Revision date: February 11, 2009

LBA-ECO ND-11 Pre-harvest Forest Tree and Liana Biomass, NW Mato Grosso, Brazil: 2003

Summary:

Tree and liana (vine) measurements were collected in a logging concession at the Fazenda Rohsamar in the municipality of Jurena in northwestern Mato Grosso. Tree identification and diameter measurements were collected between July 31, 2003 and October 14, 2003 on 10 10-m x 1000-m transects and the liana measurements were collected between August 5, 2003 and October 14, 2003 on 10 2-m x 1000-m transects within a 1400 ha logging block (Feldpauschh et al. 2006). Liana transects were nested within tree census transects to relate total species data to the tree inventory. The biomass of lianas was calculated using two different allometric equations derived for lianas in Amazonian forests (Gerwing and Farias, 2000; Gerwing et al. 2004). Comma-separated data files (.csv) of measurements of (1) tree species (diameter >10 cm), and forest characteristics, (2) measurements of liana diameter, forest characteristics, and calculated biomass, and (3) georeference points for the liana sampling transects are provided.

Selective logging has become a dominant land-use in Brazilian Amazonia. Published data on forest biomass in southern Amazonia is sparse. As part of a larger study to evaluate the effect of reduced impact logging on carbon dynamics and nutrient stocks, forest structure, and forest regeneration potential, we conducted a pre-harvest campaign to estimate tree and liana biomass in a parcel of managed forest in northwestern Mato Grosso. Prior to logging in 2003, a scientific inventory was conducted in Block 5 of the logging concession (Figure 1). Tree characteristics for all trees and palms > 10 cm DBH was measured by stratified sampling across the block to account for differences in tree densities (trees/ha). Transects were located using a commercial timber inventory to identify tree trunks approximately 10 cm DBH, lower and upper canopy height, species, and location of all individuals to the nearest 10 cm on an x-y grid. Diameter of all liana stems were included if their ultimate rooting point before ascending into the canopy fell within the transect. Lianas that had been cut due to reduced impact logging practices were also measured. Distance along the transect was recorded for each stem.

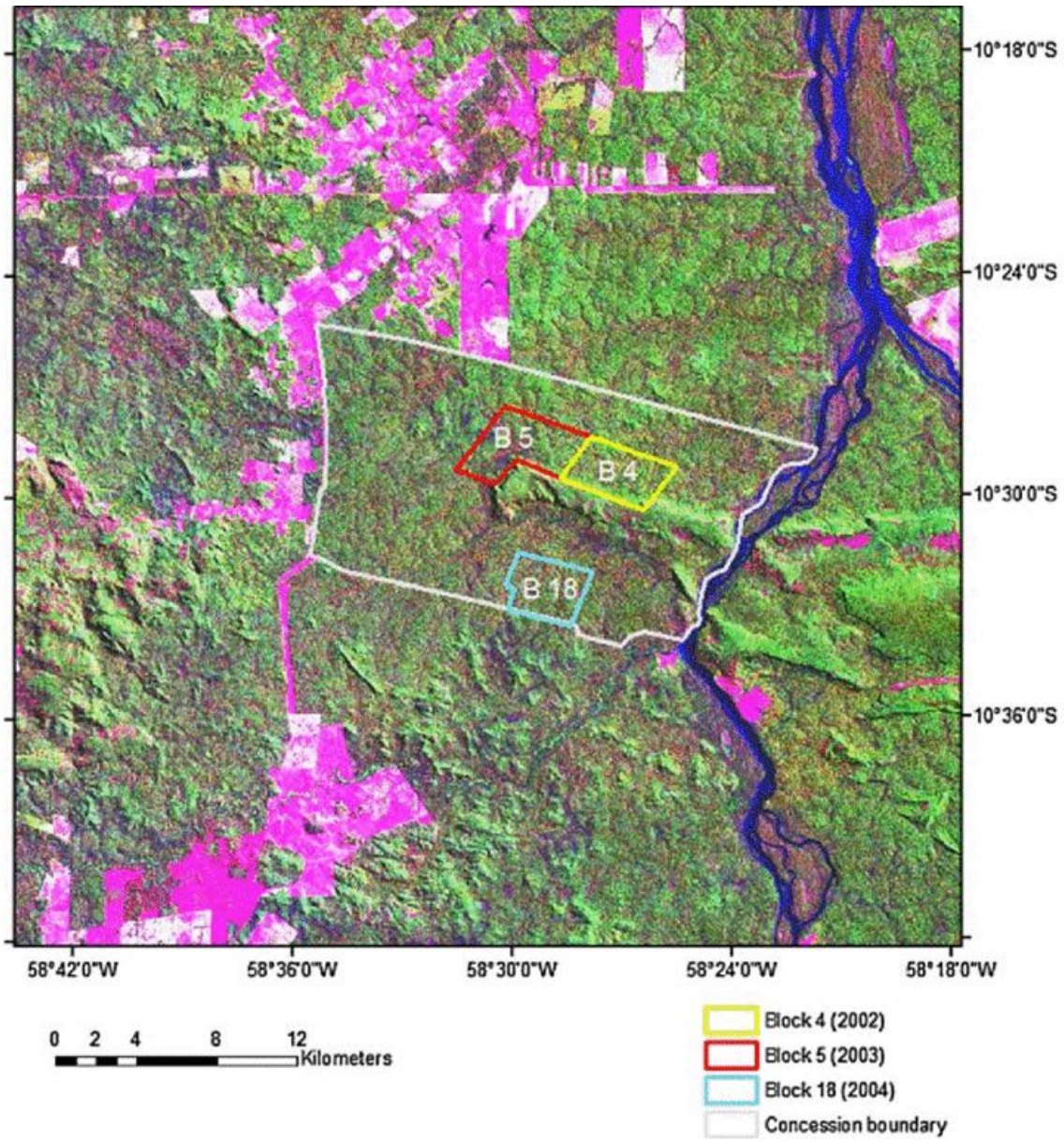

Figure 1. LANDSAT TM image (acquired July 1996) showing the location of the logging concession at Fazenda Rosahmar adjacent to the Rio Juruena in the county of Juruena in southern Amazonia, MT, Brazil. Boundaries are shown for Blocks 4, 5, and 18. Pink areas inside the concession indicate low-stature vegetation. Pink areas outside the concession are deforested and are most frequently pastures. Aqua blue areas indicate low-lying areas or water. Green areas are native forest vegetation. From Feldpausch et al., 2006.

Data Citation:

Cite this data set as follows:

Feldpausch T.R., S. Jirka, A.J. McDonald, C.A.M. Passos, J. Lehmann, S.J. Riha. 2009. LBA-ECO ND-11 Pre-harvest Forest Tree and Liana Biomass, NW Mato Grosso, Brazil: 2003. Data set. Available on-line [http://daac.ornl.gov] from Oak Ridge National Laboratory DIstributed Active Archive Center, Oak Ridge, Tennessee, U.S.A. doi:10.3334/ORNLDAAC/922

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> This data set was archived in March of 2009. Users who download the data between March 2009 and February 2014 must comply with the LBA Data and Publication Policy.

Data users should use the Investigator contact information in this document to communicate with the data provider. Alternatively, the LBA Web Site [http://lba.inpa.gov.br/lba/] in Brazil will have current contact information.

Data users should use the Data Set Citation and other applicable references provided in this document to acknowledge use of the data.

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1. Data Set Overview:

Project: LBA (Large-Scale Biosphere-Atmosphere Experiment in the Amazon)

Activity: LBA-ECO

LBA Science Component: Nutrient Dynamics

Team ID: ND-11 (Lehmann / Passos / Couto)

The investigators were Feldpausch, Ted R.; Jirka, Stefan; Riha, Susan J.; Passos, Carlos Alberto M.; Lehmann, Johannes; Noquelli, Maria Jose Miranda de Souza; Pauletto, Daniela; Gandini, Elenara and Fernandes, Erick C.M. . You may contact Feldpausch, Ted R. (trf2@cornell.edu) and Jirka, Stefan (sj42@cornell.edu).

LBA Data Set Inventory ID: ND11_Tree_Vine_Biomass_MT

Tree and liana (vine) measurements were collected in a logging concession at the Fazenda Rohsamar in the municipality of Juruena in northwestern Mato Grosso. Tree identification and diameter measurements were collected between July 31, 2003 and October 14, 2003 on 10 10-m x 1000-m transects and the liana measurements were done between August 5, 2003 and October 14, 2003 on 10 2-m x 1000-m transects within a 1400 ha logging block (Feldpausch et al., 2006). Liana transects were nested within tree census transects to relate total species data to the tree inventory. The biomass of lianas was calculated using two different allometric equations derived for lianas in Amazonian forests (Gerwing and Farias 2000; Gehring et al. 2004). Comma-separated data files of measurements of (1) tree species, diameter (>10 cm), and forest characteristics, (2) measurements of liana diameter, forest characteristics, and calculated biomass, and (3) georeference points for the liana sampling transects are provided.

2. Data Characteristics:

Data were collected in logging concession at the Fazenda Rohsamar in the municipality of Juruena in northwestern Mato Grosso. Tree diameter data were collected between July 31, 2003 and October 14, 2003 while the liana measurements were done between August 5, 2003 and October 14, 2003. Tree measurements were done in 10 10-m x 1000-m plots within a 1400 ha logging block while liana measurements were done on 10 2-m x 1000-m transects within the same logging block.

Three comma-delimited ASCII files are provided.

File Name: ND11_Pre_Harvest_Tree_Biomass_MT_2003.csv

This file provides measurements of tree diameter and species in transects to estimate pre-harvest tree biomass Mato Grosso, Brazil.

Column number	Column heading	Description
----Column 1	Tree_number	Tree number
----Column 2	Sample_date	Sample date, YYYYMMDD
----Column 3	Transect_name	Transect name (combination of BLOCK_UT and TRANSECT) and index value for Georeference Points
----Column 4	Transect_section	Transect section (m), each transect was split into 25 m sections

----Column 5	DBH	Tree diameter at breast height (DBH) (cm)
----Column 6	Common_name	Common tree name
----Column 7	Family	Tree Family
----Column 8	Genus	Tree Genus
----Column 9	Species	Tree species
----Column 10	Tree_status	Tree status (Alive or Dead)
----Column 11	Canopy_status	Canopy status (Intact or Broken)

Example Data Records: ND11_Pre_Harvest_Tree_Biomass_MT_2003.csv

```
Tree_number,Sample_date,Transect_name,Transect_section,DBH,Common_name,Family,Genus,
Species,Tree_status,Canopy_status

3,20030820,UT1-P22,200,17.3,cacau,Sterculiaceae,Theobroma,cacao,Alive,Intact
4,20030820,UT1-P22,200,45.3,cega corrente,Moraceae,indet.,indet.,Alive,Intact
5,20030820,UT1-P22,200,26.5,amescla,Burseraceae,Trattinnickia,burserifolia,Alive,Intact
...
9574,20030912,SOUTH-P17,1550,38.5,indet.,indet.,indet.,indet.,Dead,Intact
9576,20030912,SOUTH-P17,1550,10.8,bolao,indet.,indet.,indet.,Alive,Intact
9578,20030912,SOUTH-
P17,1550,17.7,amescla,Burseraceae,Trattinnickia,burserifolia,Alive,Intact
```

File Name: ND11_Pre_Harvest_Liana_Biomass_MT_2003.csv

This file provides measurements liana presence and characteristics in transects nested within tree census (>=10 cm DBH) transects to relate total species data to a an inventory of all trees >=10-cm DBH, Mato Grosso, Brazil. Missing values are coded as -9999.

Column number	Column heading	Units	Description
1	OBSERV		observation number
2	BLOCK_UT		logging block id
3	TRANSECT		transect number
4	NAME		transect name
5	NAME_2		transect name 2 (combination of BLOCK_UT and TRANSECT) and index value for Georeference Points
6	SAMPLE_DATE	YYYYMMDD	sample date
7	SECTOR		transect section each transect was split into 25-m sections
8	CANOPY_HT		for each SECTOR, qualitative estimate of average forest canopy height relative to surrounding forest; low medium or high
9	CANOPY_OPEN		for each SECTOR, qualitative estimate of canopy openeness; scale of 0-5 from closed to open
10	DISTURB		for each SECTOR, qualitative estimate of forest disturbance; scale of 0-5 from no disturbance to maxiumum
11	DIST_SECTOR	m	distance along SECTOR in meters (0-25 m)
12	DIST_TRANSECT	m	cumulative distance along transect in meters
13	DBH	cm	diameter at breast height (1.3-m from ultimate rooting point) of all vines greater than 2-m height; in centimeters
14	DBH_2	cm	for vines with rectangular or irregular stems, a second DBH measurement in cm
15	DBH_AVG	cm	average dbh of DBH and DBH2
16	DIAM_CLS		diameter class per 2 cm DBH intervals; <1 cm DBH is class 1, >=1 cm but <3 cm DBH is class 2, >=3 cm but <5 cm DBH is class 3, etc.
17	CONDIT		health; a=alive, d=dead
18	CLIMB		climbing mode; twiner, tendril, scrambler, etc
19	RELATED		if multiple shoots from same individual were measurable at 130-cm from ultimate rooting point, the parent (largest) shoot OBSERV is noted in this column
20	IND_NOTE		notes on individual
21	SECT_NOTE		note on SECTOR
22	BMS_GWING	kg	biomass calculated as BMS=10^(0.07+2.17*LOG(DBH)) from Gerwing and Farias 2000.

23	BMS_GWING_AVG	kg	biomass calculated BMS_AVG=10^(0.07+2.17*LOG(DBHAVG)); from Gerwing andFarias 2000.
24	BASAL_AREA	cm2	basal area calculated as BA =PI()*DBH^2/4
25	BA_AVG	cm2	basal area calculated as BA_AVG =PI()*DBHAVG^2/4
26	DIAM_30CM_GRNG	cm	diameter at 30 cm height calculated as DIAM=1.235*DBH+0.002*(DBHAVG^2; Gehring et al. 2004.
27	BMS_GRNG	kg	calculated biomass using; BMS = 2.71828^(-7.114+2.276*LN(DIAM30CM_GRNG*10)) Gehring et al. 2004.

Example Data Records: ND11_Pre_Harvest_Liana_Biomass_MT_2003.csv

```
OBSERV,BLOCK_UT,TRANSECT,NAME,NAME_2,SAMPLE_DATE,SECTOR,CANOPY_HT,CANOPY_OPEN,DISTURB,DIST_SECTOR,
DIST_TRANSECT,DBH,DBH_2,DBH_AVG,DIAM_CLS,CONDIT,CLIMB,RELATED,INDNOTE,SECTNOTE,BMS_GWING,
BMS_GWING_AVG,BASAL_AREA,BA_AVG,DIAM_30CM_GRNG,BMS_GRNG

1,MB1,P3,mb1p3,B1-P3,20031013,325,3,2,1,7.5,332.5,0.5,0.5,0.5,1,a,tendril,-9999,-9999,-9999,0.26,0.26,0.2,0.2,0.62,0.05
2,MB1,P3,mb1p3,B1-P3,20031013,325,3,2,1,9,334,0.5,0.5,0.5,1,a,tendril,-9999,-9999,-9999,0.26,0.26,0.2,0.2,0.62,0.05
3,MB1,P3,mb1p3,B1-P3,20031013,325,3,2,1,22,347,1.2,1.2,1.2,2,a,tendril,-9999,cut above 130; coppice,-9999,1.75,1.75,1.13,1.13,1.48,0.38
...
419,9,17,9p17,UT9-P17,20030814,1000,2,2,2,19,1019,1.2,1.2,1.2,2,a,tendril,-9999,-9999,-9999,1.75,1.75,1.13,1.13,1.48,0.38
420,9,17,9p17,UT9-P17,20030814,1000,2,2,2,19,1019,0.5,0.5,0.5,1,a,-9999,-9999,-9999,-9999,0.26,0.26,0.2,0.2,0.62,0.05
421,9,17,9p17,UT9-P17,20030814,1000,2,2,2,24.5,1024.5,0.5,0.5,0.5,1,a,twiner,-9999,-9999,-9999,0.26,0.26,0.2,0.2,0.62,0.05
```

File Name: ND11_Biomass_Georeference_Points.csv

Georeference points for the ND-11 Pre-harvest Forest Tree and Liana Biomass, NW Mato Grosso, Brazil: 2003

Column number	Column heading	Units	Description
1	Point		Sampling point number
2	ID		Sampling point identification in GPS unit
3	Name_2		transect name 2 (combination of BLOCK_UT and TRANSECT) and index value for biomass measurement files
4	Distance	m	Cumulative distance along transect in meters
5	Easting	UTM	Point location in UTM coordinates (UTM zone 21)
6	Northing	UTM	Point location in UTM coordinates (UTM zone 21)
7	Elevation	masl	Elevation of the sampling point in meters above sea level

Example Data Records: ND11_Biomass_Georeference_Points.csv

```
Point,ID,Name_2,Distance,Easting,Northing,Elevation,Latitude,Longitude
1,01 03 325,B1-P3,325,339545,8841558,237.1,-10.476245,-58.4661
2,01 03 389,B1-P3,350,339522,8841533,252.2,-10.47647,-58.466311
3,01 03 400,B1-P3,400,339440,8841400,261.1,-10.477669,-58.467066
...
82,P09 1100,UT10-P9,1100,334745,8840539,230.1,-10.485253,-58.509992
83,P09 775,UT10-P9,775,334440,8840654,236.1,-10.4842,-58.512774
84,P09 800,UT10-P9,800,334464,8840640,229.2,-10.484328,-58.512555
```

Site boundaries: (All latitude and longitude given in degrees and fractions)

Site (Region)	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude	Geodetic Datum
Mato Grosso - Juruena (Mato Grosso)	-58.7597	-58.7597	-10.4249	-10.4249	World Geodetic System, 1984 (WGS-84)

Time period:

- The data set covers the period 2003/07/31 to 2003/10/14.
- Temporal Resolution: One time sampling.

Platform/Sensor/Parameters measured include:

- FIELD SURVEY / HUMAN OBSERVER / FOREST HARVESTING AND ENGINEERING
- FIELD SURVEY / STEEL MEASURING TAPE / FOREST COMPOSITION/STRUCTURE
- FIELD SURVEY / ANALYSIS / BIOMASS

3. Data Application and Derivation:

Tree and liana stems were included if their ultimate rooting point before ascending into the canopy fell within the 2-m (liana) or 10-m (tree) wide transect. Furthermore, lianas that had been cut due to reduced impact logging practices were measured. The biomass of lianas was calculated using two different allometric equations derived for lianas in Amazonian forests (Gerwing and Farias 2000; Gehring et al. 2004).

The methods developed in this study could be useful for facilitating commercial inventory practices, understanding the relationship of tree species distribution to landscape features, and improving the novel use of CTIs to estimate AGB (Feldpausch, et al 2006).

4. Quality Assessment:

Care should be taken in using tree taxonomic data since local names were converted to Latin names for species identification.

5. Data Acquisition Materials and Methods:

The research focused on three areas, Blocks 4 (1137 ha), 5 (1397 ha), and 18 (1037 ha), harvested in 2002, 2003, and 2004, respectively. Data were collected in logging concession at the Fazenda Rohsamar in the municipality of Juruena in northwestern Mato Grosso. Tree diameter data were collected between July 31, 2003 and October 14, 2003 while the liana measurements were done between August 5, 2003 and October 14, 2003. Tree measurements were done in 10 10-m x 1000-m plots within a 1400 ha logging block and liana measurements were done on 10 2-m x 1000-m transects within the tree transects.

Tree identification and diameter measurements were done in 10 10-m x 1000-m plots within a 1400 ha logging block while liana measurements were done on 10 2-m x 1000-m transects within the same logging block. Diameter of all liana stems were included if their ultimate rooting point before ascending into the canopy fell within the transect. Furthermore, lianas that had been cut due to reduced impact logging practices were measured. The biomass of lianas

was calculated using two different allometric equations derived for lianas in Amazonian forests (Gerwing and Farias 2000; Gehring et al. 2004).

Tree diameter measured at 1.3 m height or above prop roots or buttresses using a fiberglass measuring tape. Prior to logging in 2003, a scientific inventory was conducted in Block 5. Tree characteristics and AGB for all trees and palms ~ 10 cm DBH was measured by stratified sampling across the block to account for differences in tree densities (trees/ha). Using the commercial timber inventory to identify tree density variation across the block, we located eight long (10-m x 1000-m) and eight short (10-m x 200–500-m) belt transects. Within each georeferenced transect we measured DBH of all trees and palms with trunks ~10 cm DBH, lower and upper canopy height, species, and location of all individuals to the nearest 10 cm on an x–y grid. Canopy height was measured with a Haglof Vertex III-60 ultrasonic hypsometer calibrated at ambient temperature to compensate for the effect of air density on transmission time.

2. Tree and vine diameters were measured in overlapping transects. Tree diameters were measured at 1.3-m height or above prop roots or buttresses using a fiberglass measuring tape.

6. Data Access:

This data is available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

Data Archive Center:

Contact for Data Center Access Information:

E-mail: uso@daac.ornl.gov
Telephone: +1 (865) 241-3952

7. References:

Feldpausch, T.R., A.J. McDonald, C.A.M. Passos, J. Lehmann, and S.J. Riha. 2006. Biomass, harvestable area, and forest structure estimated from commercial timber inventories and remotely sensed imagery in southern Amazonia. Forest Ecology and Management 233(1):121-132.doi:10.1016/j.foreco.2006.06.016

Gerwing, J.J., Farias, D.L., 2000. Integrating liana abundance and forest stature into an estimate of total aboveground biomass for an eastern Amazonian forest. J. Trop. Ecol. 16, 327-335.doi:10.1017/S0266467400001437

Gehring, C., Park, S., Denich, M., 2004. Liana allometric biomass equations for Amazonian primary and secondary forest. For. Ecol. Manage. 195, 69-83.doi:10.1016/j.foreco.2004.02.054

Related Publications

- Jirka, S. 2006. Plant-environment associations and forest structure in the southern Amazon basin. Thesis, Cornell University.
