday 08 August 2009 - "Carbon in the forests of Guyana (6)" - Biomass/weight in the standing forest carbon budget. http://www.stabroeknews.com/2009/features/08/08/biomassweight-in-the-standing-forest-carbon-budget/

7. Stabroek News, Feature column, Tuesday 11 August 2009 - "Carbon in the forests of Guyana (7)" - Gains and losses in the forest carbon budget. http://www.stabroeknews.com/2009/features/08/11/gains-and-losses-in-the-forest-carbon-budget/.

8. Stabroek News, Feature column, Friday 14 August 2009 - "Carbon in the forests of Guyana (8)" - Losses in the forest carbon budget (2). http://www.stabroeknews.com/2009/features/08/14/losses-in-the-forest-carbon-budget-2/.

9. Stabroek News, Feature column, Saturday 15 August 2009 - "Carbon in the forests of Guyana (9)" - Losses in the forest carbon budget (3). http://www.stabroeknews.com/2009/features/08/15/losses-in-the-forest-carbon-budget-3/.

10. Stabroek News, Feature column, Tuesday 18 August 2009 - "Carbon in the forests of Guyana (10)" - Summarising the forest carbon budget.

http://www.stabroeknews.com/2009/features/08/18/summarising-the-forest-carbon-budget/.

1. Guyana - Stabroek News, Feature column, Monday 27 July 2009. Carbon in the forests of Guyana. http://www.stabroeknews.com/2009/features/daily/07/27/carbon-in-the-forests-of-guyana/

By Janette Bulkan

(This is the first in a 10-part series)

This series of articles is intended to look at some of the issues surrounding Guyana's bid for funds from the World Bank-administered Forest Carbon Partnership Fund (FCPF) and from Norway, and for the President's Low Carbon Development Strategy (LCDS). While most of the government information is on the government's LCDS website – www.lcds.gov.gy – that site is still under development at the time of writing and it is not possible to read about the feedback from the government's traditional outreach meetings with some Amerindian communities in the hinterland. In contrast, the information developed by the Guyana Forestry Commission (GFC) for the bid for FCPF funds is not linked to the LCDS website, is not mentioned on the GFC's own website, but is available on the World Bank's FCPF website – http://www.forestcarbonpartnership.org/fcp/Node/179.

In this series I want to draw attention to the high level of uncertainty about the data on which the Government of Guyana is building up high hopes in the population. While the GFC has been cautious in emphasizing gaps in knowledge and the need for using FCPF funds to fill those gaps, the LCDS jumps into the more speculative questions about how we should spend unprecedented amounts of external funds for climate change adaptation. The LCDS glosses over the fact that we have no assurance of such funds being agreed. So far as I can tell, President Jagdeo's LCDS is not among those schemes which are under international discussion in the context of the United Nations Framework Convention on Climate Change in advance of the 15th Conference of Parties which is scheduled to agree on a post-Kyoto protocol on climate change mitigation and adaptation, at Copenhagen in December 2009; see www.littleREDDbook.org. Guyana is one of 40 nations in the Coalition for Rainforest Nations but the approach being taken by the Coalition is never mentioned in President Jagdeo's LCDS or in the GFC's submissions to the FCPF. This isolation from mainstream discussion on climate change options is surely not a good strategy at any time, and especially not at this critical time.

I start by quoting a pair of questions raised more than once at the launch of the LCDS in Georgetown on July 08, 2009, using the wording as recorded on the LCDS website -

"What are the possible negative effects of the strategy? Is US$ 580 million per year accurate and adequate?"

Answer from the government side – "Refer to the annex to the strategy for calculations of the Economic Value to the Nation. Regarding costs of adaptation measures, refer to pages 28/29 of the strategy."

So the government chose not to respond to the question about possible negative effects; referred to the McKinsey consultancy report extracted into Appendix II of the strategy (see http://www.lcds.gov.gy/images/stories/Documents/LCDS.pdf) ; and referred mainly to the adaptation costs for continued adaptation costs for continued occupation of the increasingly floodable coastal lowlands. The government did not respond to the question about accuracy or adequacy. Clearly, in the vulnerable coastal region, the sky is the limit for adaptation if the intention is to sit tight while the waters rise. The LCDS does not even consider the possibility of a population shift inland to higher drier ground, although this has been done and is being contemplated elsewhere – the move of the capital inland to Belmopan in Belize after Hurricane Hattie in 1961, the current search for a new homeland for the inhabitants of the Maldive Islands in the Indian Ocean, and the evacuation of the population of the Cateret Islands off Papua New Guinea in mid-May this year. Kaieteur News ran an editorial on this subject on June 22, 2009, but there has been as yet no government response.

In this series, we need to consider the forest carbon budget. We could think of this like a stock taking of the tins of sardines in the kitchen cupboard:

► how many tins of sardines do we have in the cupboard now? = how much carbon is contained in our standing forests now?
► how many tins of sardines do we consume, and when? = what are the decreases in the carbon stock due to natural mortality of trees, loss through windstorm and accidental fire, extraction as timber, mortal damage during logging, permanent or long-term destruction through mining, and permanent or short-term loss through sedentary or rotational agriculture?
► how many tins of sardines do we buy and add to our kitchen cupboard? = what are the increases in the carbon stock due to tree growth, expansion of forest area and forest spread?

Some of the international debate about carbon sequestration (net carbon storage) and carbon marketing concerns the net amount of carbon which could be added by extra efforts. These efforts could include:

► afforestation (new forests where forests have not grown naturally in the past);
► reforestation (replacement of previous forest);
► silviculture (making trees grow faster, or survive longer).

That is like adding extra tins of sardines above those that we stock normally in our kitchen cupboard. We could also seek to reduce loss and wastage of carbon by:

► increasing the wind resistance of forests;

► decreasing their susceptibility to fire;
► reducing or eliminating logging by cancelling logging concessions or by restricting logging to those which can operate efficiently with minimum wastage;
► actually enforcing our legislation, rules and guidelines for sustainable forest management;
► using reduced impact logging techniques to minimize careless damage to the forest;
► actually applying the integrated land use planning prescribed in the National Development Strategy in 1996, and so reducing wastage when miners destroy forests before they have been logged intensively;
► preventing wasteful land clearance for low-value or one-time agricultural crops.

A feature of the Guyana Shield forests stretching from Venezuela eastwards across Guyana to French Guiana and Brazil north of the Amazon is the natural infertility of soils derived from ancient rocks which have not been rejuvenated by volcanism or marine transgression. The forests on these soils consist of relatively small trees (compared with rainforest in tropical Africa and southeast Asia) which are naturally slow growing with hard, heavy and durable timbers. In relation to our kitchen cupboard, these forests add carbon slowly and, if left alone, lose carbon slowly. But they are vulnerable to carbon loss through badly planned and poorly executed logging and mining and agriculture, more so than forests on more fertile soils. So in Guyana we should take extra care to plan carefully and to actually apply our land laws and regulations and procedures, fully, objectively and equitably. Compared with other rainforest countries, we have only a small potential for adding "extra tins of sardines" (carbon) to our natural stock, so we need to assess that stock, the gains and the losses with extra care. That assessment is addressed partially in the GFC's proposals to the FCPF, but so far little concern has been given to the uncertainties about the estimates. I will comment on the estimates in the FCPF proposals and in the LCDS but I welcome observations from readers.

In this series I will look at some of the consequences of the slapdash approaches to land and forest management currently in use in our country, and how those affect our carbon budget. In the next article, I will ask "what is carbon?"

ENDS

2. Stabroek News news item, Tuesday 28 July 2009 - "Carbon in the forests of Guyana (2)" - http://www.stabroeknews.com/2009/features/07/28/what-is-carbon/

(This is the second in a 10-part series intended to look at some of the issues surrounding Guyana's bid for funds from the World Bank-administered Forest Carbon Partnership Fund (FCPF) and from Norway, and for the President's Low Carbon Development Strategy.)

By Janette Bulkan

Carbon as in the 'Low-Carbon Development Strategy' is only the latest manifestation of what may well prove to be a whimsical belief in 'El Dorado'. What exactly is carbon? Mr Freddie Kissoon recently described one commonplace understanding of the meaning of 'carbon': "when I was a small boy in Wortmanville at Christmas we used to put carbide in empty cans, spit inside the tin and light it. It went off like a bomb. One day it went the wrong way and almost flew into my face. I was about eight years old then, and I ran home crying. Since then I have no interest in any kind of carbon" (Guyana – Kaieteur News. Columnist Freddie Kissoon. 19 June 2009. President Jagdeo was at UG. http://www.kaieteurnewsonline.com/2009/06/19/president-jagdeo-was-at-ug/). Coal and diamonds are two forms of elemental carbon; carbon stored in trees is another. In today's column, we will review some basic information on the nature of carbon, and its place in global initiatives to address global warming.

What is carbon?

Carbon is a chemical element, which is depicted by the symbol 'C'. Carbon is the fourth most abundant element in the universe by mass, and the second most abundant element in the human body by mass (about 18.5 percent) after oxygen. Carbon is present in all known life forms; its abundance, and its ability to form organic compounds like carbon dioxide (CO2), make this element one of the chemical bases of all known life. Carbon dioxide is the most abundant of the greenhouse gases (GHG) which are causing the planet to warm dangerously. The following are three key points about carbon and trees:

#1: Trees remove or sequester carbon dioxide from the atmosphere.

Carbon is constantly being exchanged between the atmosphere, the oceans and the land. Plants play an important role in this exchange: using the energy from sunlight, plants convert atmospheric carbon dioxide into plant food, stored as biomass in the form of various compounds of carbon. This conversion is called photosynthesis, and is one reason why forests feature prominently in the discussions on global warming. But trees also respire to release the energy needed for growth and for defence against pest attack, and this respiration returns almost as much CO2 to the atmosphere as is taken up by photosynthesis.

Many tree species are long-lived. Trees increase in size as they absorb more carbon from the atmosphere. A recent report 'Increasing Carbon Storage in Intact African Tropical Forests' published in the journal Nature (19 February 2009) estimates that tropical forests are absorbing nearly one-fifth of the global carbon dioxide released by burning fossil fuels. Eventually trees die and in decaying release their stored CO2 back to the atmosphere. So, in a natural forest undisturbed by human activity most of the trees are taking in CO2 by photosynthesis, respiring most of that CO2 to generate energy, and sequestering some of the CO2 in timber. But some old trees are dying and there is dead wood on the ground, and that is returning the stored CO2 back to the atmosphere. A mature forest undisturbed by human activity is mostly in equilibrium, with carbon gain and carbon loss almost exactly balanced. In terms of area, you can imagine that most of the natural forest is sequestering carbon but some patches of forest are naturally releasing more carbon through decomposition.

#2: Trees release carbon into the atmosphere when burnt
Trees contribute to global warming when trees are burnt, whether deliberately or accidentally, or when a tree ages and dies. In the case of forest fires, carbon is released rapidly; in the case of natural processes of decay and dying, the carbon is released slowly. As tropical forests are removed (deforestation) or degraded (which is technically a reversible process), the planet loses in two major inter-related ways: generally an irreversible loss of a critical carbon sink (the absorptive capacity of trees), and intensification of global warming, and all its catastrophic feedback effects.

#3: Trees provide multiple ecosystem benefits, beyond storing carbon
In addition to storing most of the planet's above- and below-ground carbon, forests provide many significant environmental and sustainable development co-benefits including biodiversity conservation; watershed protection; reduction of runoff, siltation and flooding; protection of fisheries; and sustained livelihoods and incomes for indigenous peoples and local communities dependent on intact natural environments. These are in addition to commercial benefits from harvests of timber and non-wood forest products.

Greenhouse gases – roles in atmosphere
Greenhouse gases (GHGs) are those gases in the atmosphere that allow sunlight to reach the Earth, but slow down the outward flow of heat from Earth. Carbon dioxide (CO2) is the most abundant, making up 56 percent of the greenhouse gases, with methane making up another 16 percent. Carbon is released to the atmosphere when fossil fuels (coal, petroleum), and trees, are burned. Carbon emissions from deforestation and forest degradation in developing countries make up about one-fifth of the total global emissions of GHGs every year.

Changes in GHG emissions – historical, present
Every year human activities add about 30 billion tonnes of CO2 to the atmosphere. From studying climate records, scientists have established that half of this CO2 accumulates in the atmosphere. The concentration of CO2 in the atmosphere has risen by a little over 1/3 from the beginning of the Industrial Revolution (c. 1750): from 270 parts per million (ppm) to 384 ppm – or from 2.2 trillion tonnes to almost 3 trillion tonnes globally. It is only when those figures are disaggregated that we can fully appreciate the alarming accelerations in CO2 emissions over the last fifty years. Between 1750 and 1952, CO2 levels increased by 45 ppm. In the following 40 year-period — from 1952 to 1991 — the rate of CO2 emissions quintupled to 1 ppm a year – as another 40 ppm were added to the atmosphere. Then, in the past 15 years, from 1991 to 2006, the rate of increase doubled again with 30 ppm, or 2 ppm a year, added in 15 years. This is an exponential rate of increase, and starkly underlines why urgent action is needed.

There are two important points to add: For a long time, it was widely, and mistakenly, thought that the ocean would absorb nearly all the industrial CO2 released particularly over the past 250 years after the invention of machinery powered by coal, or fossil fuels. Scientists later established that because of the slowness of ocean uptake, CO2

concentrations will take decades and centuries to come back down, even if humans stop emitting CO2 immediately. Roughly 15 percent of the carbon we emit will still be in the atmosphere 500 years from now. Secondly, simply stabilizing CO2 at the present concentration requires a reduction in current emissions of around 60 percent, and because of climate feedbacks, the reduction may need to be closer to 80 percent in the long term. I shall look at when and how carbon became a tradable commodity in my next column.

ENDS

3. Stabroek News, Feature Column, Friday 31 July 2009 - "When did carbon become tradable and what is actually traded?" -
http://www.stabroeknews.com/2009/features/07/31/53115/

(This is the third in a 10-part series intended to look at some of the issues surrounding Guyana's bid for funds from the World Bank-administered Forest Carbon Partnership Fund (FCPF) and from Norway, and for the President's Low Carbon Development Strategy.)

By Janette Bulkan

In 1992 most countries in the world joined an international treaty on global warming – the United Nations Framework Convention on Climate Change (UNFCCC). In 1997, the UNFCCC issued the Kyoto Protocol which laid out target emission reductions of carbon dioxide for developed countries, and instituted some mechanisms by which those targets could be achieved. Rapidly industrializing developing countries like China, India and Brazil resisted emission targets, arguing that the developed countries bore historical responsibility for the accumulation of greenhouse gases (GHGs) in the atmosphere.

Overall, there was little progress made at the Kyoto meeting: firstly, the targets suggested for developed countries to reduce their carbon emissions were voluntary, not mandatory. Secondly, the United States, at that time the most powerful country in the world and the largest emitter of GHGs, signed but did not later ratify the Kyoto Protocol.

Trading mechanisms
Two mechanisms – the Clean Development Mechanism (CDM) and the Joint Implementation Mechanism (JI) – were set up under the Kyoto Protocol to manage the buying and selling of carbon credits between countries. The idea is that global carbon emissions can be regulated and reduced under a cap-and-trade programme: countries submit an inventory of national GHGs, and work out ways of reducing their emissions as part of a concerted global effort to stabilize global warming. Nationally a developed country would identify the principal emitters within its borders, and set individual reduction targets for each factory or industrial sector, with penalties for non-compliance. In turn, the emitter could reduce its greenhouse gas emissions by retrofitting existing

GHG-emitting plants. There would be investments in green technologies, etc. An additional measure allowed developed countries to offset their GHG emissions by supporting projects in developing countries that verifiably reduced carbon emissions, measurable in CDM-approved credits. JI emissions reduction schemes are those that take place between two Annex 1 countries, that is, countries with binding GHG emissions reduction targets.

Emissions reductions are measured in Certified Emissions Reduction (CER) units and one CER equals one tonne of carbon. One tonne of carbon (1 tC) is equal to 3.67 tonnes of carbon dioxide (tCO2). The trading of carbon credits through any market mechanism begins with reliable data on emissions plus reliable data on carbon sequestration that are measurable in CERs, and independently verifiable and monitored.

At the time of the negotiations leading to the Kyoto Protocol in 1997, the role played by standing forests in regulating the global temperature was widely accepted. However, the Parties to the Protocol excluded Reduced Emissions from Deforestation and Degradation (REDD) from the offset mechanisms because of (i) uncertainties about the magnitude of deforestation emissions and (ii) the ability to monitor deforestation, especially in countries with endemic corruption and weak capacity for governance.

Instead, the Kyoto Protocol recognized credits from what are labeled AR activities, that is, afforestation and reforestation. Afforestation means growing trees in a previously treeless area; reforestation means growing new trees in a degraded forest area. Two special kinds of CERs can be issued for net emission removals from AR projects under CDM – temporary certified emission reduction (tCER) and long-term certified emission reductions (lCER). These different credits were set up to guard against 'leakage' or emissions displacement situations. For example, a forest area might be converted to another form of land use soon after CERs were paid out, or where the supplier country simply transferred destructive or degrading forest activities to another area of forest under the supplier's control. Credits from AR activities can be used to generate offsets under CDM and JI. However, in the years since Kyoto, only one CDM AR project has been approved. Most of the successful CDM projects are in the energy sector, particularly in China. CDM had a primary market value of US$7.4 billion in 2007.

Developments in carbon trading under REDD

The outlook for Reduced Emissions from Deforestation and Degradation (REDD) changed at the 2005 Conference of Parties (COP 11) of the UNFCCC in Montreal, Canada. Papua New Guinea and Costa Rica, on behalf of the newly-formed 'Coalition for Rainforest Nations', proposed to give forested developing countries access to the carbon market through credits generated from 'compensated reduction' activities. Under this approach, developing countries that reduce deforestation rates below a baseline rate generate credits that can be traded on the carbon market. Verification of emissions reductions would be carried out under agreed mechanisms, and no credits would be generated if deforestation rates were not reduced below the agreed national baseline.

REDD was proposed as a market-based scheme for standing forests, to be just as eligible for trading under the UNFCCC as afforestation/reforestation (AR) schemes were. Papua New Guinea and Costa Rica argued that 'additional' carbon would be grown in REDD projects: protected forests would store carbon in trees, and act as carbon sinks by absorbing some of the excess carbon dioxide that is warming our planet. Participating countries and projects should be allowed to sell certified carbon credits (that is measurable, and independently verifiable and monitored) to carbon emitters in the global North. In response, UNFCCC launched a two-year initiative to examine the potential of REDD. Those two years culminated at the 13th UNFCCC Conference of Parties (COP 13) in Bali, Indonesia, in December 2007.

Officially, the Bali decision was non-committal. The Bali Action Plan formally listed REDD among other mitigation activities as a potential means to achieve emission targets, and encouraged voluntary action on REDD. The decision of whether and how REDD would fit into the international climate change strategy was put off until COP 15 in Copenhagen, Denmark, in December 2009.

And yet Bali was a turning point because it put REDD on the broader agenda of the UNFCCC Conference of Parties, signaling that the international climate change framework would address the problem of emissions from deforestation and forest degradation in some manner. REDD is widely touted as a win-win scenario: finally, a scheme which simultaneously protects the remaining tropical rainforests, compensating local peoples and other forest users for 'avoided deforestation' while reducing at source about 20 percent of global greenhouse gases. The Bali decision on REDD encourages capacity building related to measuring and independently verifying and monitoring stored carbon and the development of pilot projects. In my next column, I shall describe the market and non-market schemes that are under consideration in the lead up to COP 15 in Copenhagen, Denmark, in December 2009.

ENDS

4. Stabroek News, Feature Column, Tuesday, 4 August 2009. REDD antecedents, and possible architecture. http://www.stabroeknews.com/2009/features/08/04/redd-antecedents-and-possible-architecture/

(This is the fourth in a 10-part series intended to look at some of the issues surrounding Guyana's bid for funds from the World Bank-administered Forest Carbon Partnership Fund (FCPF) and from Norway, and for the President's Low Carbon Development Strategy.)

In this article I outline the background discussions on and major approaches to tropical forest protection. The Reduced Emissions from Deforestation and Degradation (REDD) approach is a newcomer in the United Nations Framework Convention on Climate

Change (UNFCCC) negotiations, and its final shape is still in development. Still the REDD train is steaming ahead, and proposed activities can be categorized as projects, policies or sector activities that operate at different scales, multi-country, national and sub-national.

Background

The discussions between developed and developing countries over responsibility for protecting tropical forests, and at whose expense, took shape in the 1970s and have not progressed much since then. In the two decades leading up to the UN Conference on the Environment and Development – UNCED, also referred to as the Earth Summit in 1992 – environmental activist campaigns against rainforest destruction, and its effects on forest-dependent peoples, generally the most marginalized in their own countries, opened up spaces for discussion of global responsibility for the health of the planet. However, the media reports and images from far-off places in the 1970s and 1980s — the Chipko 'tree huggers' of Uttarakhand in India, the indigenous Penan people standing guard at roadblocks in what were ultimately failed efforts to prevent the depredations of large-scale loggers in Sarawak, Malaysia, and the Amazon burning – were mostly broadcast from developed countries, and raised the hackles of developing countries' governments.

Southern governments reacted to the perceived interference in the domestic affairs of sovereign nations, and pushed back. Brazil restated its national sovereignty over the Brazilian Amazon, and other rainforest countries did likewise. Many Southern diplomats suggested that the North first put its own house in order before dictating to the South in tones reminiscent of colonialism. Malaysian Prime Minister Mahathir bin Mohamad famously said that 'If it is in the interests of the rich that we do not cut down our trees then they must compensate us for the loss of income'.

In turn, the Northern countries balked at developing countries' demands for 'compensation for economic costs foregone' and a global forest fund and technology transfers as pre-conditions for a global forests convention. The UNCED in 1992 failed to reach agreement on a legally binding instrument for forests, parallel to the United Nations Framework Convention on Climate Change (UNFCCC) or the United Nations Convention on the Law of the Sea (UNCLOS).

In the years since UNCED, there have been a series of ineffective United Nations fora on forests – the Intergovernmental Panel on Forests (IPF) from 1995, replaced by the Intergovernmental Forum on Forests (IFF) in 1997, and followed in turn by the United Nations Forum on Forests (UNFF) in 2001. The lack of progress on those fronts has resulted in a global focus on the UNFCCC as a negotiating forum for tropical forests. At the level of governments – the multilateral level – two principal approaches to protecting tropical forests are on the table – on one side, letting the market set a price on forest carbon, and trading that carbon on the open market; on the other side, insisting on Official Development Aid (ODA) from global North to forested global South countries, which would then be used to protect national forests in the global interest. The Coalition

for Rainforest Nations is mostly associated with the first approach, from 2006, and Brazil with the second.

While ultimate power is vested in Governments at the multilateral level, the views of indigenous and forest-dependent peoples and some international environmental, religious and social organizations have also been prominent. Here also there is no single position. Some argue that carbon trading is a form of eco-colonialism; getting the world's poor to forego development so that the rich can continue with their high carbon footprint lifestyles. Other lobbies eschew any talk about windfall cash, arguing that the poor will always lose out in that trade. They argue that the terms of the negotiations are set by powerful institutions located in distant places, and that the poor end up selling cheap. In this view, the end result is that control over priceless assets, like forest homelands, can be ceded for very little. In order to avoid the second scenario, the directly affected stakeholders need to be represented at the negotiating tables, with voice and vote.
Coalition for Rainforest Nations

In the impasse over measures to reduce global carbon emissions, the Coalition for Rainforest Nations'1 proposal of a market-based scheme in tropical forest carbon at the 11th Conference of Parties of the UNFCCC in 2005 — REDD — was given serious consideration by the developed world. REDD was interpreted as a concrete signal by a subset of developing countries of willingness to commit to verifiable reduction measures. In 2006, seven member states of the Coalition (Bolivia, Central African Republic, Costa Rica, Dominican Republic, Nicaragua, Papua New Guinea and Solomon Islands) argued for financial mechanisms and technical support to developing countries 'to effectively and significantly reduce emissions from deforestation.' In other words, developing countries would require ODA before they could enter the carbon trading market. The Coalition takes credit for the establishment of the World Bank's Forest Carbon Partnership Facility (FCPF), the United Nation's UN-REDD program and the pledges made by various industrialized countries (including Norway, the UK, Germany, France, Japan, Australia, Finland, and others) towards capacity building and incentives to reduce rates of deforestation in participating developing countries (http://www.rainforestcoalition.org/eng/).

On the other hand, some of the industrialized developing countries with significant forest resources oppose including a carbon trading mechanism in a post-Kyoto agreement, arguing instead for non-market based initiatives to reduce carbon emissions. Brazil, a major proponent of this view, favours international public funding-based approaches, both bilateral official development assistance (ODA) and a multilateral fund made up of voluntary donations from developed states. Brazil launched its Amazon Fund, in August 2008 to support sustainable development and conservation. Norway pledged US$1 billion by 2015 to the Amazon Fund, but full payment is contingent upon a demonstrated reduction in deforestation. Brazil is a key player in the global negotiations on reducing emissions. It is a member of the G20 group of countries, and very active in multilateral fora, including the UNFCCC. Brazil is both a holder of the greatest calculated carbon stock of the top 20 developing countries by forest area 2 (one-third of a total of an estimated 177,000 million tones of carbon) and the fourth largest emitter of GHGs after

the USA, China and Indonesia. Brazil stands to gain from both market and non-market initiatives.

At Bali, the prospect of payment for carbon locked up in tropical forests, whether through market or non-market schemes, opened the possibility of substantial transfers of money from the historical emitters of greenhouse gases, the global North countries, to participating developing countries. Since then, however, a major global recession has set in, and has put a damper on global South hopes. The G8 meeting in Italy in July 2009 failed to reach agreement over firm carbon emissions reductions targets for the global North, and any commitments to following suit from the South. The REDD train may yet be derailed.

1 The Coalition had expanded to 40 member countries, including Guyana, by 2009.

2 Strassburg, Bernardo, R. Kerry Turner, Brendan Fisher, Roberto Schaeffer, and Andrew Lovett. 2009. Reducing emissions from deforestation – The 'combined incentives' mechanism and empirical simulations. Global Environmental Change 19:265-278.

ENDS

5. Stabroek News feature column, Friday 07 August 2009 - "Carbon in the forests of Guyana (5)" - http://www.stabroeknews.com/2009/features/08/07/area-components-of-the-forest-carbon-budget/

(This is the fifth in a 10-part series intended to look at some of the issues surrounding Guyana's bid for funds from the World Bank-administered Forest Carbon Partnership Fund (FCPF) and from Norway, and for the President's Low Carbon Development Strategy.)

The last few articles in this series have covered some of the international processes for carbon trading in the context of managing climate change. The processes range from the tightly regulated Clean Development Mechanism (CDM) to Brazil's Amazon Fund. The CDM rules, devised essentially for industrial contexts where assessment and monitoring is relatively simple, have been almost insurmountable barriers for forest situations. Carbon trading with forests being managed to provide additional sequestration of carbon has been more successful under the voluntary schemes, because rules are less demanding and more flexible. Guyana could have participated in voluntary projects from some years ago. At one time it appeared that Iwokrama might become involved but low potential for extra carbon sequestration, above that provided by natural forest growth, plus the lack of baseline data, discouraged the traders.

Brazil's Amazon Fund is a voluntary scheme for Avoided Deforestation (AD) outside the scope of the UN Framework Convention on Climate Change (UNFCCC), whereby

donors can compensate communities which have lived by cutting and burning trees at the forest frontier, farming for a year or two and then moving on as the forest frontier recedes.

The Fund would pay these farmers to change to a different livelihood, not based on annual forest burning. The Fund has no explicit link to changes in carbon stocks. This situation is not comparable with the rotational agriculture of the Amerindians in southern Guyana, where farming takes place in the secondary forest on the edge of the savanna. Here the farmers return to the same patches after a fallow period of several years but do not generally fell primary forest.

The Amazon Fund is not the same as Brazil's REDD proposal of February 2007 which does involve assessment of emissions from deforestation, during a reference period (historical) and during the crediting period. REDD is the acronym for Reduced Emissions from Deforestation and Degradation, one of several approaches to be negotiated at the 15th Conference of Parties of the UNFCCC at Copenhagen in December 2009.

All the schemes, even Brazil's Avoided Deforestation (AD), require countries to assess their standing stocks and their losses of forest. In its present state of development, Brazil's AD seems to require only measures of forest area, not carbon content. With high resolution satellite-based sensors, detection of recent clearance of tropical rainforest is not difficult, even if the area is covered by cloud. In spite of having frequent cloud cover, Guyana has (or had) images from aerial photographs dating back to 1950 and since 1972 it has had satellite-based imagery, of which Landsat is the best known, with cloud-penetrating radar more recently.

National forest area

The Guyana Forestry Commission (GFC) has estimated the national forest cover in versions of proposals made to the World Bank's Forest Carbon Partnership Fund (FCPF). The GFC has given four estimates so far, related to our total surface area (land and water) of 21.5 million hectares (Mha), of which 19.7 million ha are on land –
75 per cent of 21.5 Mha land = 16.1Mha of forest (Quick Assessment Paper for FCPF, revised May 2009, page 4);

80 per cent of land = c.16 Mha of forest (R-PLAN for FCPF, component 4, revised June 1, 2009, page 56);

83.7 per cent of 21.5 Mha land = 18.0Mha of forest (Quick Assessment Paper for FCPF, February 2009, page 4);

85 per cent of the country = 18.5 Mha of forest (R-PLAN for FCPF, all versions, page 2).

No explanation has been given by the GFC for the variety of estimates in less than six months, ranging from 16 to 18.5 Mha. Why is the uncertainty about areas important? Because that 2.5 Mha discrepancy could contain tradable carbon. President Jagdeo's

Low Carbon Development Strategy (LCDS – June 2009, footnote 8 on page 8) cautiously says "Guyana's rainforest covers an area in excess of 15 million hectares".

Who owns or administers these forests? The GFC administers the State Forest area on behalf of the citizens of Guyana. The GFC's Forest Sector Information Report for calendar year 2008, the latest data available on the GFC website, totals the State Forests as just under 13.7 Mha but the GFC claims 13.8 Mha in the R-PLANs for the FCPF, a discrepancy equivalent to a medium-sized Timber Sales Agreement logging concession of 130,000 ha.

Amerindian areas

The LCDS estimates (page 43) that forests on titled Amerindian Village Lands cover about 1.7 Mha out of the 2.8 Mha of such lands (14 per cent of Guyana's land area, LCDS page 5). There are now 97 communities with title and demarcated lands, leaving 42 communities still without title out of the current total of 139 communities (Minister of Amerindian Affairs Pauline Sukhai in SN, December 09 2008). That is an increase of 11 Amerindian communities since the 128 recorded by the Amerindian Lands Commission during 1966-69. Successive post-independence governments of Guyana have not yet complied with the legal obligation in the independence agreement with the UK to provide title to the communities for the lands which they occupied and used at the moment of independence; there are still 128-97 = 31 communities to be titled. How does this lack of official tenure affect the position of these communities in relation to the LCDS?

And what about the extensions to titled Amerindian Village Lands, requests made for extra land for cultivation because of demographic increases? While some of these have been granted, others have not. How do these latter communities stand in relation to the LCDS?

Why is the uncertainty important, about the numbers of Amerindian communities and areas of land claimed by or titled to Amerindian communities? Not only because of the quantification for the Economic Value to the Nation in the LCDS; the McKinsey calculations used in the LCDS excluded titled Amerindian lands, but what about the claimed lands?

Perhaps more important is the ownership of the carbon in the forests. While the Mining Act 1989 (no.20 of 1989) is clear that Amerindians have no intrinsic rights to sub-surface minerals, on titled Amerindian Village Lands the communities own the forests and thus the trees and thus the carbon in the trees.

It would thus be quite legal for any one or several or all titled communities to negotiate voluntary carbon sequestration agreements with carbon emitters, as happens in several tropical countries. Brazil and Indonesia positively encourage communities to participate in such trading. Why not Guyana? The architecture of REDD is still under discussion in the UNFCCC context, and a diversity of trials and pilot projects is encouraged.

There is indeed the precedent of Iwokrama negotiating with Canopy Capital for "Measuring and then placing a value in the market place on eco-services of Iwokrama to humanity such as rainfall and biodiversity; [and] Using income from the ecosystem services to help make Iwokrama financially independent of institutional donors by 2010 in accordance with the IIC Business Plan and Iwokrama's research obligation" (http://canopycapital.co.uk/ about/index.html).

If there are 18.5 Mha of forest in Guyana, 13.8 Mha in State Forest and 1.7 Mha in Amerindian Village Lands, who owns or administers the balance of 3.0 Mha?

In the next article, I will look at the volume components of the forest carbon budget for Guyana.

ENDS

6. Stabroek News feature column, Saturday 08 August 2009 - "Carbon in the forests of Guyana (6)" - Biomass/weight in the standing forest carbon budget.
http://www.stabroeknews.com/2009/features/08/08/biomassweight-in-the-standing-forest-carbon-budget/

(This is the sixth in a 10-part series intended to look at some of the issues surrounding Guyana's bid for funds from the World Bank-administered Forest Carbon Partnership Fund (FCPF) and from Norway, and for the President's Low Carbon Development Strategy.)

By Janette Bulkan

In my last article in this series I mentioned three considerable uncertainties about the areas of Guyana's forest and who administers them. Reliable knowledge about forest areas is essential in schemes for trading the carbon sequestered in forests for carbon emitted as a result of human activities. This is because the trades are formal contracts and so subject to business contract law. If Guyana sequesters less carbon or emits more carbon than the amounts for which it makes claims, then the government (or a community engaged in carbon trading) could be subject to legal action by the business partner.

It may not be apparent how the 15 million hectares (Mha) of forest mentioned in connection with the President's Low Carbon Development Strategy (LCDS) relate to the 18.5 Mha generally used in the Guyana Forestry Commission's (GFC) proposals for the World Bank's Forest Carbon Partnership Fund (FCPF). The GFC does not explain how it estimates 18.5 Mha as the national forest cover. The figure used in the National

Development Strategy 1996 was 16.9 Mha and the GFC has not been planting or regenerating 1.6 Mha since then.

The LCDS subtracts an estimated 1.7 Mha of forest on titled Amerindian Village Land from the 18.5 Mha, and then subtracts 10 per cent (another 1.7 Mha) from the remainder for biodiversity and habitat conservation, leaving 15.1 Mha. This LCDS base area was valued by McKinsey for the timber harvested by destructive logging, for the minerals obtained by destructive mining, and the whole area cleared progressively over 25 years and replaced by commercial agricultural crops. The combined value of that timber, minerals and crops is McKinsey's Economic Value to the Nation, a fund from which derives the ten per cent annual annuity referred to by the President as US$580 million. It is not clear how the President's LCDS can seek donor finance for retaining forest against an improbable destruction scenario, and simultaneously continue the destructive logging and mining which are contrary to long-standing national policies, laws and land management procedures.

Coming back to the FCPF proposal; in terms of biomass or weights of carbon, we need to know the standing stock (I drew an analogy with the stock of tins of sardines in the kitchen cupboard in my first article in this series), the annual increase through natural or assisted tree growth, and the annual loss through natural and human causes. We need all three main components because the institutional architecture of the climate change treaty to succeed the Kyoto Protocol 1997 has not yet been fixed; this treaty to be negotiated at the 15th Conference of Parties of the UN Framework Convention on Climate Change at Copenhagen in December 2009. The GFC would be prudent, therefore, to estimate increases and decreases of carbon as well as the standing stock.

Standing stock of forest carbon

The GFC has claimed a standing stock of 5,000 million tonnes of CO2e (carbon dioxide equivalent) for the 18.5 Mha of Guyana's forest cover. Using the standard conversion of 3.67 tonnes of CO2 to 1 tonne of carbon, this means an average standing stock of 74 tonnes of carbon per hectare (tC/ha). However, this does not match the 93 tC/ha of above-ground carbon plus an assumed 20 per cent of below-ground carbon (mainly in roots), a total of 111 tC/ha which can be derived from the GFC's CO2e figures in the R-PLAN proposal to the FCPF (page 2 of the June 01, 2009, version). It is also not clear why the GFC is adding carbon in roots, as this is more difficult to measure and monitor than carbon in standing trees.

The GFC says that it is using an average derived from two sources: FAO Forestry Paper 134 "Estimating biomass and biomass change of tropical forests: a primer" by Sandra Brown in 1997, and the desk study by Hans ter Steege (ex-Tropenbos-Guyana programme) for Iwokrama in 2001. Importantly, ter Steege made estimates for the ten forest inventory zones into which Guyana was divided by the FAO Forest Industries Development Survey in the mid-1960s, excluding the Barima-Cuyuni-Kaituma mining areas, the main part of the Pakaraima Mountains and the New River triangle.

High biomass (that is, dense forests) was estimated in the northwestern quadrant of Guyana and the upper Essequibo. However, the GFC notes that the North West is where the bulk of the deforestation by mining has occurred.

FAO forest Inventory zone	Zone location	Above-ground average tree biomass (tC/ha)
3	Lower Mazaruni-Cuyuni	103
7	Southern Pakaraima Mountains	115
10	Upper Essequibo	109

Low biomass was estimated in the northeastern quadrant, the Rupununi savannas (as you would expect) and the mountainous south in the Wai Wai titled Amerindian Village Lands.

FAO forest Inventory zone	Zone location	Above-ground tree biomass (tC/ha)
4	Upper Berbice	61
6	Middle Essequibo	70
9	Rupununi / Rewa River / Wai Wai	86

Note: although estimated by ter Steege, the Iwokrama report does not provide the data for the other four forest inventory zones.

The northeastern quadrant includes the intermediate savannas whose forest areas have been repeatedly harvested for wallaba (Eperua falcata) posts and piles, firewood and charcoal, and burned over accidentally and deliberately for many decades. The National Development Strategy (1996, chapter 18 Environmental Policy, section I.E Watersheds) said "As much as 200,000 hectares are believed to be unable to regenerate spontaneously" because of this long mis-management.

Why is this natural variation in standing stock of forest carbon important? Firstly because it reflects the variety of natural productivity due to the heterogeneity of Guyana's very ancient and infertile hinterland soils. This variety is further compounded by influence of topography and the depth of the water table on the distribution of tree species and forest types within the inventory zones. So such average data are not much help for forest management. And secondly because the forests in the titled and claimed Amerindian areas have considerably less carbon than the denser forests in the middle of Guyana.

Although the titled Amerindian Village Lands were excluded from the President's draft LCDS, the Ministerial teams from the Office of the President are canvassing the Amerindian communities and arousing understandable concern though this unprecedented attention. It is not clear what any community, Amerindian or other ethnic

group, would have to do or not do to fit the LCDS scenario, and which would be different from what national laws and regulations now prescribe.

In summary, the GFC is not explicit enough about the source or calculation of its various figures or which one or ones it wishes to be considered for carbon trading or as contributions towards mitigation of climate change.

In the next article I will look at uncertainties in the estimates of gains and losses of forest carbon.

ENDS

7. Stabroek News feature column, Tuesday 11 August 2009 - "Carbon in the forests of Guyana (7)" - Gains and losses in the forest carbon budget.
http://www.stabroeknews.com/2009/features/08/11/gains-and-losses-in-the-forest-carbon-budget/.

(This is the seventh in a 10-part series intended to look at some of the issues surrounding Guyana's bid for funds from the World Bank-administered Forest Carbon Partnership Fund (FCPF) and from Norway, and for the President's Low Carbon Development Strategy.)

By Janette Bulkan

In the last article I looked at uncertainties in the weight of carbon in the standing forest of Guyana. In this article I will look at the more difficult estimation of the gains and losses in carbon sequestered in our forests. Apart from the obvious physical difficulties in estimating changes in biomass from one time period to the next in remote, muddy, wet forests, there are mathematical problems in estimating relatively small changes when the standing stock (or "carbon capital" in money terms) is itself not easy to estimate with accuracy or precision – accuracy being a measure of how closely we approximate to the true value, and precision being our ability to repeat measurements and obtain the same or nearly the same answer each time.
David Hammond, former director of research at Iwokrama, said "With only small quantities of nutrients to be gained through atmospheric deposition, rock weathering, fluvial deposition and biological fixation, conservation through adept internal cycling appears to be the only plausible mechanism sustaining standing forest biomass across most parts of the Guiana Shield" (Tropical Forests of the Guiana Shield: ancient forests in a modern world, 2005, page 355). In other words, with so little plant nutrients available, the scope is very limited for growing trees faster or growing more trees per hectare. Without inputs of nitrogen, phosphorus, calcium and other elements needed for plant growth, having abundant sunshine and a good supply of water does not lead to denser forest or more carbon per hectare. Experiments in other tropical rain forests have

shown that they can respond positively to inorganic farm-type fertilizer applied "from the bag" but this is not financially worthwhile outside a plantation context.

Simple observation shows that trees do not continue to grow in size for ever, nor do forests become denser and denser without limit. There are natural limits determined by the genetic potential of the trees and by the restricted supplies of plant nutrients and water which the tree roots can access. In a natural forest, undisturbed by human activity or natural disasters such as windstorms or accidental fires, a steady state is reached in which the natural gains in carbon fixed by photosynthesis and net of respiration are balanced by natural decay and death of trees.

A multi-country study – the Amazon Forest Inventory Network (RAINFOR) – has since the mid-1970s shown that catastrophe affects intact Amazonian forests only very rarely and apparently at very long intervals. However, rainforests which have been logged, and especially those which have been repeatedly logged at short intervals, become much drier at ground level and much more susceptible to fire damage. In Guyana, this is exemplified by the poorly managed and much burned wallaba (Eperua falcata) forests on the white sand soils in the Intermediate Savannas of Berbice.

Gains in forest carbon

Mostly, in intact Amazonian rainforests, trees die and decay singly or in small clumps, and annual growth balances annual death and decay. But RAINFOR now shows that Amazonian forest growth has apparently increased in the last three decades, giving us an extra 0.45 tonnes of carbon per hectare per year (tC/ha/yr). Exhaustive checks across this network have shown that this is not an artifact of measurements or calculations but a real increase found on 3⁄4 of the study sites, including the four sample plots in Guyana which contribute to RAINFOR. The severe drought in 2005 which affected much of Amazonia caused a sharp reduction in this extra growth and a sharp increase in tree mortality, especially of the trees with lower wood density.

The Guyana Forestry Commission (GFC) well recognizes the difficulties of estimating standing stocks of carbon and dynamic rates of change. In its R-PLAN proposals to the World Bank's Forest Carbon Partnership Fund, the GFC is requesting funding for a great increase in its forest monitoring capability. This would include the establishment of 900 sample plots distributed across Guyana, to be repeatedly measured. Unfortunately, the GFC has proved incapable of taking over, using and protecting the 52 plots established by the Edinburgh Centre for Tropical Forestry on contract to Barama in the early 1990s (plots now allegedly lost because of illegal logging or mining damage) or the Pibiri observational and experimental plots at Mabura established during the University of Utrecht and Tropenbos exercises over 15 years from the mid-1980s. It is thus unclear how the GFC would cope with such a large new programme.

This is not to doubt the potential value of such a sample plot programme to evaluate forest-based carbon emissions, among many other objectives, or the technical soundness of the sample plot plan devised by consultant Denis Alder.

Apart from this unexpected natural increase in sequestered forest carbon, what carbon-stimulating activities have been undertaken by the GFC?
► afforestation (new forests where forests have not grown naturally in the past)? – No.
► reforestation (replacement of previous forest)? – No.
► silviculture (making trees grow faster, or survive longer)? - No.

Losses in forest carbon

What does the GFC do to reduce loss and wastage of carbon?

► increasing the wind resistance of forests? – not relevant. Guyana is south of the paths of Caribbean hurricanes.

► decreasing susceptibility of forests to fire? – the main way is to reduce tree damage during felling and logging and consequent piles of drying wood which could catch fire during lightning strikes or arson in the forest. The GFC's Code of Practice for Timber Harvesting (second edition, November 2002, and available on the GFC website) is not obligatory because the GFC failed to amend the Forest Regulations 1953 to make it so. Nor, in spite of Ministerial promises since December 2006 about recruiting 50-60 new Forest Rangers (see Guyana Chronicle, February 28, 2009), has there been any public evidence of improved logging practices or less wastage by concession holders and their contractors. This is not surprising as Guyana's forest taxes continue to be among the world's lowest, in spite of over 15 years of external recommendations for increases at least to cover devaluation by inflation. So the GFC, responsible for administering the State Forest on behalf of the citizens, is almost giving away the public property, including the forest carbon, free of charge; the best timbers are forest-taxed at c.US$ 4 per cubic metre, when the CIF landed price for logs of equivalent timbers in Asia is US$ 750 per cubic metre.

In my next article I will continue to explore the carbon losses from Guyana's forests.

ENDS

8. Stabroek News feature column, Friday 14 August 2009 - "Carbon in the forests of Guyana (8)" - Losses in the forest carbon budget (2).
http://www.stabroeknews.com/2009/features/08/14/losses-in-the-forest-carbon-budget-2/.

(This is the eighth in a 10-part series intended to look at some of the issues surrounding Guyana's bid for funds from the World Bank-administered Forest Carbon Partnership

Fund (FCPF) and from Norway, and for the President's Low Carbon Development Strategy.)
By Janette Bulkan

In my last article I began to examine the losses of carbon from Guyana's forests. These losses from forests are the equivalent of emissions from factory exhaust stacks. The losses must be assessed alongside the gains in carbon and the standing stock of carbon in the trees, if Guyana is to participate in carbon trading schemes under the rubric of REDD (Reduced Emissions from Deforestation and Degradation). REDD is one of the approaches being negotiated internationally towards a replacement for the Kyoto Protocol 1997. This negotiation process should conclude with a new treaty to be signed at the 15th Conference of Parties of the UN Framework Convention on Climate Change, in Copenhagen in December 2009.

The Guyana Forestry Commission (GFC) has made provision for new assessment of emissions from forests in its proposal to the World Bank's Forest Carbon Partnership Fund (FCPF). The version of the proposal (the R-PLAN) dated June 1, 2009, was approved along with the R-PLAN of Panama and approval pending for the more complex plan of Indonesia. I will draw attention to some inconsistencies and inaccuracies in Guyana's R-PLAN later in this series but here I will note the GFC's prudent comment, "for many carbon trading schemes, only above ground bole and crown biomass are normally considered . . . but the ultimate standards REDD will adopt are as yet unknown, and all carbon pools need to be allowed for" (pages 85 and 91 in the R-PLAN). The GFC scheme thus proposes to assess as major biomass pools "tree boles, crowns and roots, lianas and epiphytes, understorey shrubs and herbaceous plants, standing and fallen deadwood, litter and soil carbon" (pages 86 and 93).

This is a huge and expensive task, but if carried out correctly would put Guyana in a sound technical position for REDD trading. What the R-PLAN does not estimate is whether the cost of this assessment, which has to be repeated at intervals although not always with the same level of detail, would be commensurate with the value of the forest carbon which would be available for trading with emitting countries or enterprises. In part 5 of this series, I commented on uncertainties about forest area, in part 6 about the carbon in the standing forest, and in part 7 I noted that we have possibly an unexpected natural accumulation or net gain of 0.45 tonnes of carbon per hectare per year (tC/ha/yr). I noted also in part 7 that the GFC could reduce fire damage by making obligatory the implementation of the Code of Practice for Timber Harvesting; it is now voluntary and so not generally observed. The GFC says that fire damage "has not been officially recorded at a given percentage level" (R-PLAN page 6).

We should now look at carbon losses (emissions in REDD terms) using the GFC's area figures quoted in the R-PLAN. The GFC gives only three sources – mining, agriculture and forest roads – but without definitions. Interpretation is further confused because the GFC very often refers to "deforestation and degradation" together, although the distinction is important. In terms of REDD and other climate change discussions, deforestation means replacement of forest by another land use with no likelihood of

return to forest in the foreseeable future. Degradation means a reduction in one or more components of the forest, including biomass and carbon density change, but with the possibility of recovery.

The LCDS multistakeholder consultation steering committee agreed on June 23, 2009, that Amerindian traditional rotational agriculture, which may involve small-scale annual clearing and burning of secondary forest, is not deforestation or degradation; see http://www.lcds.gov.gy/images/stories/Documents/minutes3.pdf. So such areas would not come within the scope of a carbon trading scheme.

Mining

On page 100 of the R-PLAN, the GFC estimated degraded forest area from mapping in 2007-8 as 54,210 ha. Presumably this was from LANDSAT satellite imagery, and presumably this was an area affected just in that one-year period, although the R-PLAN was not specific. Of this area, mining occupied 24,428 ha and agriculture 21,903 ha. As the mining is a change in land use and as there is hardly any post-mining site restoration, it is deforestation, not degradation. For the purpose of argument, I assume that the forest cleared by mining carried the largest amount of above ground tree biomass estimated by Hans ter Steege for Iwokrama in 2001: 147 tC/ha on loam soils. This would mean a deforestation emission from mining in 2007-8 of 24428 ha x 147 tC/ha = 3.6 million tonnes of carbon (MtC).

Agriculture

Likewise, deforestation for "agriculture" would mean an emission of 21903 ha x 147 tC/ha = 3.2 MtC. Exactly what is this agriculture is not explained in the R-PLAN.

Forest roads

The balance of "degraded" area mapped in 2007-8 is 7879 ha, which presumably is the estimate for the 2626 km of forest roads, apparently assumed to have an average forest clearing width 30m; although the GFC Code of Practice for Timber Harvesting specifies a maximum width of 25m for main haul roads (section 4.1.43 on page 25, November 2002). Presumably the 30m was used for estimation as it relates to LANDSAT resolution, but the GFC is not specific. The deforestation emission from forest roads is thus 7879 ha x 147 tC/ha = 1.2 MtC. This would be an underestimate because for main haul forest roads there would be clearance also of the main roots of the felled trees, so adding 20 per cent for those main roots (as the GFC does) would mean a deforestation emission from forest roads in 2007-8 of 1.4 MtC.

Although the GFC refers to the three categories above as "degradation", they are "deforestation" by the definition used by the GFC (page 83 in the R-PLAN).

Log markets, forest camps and logging base camps

The GFC did not apparently try to estimate the deforestation in 2007-8 due to clearance of log markets, forest camps or base camps; perhaps because the resolution of the satellite imagery was not good enough. It should be noted that in the R-PLAN the GFC proposes to move to more advanced satellite imagery with higher resolution, but the GFC sensibly notes that this monitoring would be more costly.

In the next article, I will continue to assess the carbon losses from Guyana's forests, dealing with the difficult estimation of losses due to logging.

ENDS

9. Stabroek News feature column, Saturday 15 August 2009 - "Carbon in the forests of Guyana (9)" - Losses in the forest carbon budget (3).
http://www.stabroeknews.com/2009/features/08/15/losses-in-the-forest-carbon-budget-3/.

(This is the ninth in a 10-part series intended to look at some of the issues surrounding Guyana's bid for funds from the World Bank-administered Forest Carbon Partnership Fund (FCPF) and from Norway, and for the President's Low Carbon Development Strategy.)

By Janette Bulkan

In my last article I examined the losses of carbon from mining, agriculture and roads in Guyana's forests. These losses from forests are the equivalent of emissions from factory exhaust stacks. The losses must be assessed alongside the gains in carbon and the standing stock of carbon in the trees, if Guyana is to participate in carbon trading schemes under the rubric of REDD (Reduced Emissions from Deforestation and Degradation). REDD is one of the approaches being negotiated internationally towards a replacement for the Kyoto Protocol 1997.

In this article I will discuss estimation of carbon emissions due to logging. Logging damage is forest degradation, including biomass and carbon density change, rather than deforestation because the forest biomass can usually recover from logging damage, unless the damage is severe. Estimation of biomass/carbon loss says nothing about degradation due to damage to species biodiversity or forest structure.

The forests of Guyana contain 1000 or more species of woody plants, almost all of them trees. Because of traditional market preferences, a near-absence of conventional marketing of technically adequate timbers, and a Guyana Forestry Commission (GFC) which does not insist that loggers follow best international practices, only around 60 of this 1000 are commercialized and only a half-dozen are really favoured. Consequently, harvesting in the natural forest is highly selective. Some of the most preferred timbers grow in small areas of particular combinations of soil type, topography and water availability. These areas – known as "reefs" – are especially liable to be over-harvested because the GFC does not insist on observance of its own between-tree distance rule: that there should be 10 metres between stumps of felled trees. This distance rule has a sound basis in research by the Tropenbos-Guyana programme in the 1990s.

Hence in the forest where GFC supervision is poor we see intensive and highly damaging harvesting in reefs, and considerable areas where the preferred timbers do not grow and no harvesting has been done, and areas of harvesting of scattered trees. This patchiness greatly complicates estimation of damage from logging and hence of carbon emissions. Here I give a range of estimates.

Area-based estimate of carbon emissions from logging damage

For this estimate I turn again to the biomass study by Hans ter Steege for Iwokrama in 2001. By reference to the experimental studies of the Tropenbos-Guyana programme at Pibiri near Mabura, he summarized average extraction rates as 1.5-2.5 tonnes of carbon per hectare (tC/ha) but rising to 35-50 tC/ha in reefs. In the reduced impact logging studies by Tropenbos, the conventional (uncontrolled) logging damage was 1.5 times the amount of timber extracted. So here I am using 2 tC/ha extracted x 1.5 damage factor = 3 tC/ha mortally damaged on average. This may be too low, because one figure for Barama is 5.5 tC/ha of mortal damage but there associated with a higher intensity of timber extraction. I multiply this 3 tC/ha by the areas of annual harvests.

Long-term (15-25 years) Timber Sales Agreements (TSAs) covered 4.2 million hectares (Mha) in 2008 (GFC data), thus an annual coupe of 170,000 ha/year for a 25-year licence period. This does not take account of areas inoperable because of being too steep or too swampy because the GFC does not provide such data. What is in the public domain, from the summaries of FSC certification evaluations for Barama, shows great variation between compartments of forest. Barama's current compartment 4 is considered to be 92 per cent operable, but compartments 1-3 were on average only 33 per cent operable.

This would mean a degradation emission from logging damage in TSAs of 170,000 ha x 3tC/ha = 0.5 million tonnes of carbon (MtC).
Short-term (2-year) State Forest Permissions (SFPs) and SFP conversions areas (intended for conversion at some time to long-term TSAs but GFC has not progressed in the conversion) covered 1.6 Mha in 2008 (GFC data), thus an annual coupe of 823,000 ha/year for a 2-year licence period. Again neglecting operability factors because of non-disclosure by the GFC, I estimate a degradation emission from logging damage in SFPs of 823,000 ha x 3tC/ha = 2.5 MtC.

Volume-based estimate of carbon emissions from logging damage

Another way of estimating carbon emissions is based on the volumes of logs extracted. As recorded by the GFC for 2008, 275,000 cubic metres (m3) were harvested as logs and 67,000 m3 as chainsawn lumber (the equivalent of 223,000 m3 of logs at 30 per cent conversion from log to lumber), a total harvest of 498,000 m3 of roundwood equivalent volume and thus 249,257 tC in 2008 (2 m3 of biomass = 1 tonne of carbon is a reasonable approximation for the dense timbers of Guyana). This time, I test three estimates of logging damage as ratios to volume of logs extracted:

From ter Steege (2001), 1.5 damaged : 1 extracted, so 249,257 tC x 1.5 = 0.4 MtC.
From a study by Laporte et al. (2007) in the Congo Basin, 8.5 damaged : 3 extracted, so 249,257 tC x 8.5/3 = 0.7 MtC.

From studies by the Edinburgh Centre for Tropical Forestry for Barama in the 1990s, 3 damaged : 1 extracted, so 249,257 tC x 3 = 0.7 MtC.

Clearly there is a great difference between the area-based (3 MtC) and volume-based (0.4 – 0.7 MtC) estimates of logging damage. This may be attributed to loggers harvesting much less than half of the area of their SFPs in each of their 2-year concessions. It is one of the lines of evidence which suggest that the SFP system is being incorrectly operated by the GFC, which is allocating too many SFPs and too large areas per SFP for systematic salvage cutting. According to the 1993 GFC policy on logging concessions the SFPs are intended for small-scale and low-capital operators. Surveys during 1999-2002 showed that the majority of the SFPs were too degraded from years of uncontrolled logging, or from naturally low stocking of good timber trees. These areas should be systematically salvaged and then placed under long-term protection for natural recovery. The GFC's failure to take appropriate action from these conclusive surveys frustrates the small-scale operators and degrades the forests still further. Here is a clear opportunity for reducing forest carbon emissions.

Carbon emissions from timber extracted

The carbon balance sheet also requires that the extracted timber be accounted, as the longevity of the timber in use cannot be estimated. This is reasonable because the recovery rate in fixed sawmills in Guyana is poor, and at least half of each log is likely to be burned or discarded as waste at the mill. So those emissions are derived as above from the declared volumes harvested, = 0.2 MtC.

Carbon emissions from natural decay and decomposition in the forest

Again we return to ter Steege's forest on loam soil in his study for Iwokrama in 2001. 3.5 tC/ha/yr of leaves and twigs and small branches fall, decay and are naturally re-cycled within a year. Standing deadwood and fallen tree boles and large branches (collectively known as coarse woody debris) amount to 7.5 tC/ha and decay over a period of about 20 years. About half of this coarse woody debris decomposes back into carbon dioxide and returned to the atmosphere, while the other half is incorporated into soil organic matter. However, over a period of perhaps 65 years, that organic matter itself decomposes and returns carbon dioxide to the air. As this is a continuous process, and as the International Panel on Climate Change advises against trying to factor soil respiration and soil organic matter dynamics into carbon balance estimates, we can treat that coarse woody debris as emitting 0.4 tC/ha/yr (7.5 tC/ha divided by 20 years). Applying this figure to the 18.5 Mha of forests gives an annual rate of 6.9 MtC.

In my next article I will summarise my estimates for our forest-based above-ground carbon from articles 7, 8 and 9 in this series.

ENDS

10. Stabroek News feature column, Tuesday 18 August 2009 - "Carbon in the forests of Guyana (10)" - Summarising the forest carbon budget.
http://www.stabroeknews.com/2009/features/08/18/summarising-the-forest-carbon-budget/.

(This is the final piece in a 10-part series intended to look at some of the issues surrounding Guyana's bid for funds from the World Bank-administered Forest Carbon Partnership Fund (FCPF) and from Norway, and for the President's Low Carbon Development Strategy.)

By Janette Bulkan

In my last article I estimated carbon emissions due to logging and from natural decay and decomposition in Guyana's forests. These losses from forests are the equivalent of emissions from factory exhaust stacks. The losses must be assessed alongside the gains in carbon and the standing stock of carbon in the trees, if Guyana is to participate in carbon trading schemes under the rubric of REDD (Reduced Emissions from Deforestation and Degradation). REDD is one of the approaches being negotiated internationally towards a replacement for the Kyoto Protocol 1997.

In this article I will summarise the forest carbon budget. It is important to recognize, which the Guyana Forestry Commission (GFC) does not clearly emphasise in its proposals to the World Bank's Forest Carbon Partnership Fund, that the as-yet un-logged and un-mined rainforests of Guyana are essentially in equilibrium. Natural growth is almost exactly balanced by natural death and decay. The Japanese tree physiologist Tatuo Kira, summarizing work in South East Asia in 1978, commented – "The very small net production / gross production ratio is not inherent in tropical rain forests, but is a common property of forest communities in general, in particular of mature climax forests dominated by a number of big, old trees".

Our dynamically stable forests, like those of most of the Amazon Basin, are thus unlike those forests in the Caribbean Islands which are subject to severe damage by hurricanes at irregular intervals. These recovering forests in the Islands are therefore more dynamic than our unlogged forest, in the sense of partitioning a greater proportion of carbon to creating new wood (timber) and less to respiration to maintain big old trees.

Because of the extreme infertility of most of our forest-covered hinterland soils, gross production is limited by shortage of soil nutrients such as nitrogen and phosphorus. Our standing biomass (and thus the standing stock of forest carbon) is much less than in forests on more fertile soils, including most of the Amazon Basin. This makes our forests much less likely to be convertible to financially-profitable ecologically-sustainable agriculture than in neighbouring Brazil.

Gross and net primary forest production

There does not seem to have been research on gross and net primary production of tropical rain forest in Guyana as there has been in Africa and Asia. I have therefore used the ratio from the Japanese studies in South East Asia of net primary production = 1/3 of gross primary production. That is, 2/3 of the carbon absorbed by the forest through photosynthesis (article 2 in this series) soon returns back to the atmosphere as carbon dioxide from respiration. Gross primary production is estimated at 12.1 tonnes of carbon per hectare per year (tC/ha/yr), normal net primary production (leaves and wood) as 3.9 tC/ha/yr and respiration loss of carbon as 7.8 tC/ha/yr, together with the 0.45 tC/ha/yr of "unexpected gain" in wood which I mentioned in article 7 of this series.

The normal net primary production (3.88 tC/ha/yr) can be partitioned into 3.50 tC/ha/yr of leaves and 0.38 tC/ha/yr of normal growth of branches and stem wood.

The reader may wonder at this point how the forest accumulates its standing stock of carbon, if gain and loss are almost exactly balanced in mature climax rainforest. The answer is that over perhaps 99 per cent of the forest the wood does accumulate slowly year by year (trees get bigger) but natural mortality occurs over about 1 per cent of the forest annually, mostly by the death of single trees, and the whole of the in-wood carbon of that 1 per cent is lost rapidly back to the atmosphere through natural decay and decomposition.

I now provide a tabular summary of the estimates made in articles 6-10 in this series. A plus in the last column means carbon gain, a minus in the last column means carbon loss (emission):

Components of the national forest carbon balance sheet	Source	National total in million tonnes of above-ground carbon on 18.5 million hectares of forest
Standing stock of forest carbon		
5000 $MtCO_2e$ for all Guyana	GFC's R-PLAN, page 2 (in article 6)	1362 MtC
340 tCO_2e/ha = 93 tC/ha Tree stems and branches	GFC's R-PLAN, page 2 from ter Steege and FAO (in article 6)	1720 MtC
408 tCO_2e/ha = 111 tC/ha Tree stems, branches + 20% for Roots	GFC's R-PLAN, page 2 (in article 6)	2053 MtC
Current gross primary production 12.1 tC/ha/yr	My estimate as above (in article 10)	224 MtC/yr
Normal gross primary	Excludes the unexpected forest	215 MtC/yr

production 11.6 tC/ha/yr	growth of 0.45 tC/ha/yr	
Normal net primary production = wood and leaves 3.88 tC/ha/yr	My estimate as above (in article 10)	+72 MtC/yr
Unexpected forest growth 0.45 tC/ha/yr	RAINFOR 1998 (in article 7)	+8 MtC/yr
Tree respiration 7.76 tC/ha/yr	My estimate as above (in article 10)	-143 MtC/yr
Note that the normal balance is zero	Forest in equilibrium	215 – (72 + 143) = 0
Normal net primary production is balanced by decomposition		72 MtC/yr
Leaves and small branches 3.50 tC/ha/yr	ter Steege 2001 (in article 10)	-65 MtC/yr
Deadwood / coarse woody debris 0.38 tC/ha/yr	ter Steege 2001 (in article 10)	-7 MtC/year
Note that the balance is zero	Forest in equilibrium	72 – (65 + 7) = 0
Deforestation	Mining (from GFC) (in article 8)	-3.6 MtC in 2007-8
- Ditto -	Agriculture (from GFC) (in article 8)	-3.2 MtC in 2007-8
- Ditto -	Forest roads (from GFC) (in article 8)	-1.4 MtC in 2007-8
Degradation	Logging damage (area-based) (in article 9)	-3.0 MtC using GFC 2008 data*
- Ditto -	Logging damage (volume-based) (in article 9)	-0.4 to -0.7 MtC using GFC 2008 data
- Ditto -	Logs harvested (in article 9)	-0.2 MtC using GFC 2008 data
Loss of forest-based carbon (emissions) in 2007-8 from deforestation and degradation	*using this higher value for logging damage	-11.4 MtC
Net loss of forest-based carbon in 2007-8	11.4 MtC deforestation and degradation – 8.0 unexpected gain	-3.4 MtC

It is obvious that these are very rough estimates, and the GFC has laid out a scheme for greatly improving our knowledge, in the R-PLAN proposed to the World Bank's Forest Carbon Partnership Fund. However, collecting that information from scratch will be a

lengthy process and would require a government dedication to forestry field work and data analysis not seen since the 1960s during the FAO-assisted Forest Industries Development Surveys. In the meantime, Guyana needs some figures to put on the negotiating tables for carbon trading and for the 15th Conference of Parties of the UN Framework Convention on Climate Change, in Copenhagen in December 2009.

At this point, it is worth noting the differences in orders of magnitude. Although we take in 224 MtC annually through forest photosynthesis, the trees promptly respire 143 MtC back to the atmosphere. What is controllable, and negotiable, is the 11.4 MtC emitted as a result of deforestation and degradation.

ENDS