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LBA-ECO ND-11 Regeneration in Undisturbed and Logged Forests, NW Mato Grosso, Brazil

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Summary:

Revision date: February 17, 2010

Summary:

This data set reports the results of field surveys to determine: regeneration diversity and size distribution of plants in primary undisturbed forest; and regeneration diversity and size distribution of trees in a one hundred hectare block, six years after reduced impact logging treatment (vine removal) was applied in 1998. In addition, wood density and carbon concentrations in commercially harvested species are reported. All surveys were performed in 2003 and 2004 within block 5 of the logging concession at the Fazenda Rohsamar in the municipality of Juruena in northwestern Mato Grosso, Brazil. The data are reported in three comma separated files.
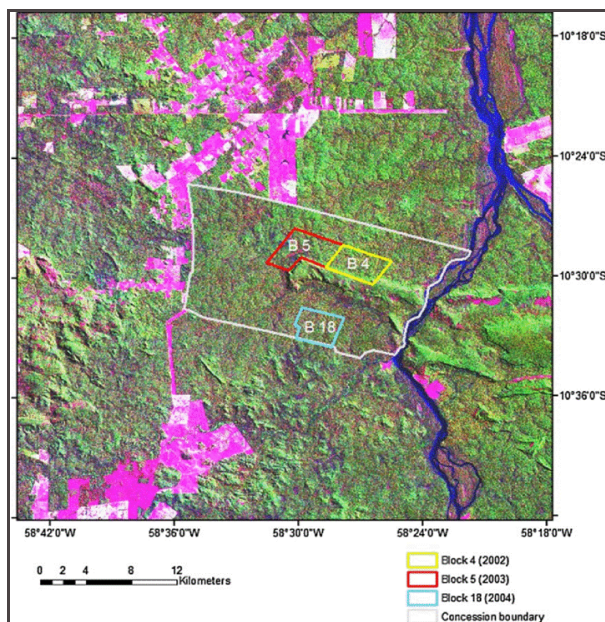
Figure 1. LANDSAT TM image (acquired July 1996) showing the location of the logging concession at Fazenda Rosahmar adjacent to the Rio Juruena in the county of Juruena in southern Amazonia, MT, Brazil. Boundaries are shown for Blocks 4, 5, and 18. Pink areas inside the concession indicate low-stature 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., C.A.M. Passos, E. Gandini, S. Jirka, A.J. McDonald, J. Lehmann, S.J. Riha. 2010. LBA-ECO ND-11 Regeneration in Undisturbed

and Logged Forests, NW Mato Grosso, Brazil. 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/965

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This data set was archived in March of 2010. Users who download the data between March 2010 and February 2015 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.

Table of Contents:

1. Data Set Overview:

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

Activity: LBA-ECO

LBA Science Component: Land Use and Land Cover

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

The investigators were Gandini, Elenara; Passos, Carlos Alberto Moraes; Noquelli, Maria José Miranda de Souza; Fernandes, Erick C.M.; Lehmann, Johannes; Riha, Susan J.; Fuhr, Silvana Inês; Botelho, Péricles de Aquino; Feldpausch, Ted R. and Jirka, Stefan . You may contact Gandini, Elenara (gandini.nara@bol.com.br) and Feldpausch, Ted (T.R.Feldspausch@leeds.ac.uk)

LBA Data Set Inventory ID: ND11_Regeneration_Succession

The goal of this study was to evaluate the effects of reduced impact logging treatments on forest regeneration and forest structure and carbon stocks in an open submontane Umbriferous tropical forest with palms. Three individual data sets contribute to this effort: regeneration diversity and size distribution in primary forest prior to logging, regeneration diversity and size distribution six years after logging; and wood density and carbon stocks in commercially harvested species. The natural regeneration study of primary forest was done in a 1,000 ha area within the boundaries of a 25,000 ha area prior to the logging operation. Effects of logging treatments were studied in a one hundred hectare block, six years after reduced impact logging treatment was applied in 1998. There were three silvicultural treatments considered in both the structure and the regeneration studies: reduced impact logging with a vine removal pre-treatment (RILVR), which was applied to a 25 ha area: reduced impact logging with no vine removal (RILVI) applied to an adjacent 25 ha area; and the control treatment where no logging was done (total area of 50 ha.). Wood density and carbon concentrations were measured in samples provided by logging operations at the Fazenda Roshamar. All studies were done within the logging concession at the Fazenda Rohsamar in the municipality of Juruena in northwestern Mato Grosso, Brazil.

Related Data Sets:

- LBA-ECO ND-11 Forest Damage Following Reduced Impact Logging, NW Mato Grosso, Brazil
- LBA-ECO ND-11 Pre-harvest Forest Tree and Liana Biomass, NW Mato Grosso, Brazil: 2003
- LBA-ECO ND-11 Ecotone Vegetation Survey and Biomass, NW Mato Grosso, Brazil: 2004

2. Data Characteristics:

All surveys were performed in 2003 and 2004 within logging unit 5 of the logging concession at the Fazenda Rohsamar in the municipality of Juruena in northwestern Mato Grosso, Brazil. Each data file represents a one time survey.

In September/October of 2003, species and size distribution of natural regeneration were evaluated in primary forest in a 1,000 ha block of forest within an area of 25,000 ha which was scheduled to be logged. These survey results are reported in file:
 ND11_Regeneration_Inventory_Unlogged_Forest_MT_2003.csv

In January 2004, the effect of reduced impact logging treatments on the size and species distribution of regeneration six years after logging (1998) was measured in a 100 ha plot (see sampling map below). Half of the study area was managed using two reduced impact logging (RIL) treatments (either vines were cut before logging (RILVR) or no cutting of the vines (RILVI)) and the remaining 50 hectares was unlogged and used as a control.

All naturally regenerating trees and palms were classified into 3 size classes based on height and diameter (DBH): (1) height < 1.0 m, (2) height between 1.0 and 3.0 m, and (3) height > 3.0 m and DBH < 10 cm. These survey results are reported in file: **ND11_Regeneration_Inventory_Post-Logging_MT_2004.csv**

Carbon content and wood density was determined for the commercially valuable tree species characteristic of this forest. Samples of bole wood were collected from the base and upper end of the bole during a logging operation at the Fazenda Rohsamar. These results are reported in file: **ND11_Wood_and_Carbon_Density_MT.csv**

Three comma-delimited ASCII files are provided.Variables for each file are provided below:

Data File: ND11_Regeneration_Inventory_Unlogged_Forest_MT_2003.csv

Column	Column Heading	Units	Description
1	Plant_number		Plant number within Sample number
2	Common_name		Transect number
3	Family		
4	Date	YYYY/MM/DD	
5	Sample_number		Sample number along transect. Each sample represents an area X m2
6	Logging_unit		Logging unit ID, Unit 5
7	Block		Logging block within the logging unit
8	Transect		Transect number
9	Size_class		(1) height <1.0 m (2)height 1.0 to 3.0 m (3) height >3.0 m and DBH <10 cm
10	Herbaceous		Number of herbaceous plants encountered
11	Tree		Number of trees encountered
12	Epiphytes		Number of epiphytes encountered
13	Palms		Number of palms encountered
14	Total		Total numer of plants counted
15	Illumination		1= full sun, 2= partial light, 3=shady
16	Side		Side of the transect line +1 is the right of the transect line, -1 to the left

Example data record:

```
Header records omitted

Number,Common name,Family,Date,Sample number,Unit,Block,Transect,Size class,Herbaceous ,Tree,Epiphytes,Palms,Total,Illumination,Side,
1,Amescla-aroeira,Burseraceae,2003/09/23,1,5,8,1,1,0,18,0,0,18,2,1,
2,Cega-corrente,Moraceae,2003/09/23,1,5,8,1,1,0,1,0,0,1,2,1,
3,not identified 1,Not provided,2003/09/23,1,5,8,1,1,1,0,0,0,1,2,1,
...
11,Angelim-amargo,Fabaceae,2003/10/02,61,5,1,22,1,0,0,0,0,1,2,1,
12,Cega-corrente,Moraceae,2003/10/02,61,5,1,22,1,0,2,0,0,2,2,1,
13,Abiurana-folha pequena,Sapotaceae,2003/10/02,61,5,1,22,3,0,2,0,0,2,2,1,
```

Data File: ND11_Regeneration_Inventory_Post-Logging_MT_2004.csv

Column	Column Heading	Units	Description
1	ID_number		Each tree measured within a study sub-plot was given a unique id number
2	Month_year	MM-YY	Month and year of measurements
3	Common_name		
4	Scientific_name		
5	Family		
6	Life_form		Tree or palm
7	Transect		Transect id (x coordinate on the study area figure)
8	Sub_plot		Sub-plot id (y coordinate on the study area figure)
			RILVI= reduced impact logging in 1998 with vines left intact; RILVR= reduced impact

9	Treatment		logging in 1998 with vines cut prior to logging; CONT.= no logging
10	DBH	centimeters	Diameter at breast height (DBH) measured at 1.3 m height
11	Commercial_Ht	meters	Commercial height
12	Tree_Ht	meters	Total height
13	Canopy_position	meters	A= emergent, B= canopy, C= sub-canopy, D= mid-canopy, E=understory
14	Trunk_quality		A= emergent, B= average, C= poor, D= no commercial value
15	Observations		Field notes

Example data record:

Header records omitted

ID_number,Month_year,Common_name,Scientific_name,Family,Life_form,Transect,Sub_plot,Treatment,DBH,
Commercial_Ht,Tree_Ht,Canopy_position,Trunk_quality,Observations
1,Jan-04,Amescla-aroeira,Protium heptaphyllum,Burseraceae,tree,E,35,RILVI,47,8,18,C,A,None
2,Jan-04,Imbauba-branca,Cecropia sp,Cecropiaceae,tree,E,35,RILVI,37.5,9,12,C,A,None
3,Jan-04,Cega-corrente,Not provided,Moraceae,tree,E,35,RILVI,99,10,22,B,A,None
...
16,Jan-04,Amescla-aroeira,Protium heptaphyllum,Burseraceae,tree,W,15,CONT.,60,8,12,D,A,None
17,Jan-04,Amescla,Trattinickia sp.,Burseraceae,tree,W,15,CONT.,39,6,12,D,A,None
2,Jan-04,Cega-corrente,Not provided,Moraceae,tree,W,14,CONT.,128,10,26,A,B,None

Data File: ND11_Wood_and_Carbon_Density_MT.csv

Column Number	Column Heading	Units	Description
1	Number		Sample number
2	Common_name		Common species name
3	Repetition		Replicate number
4	Location		Location of bole sample: B=base, P=upper end of commercial bole near first branch; Cross-sectional location: center, mid-radius, and bark
5	Wet_weight	g	Sample wet weight
6	Dry_weight	g	Sample dry weight
7	Width	mm	Sample width
8	Height	mm	Sample height
9	Length	mm	Sample length
10	Humidity	%	Caclulated as the difference between wet weight and dry weight divided by total weight*100
11	Dry_mass	%	Caclulated as the sample dry weight divided by sample wet weight*100
12	Volume	cm3	Sample volume calculated as sample width* sample height*sample length/1000
13	Density	g/cm3	Sample density calculated as dry weight/sample volume
14	Sample_weight	mg	Sample used for carbon analysis, dry weight
15	Carbon_mass	mg	Mass of carbon in analytical sample calculated as carbon concentration*sample weight/1000
			Carbon concentration, dry weight. Determined by combustion at the

16		Carbon_concentration	g/kg	Wood Technology Laboratory at the Forest Engineering School (Faculdade de Engenharia de Engenharia Florestal) of the Universdade Federal do Estado de Mato Grosso

Example data record:

```
Header records omitted

Number,Common_name,Repetition,Location,Wet_weight,Dry_weight,Width,Height,Length,Humidity,Dry_mass,Volume,
Density,Sample_weight,Carbon_mass,Carbon_concentration
1,Angelim pedra,1,B- center,23.212,20.89,30.14,19.02,50,10,90,28.66,0.73,20.2,10.1,499.98
2,Angelim pedra,1,B- mid-radius,24.222,21.789,30,19.9,50.16,10.04,89.56,29.95,0.73,18.4,8.99,488.81
3,Angelim pedra,2,B- mid-radius,23.004,20.751,28.8,20.27,50.3,9.8,90.2,29.36,0.71,19,9.25,487.06
...
30,Angelim pedra,1,P-mid-radius,19.715,17.722,29.26,19,50.44,10.1,89.9,28.04,0.63,19.3,9.68,501.4
31,Angelim amargo,1,B- mid-radius,21.42,19.347,28.89,19.9,50.32,9.67,90.33,28.93,0.67,18.4,9.16,497.64
32,Angelim amargo,2***,B- mid-radius,21.625,19.347,29.15,19.61,50.32,8.19,91.81,28.76,0.67,19.5,9.48,486.25
```

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

Site (Region)	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude	Geodetic Datum
Mato Grosso - Juruena (Mato Grosso)	-58.75969	-58.75969	-10.42492	-10.42492	World Geodetic System, 1984 (WGS-84)

Time period:

- The data set covers the period 2003/09/23 to 2004/01/21.
- Temporal Resolution:One time sampling for each set of measurements

Platform/Sensor/Parameters measured include:

- VEGETATION SURVEY / HUMAN OBSERVER / FOREST COMPOSITION/VEGETATION STRUCTURE
- VEGETATION SURVEY / HUMAN OBSERVER / VEGETATION SPECIES
- FIELD INVESTIGATION / STEEL MEASURING TAPE / PLANT CHARACTERISTICS

3. Data Application and Derivation:

These data can be applied to model forest recovery and the effects of reduced impact logging, including species recover and carbon sequestration in undisturbed and logged forests.

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:

Regeneration was evaluated in 2003 in a primary forest in a 1,000 ha block of forest in an area of 25,000 ha which was going to be logged. Regenerating stems were classified into 3 size classes (1) height <1.0m; (2) height 1.0 to 3.0 m; (3) height >3.0 m and diameter at breast height (DBH) <10 cm. The area surveyed around a given tree (plot size) varied with tree size class: for the smallest size class plots were 2 x 2 m, for the intermediate size class plots were 5 x 5 m and for the largest size class plots were 5 x 10 m. Diameter and species identification for each stem was recorded. Relative natural regeneration index was determined by the sum of the relative frequency, relative density and relative size class. A total of 123 species were measured including 111 tree species and 12 palm species with 38 species not identified though 5 of those were identified to family.

In January 2004, the effects of silvicultural treatments on the forest structure were measured by surveying plots in a 100 ha area of which half (50 ha) had been logged using a reduced impact management regime 6 years earlier (1998). Within the treatment area (logged) there were two different management schemes each applied to half the treatment area: vines were cut before logging (RILVR), and no cutting of the vines (RILVI), the unlogged half of the area was considered a control treatment. Trees and palms that had regenerated since the logging treatment were categorized into 3 classes: height < 1.0m; 1.0 > height < 3.0 m; height > 3.0 m and diameter at breast height (DBH) < 10 cm. The area surveyed around a given tree (plot size) varied with tree size class: for the smallest size class plots were 2 x 2 m, for the intermediate size class plots were 5 x 5 m and for the largest size class plots were 5 x 10 m. Diameter and species identification for each stem was recorded .

Carbon content and wood density was determined for commercially valuable tree species characteristic of this forest. Cross-sectional discs were cut from tree trunks which were located in the landing of the logging operation wood samples at the Fazenda Roshamar, in the municipality of Juruena. From each species analyzed samples were taken from two different positions on the stem: base and top of commercial bole and three tangential positions within the disc; center, mid-radius and bark. Mass, carbon content (g kg-1) and density based on dry weight were determined for each

sample at the Wood Technology Laboratory at the Forest Engineering School (Faculdade de Engenharia Florestal) of the Univerisdade Federal do Estado de Mato Grosso.
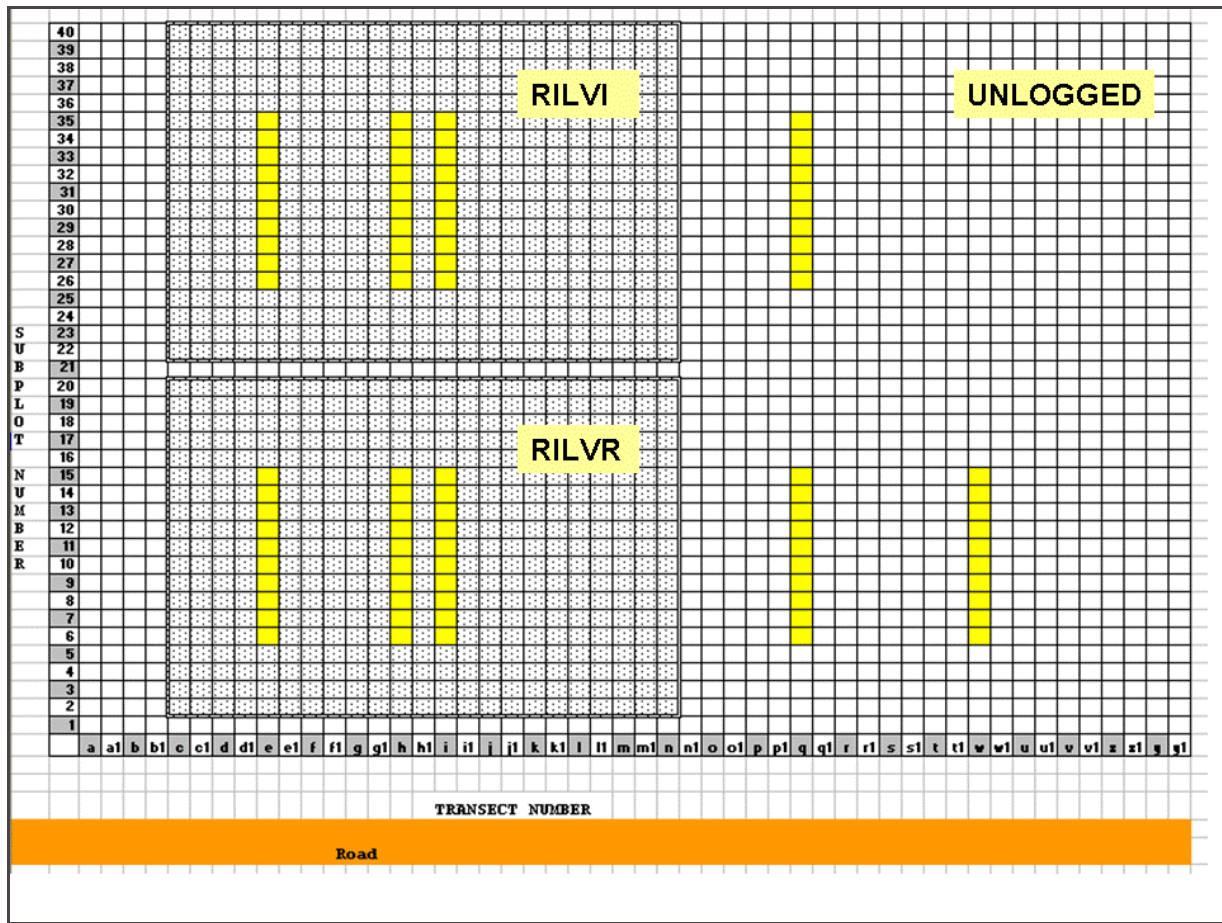
Schematic diagram of study area showing the treatment area (logged), where different management schemes were applied to half of the treatment area: vines were cut before logging (RILVR), and no cutting of the vines (RILVI), the unlogged half of the area was considered a control treatment. The table below shows selected plot location coordinates (lower left corner) within the transects. UTM Zone 21S.

X-axis Transect number	Y-axis Subplot number	UTM X-axis	UTM Y-axis
A	1	334873	8833514
A	2	334883	8833548
A	3	334869	8833570
A	4	334865	8833602
B	1	334919	8833530
B	4	334908	8833606
C	1	334968	8833506
C	2	334939	8833550
C	4	334951	8833602

6. Data Access:

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

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

Related Publications

- Gandini, Elenara. 2006. Natural regeneration in gaps within an open Umbriferous forest in the southern region of Amazonia, under a reduced impact logging management regime. Dissertation for a Masters degree in Tropical Agriculture. Universidade Federal de Mato Grosso, Brazil.